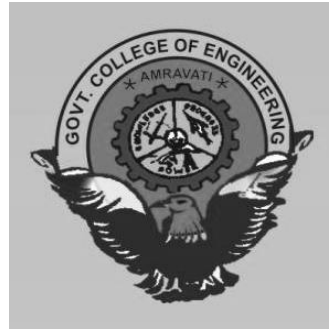


GOVT. COLLEGE OF ENGINEERING AMRAVATI

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING



PROPOSED CURRICULUM

Of

FINAL YEAR

B. TECH. (Computer Science and Engineering)

2022- 2023

Semester I

Teaching Scheme							Evaluation Scheme						
Category	Course Code	Course Title	Theory	Tutorial	Practical		Theory			Practical		Total	Credits
			Hrs/week	Hrs/week	Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
MC	SHU100	Induction Program	Two weeks mandatory audit course										0
BSC	SHU121	Physics	3	1	---	4	30	10	60	---	---	100	4
BSC	SHU122	Calculus and Linear Algebra	3	1	---	4	30	10	60	---	---	100	4
ESC	EEU121	Basic Electrical Engineering	3	---	---	3	30	10	60	---	---	100	3
ESC	CEU121	Engineering Mechanics	3	---	---	3	30	10	60	---	---	100	3
HSMC	SHU123	English	2	---	---	2	---	---	60	---	---	60	2
BSC/LC	SHU124	Physics Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	EEU122	Basic Electrical Engg Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	CEU122	Engineering Mechanics Lab	---	---	2	2	---	---	---	50	---	50	1
HSMC/LC	SHU125	English Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	MEU121	Workshop Practice I	---	---	2	2	---	---	---	50	---	50	1
		Total	14	2	10	26	120	40	300	250	0	710	21

Semester II

Teaching Scheme							Evaluation Scheme						
Category	Course Code	Course Title	Theory	Tutorial	Practical		Theory			Practical		Total	Credits
			Hrs/week	Hrs/week	Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
BSC	SHU221	Chemistry	4	--	---	4	30	10	60	---	---	100	4
BSC	SHU222	Integral calculus and differential equations	3	1	---	4	30	10	60	---	---	100	4
ESC	CSU221	Programming for Problem solving	3	---	---	3	30	10	60	---	---	100	3
ESC	MEU221	Engineering Graphics	2	---	---	2	30	10	60	---	---	100	2
ESC	MEU222/ETU221	Basic Mechanical Engineering/ Basic Electronics Engineering	2	---	---	2	30	10	60	---	---	100	2
BSC/LC	SHU223	Chemistry Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	CSU222	Programming for Problem solving Lab	---	---	4	4	---	---	---	50	---	50	2
ESC/LC	MEU223	Engineering Graphics Lab	---	---	4	4	---	---	---	50	---	50	2
ESC/LC	MEU224	Workshop Practice II	---	---	2	2	---	---	---	50	---	50	1
		Total	14	1	12	27	150	50	300	200	0	700	21

TA: Teacher Assessment MSE: Mid Semester Examination ESE: End Semester Examination ICA: Internal Continuous Assessment MSE Duration: 1.30 Hrs all courses
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Important Note:

MEU222 for only Electrical, Electronics & TC, Computer Science, Information Technology and Instrumentation Engineering branch

ETU221 for only Civil and Mechanical Engineering branch

In Semester I, the students of Civil, Mechanical, Electrical & Instrumentation Engineering shall be offered group A courses, and that of

Electronics & TC, Computer Science and Information Technology shall be offered group B courses. In Semester II, vice versa.

There should be direct correspondence of group A and group B courses.

Sr. No.	Group A Courses		Group B Courses		
	Course Code	Title of Course	Course Code	Title of Course	
1	SHU121	Physics	SHU221	Chemistry	
2	EEU121	Basic Electrical Engineering	CSU221	Programming for Problem solving	
3	CEU121	Engineering Mechanics	MEU221	Engineering Graphics	
4	SHU123	English	SHU223	Chemistry Lab	
5	SHU124	Physics Lab	CSU222	Programming for Problem solving Lab	
6	EEU122	Basic Electrical Engineering Lab	MEU223	Engineering Graphics Lab	
7	CEU122	Engineering Mechanics Lab			
8	SHU125	English Lab			
Category of Course		Definition		Credits	
BSC		Basic Science Courses		18	
ESC		Engineering Science Courses		21	
HSMC		Humanities and Social Sciences including Mgt.Courses		3	
				Total Credits	42

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVTI.
Department of Computer Science & Engineering
Scheme for B. Tech. (Computer Science & Engineering)

SEM III

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
			Theory Hrs	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
ESC	ETU331	Analog and Digital Integrated Circuit	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU321	Data Structure & Algorithms	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU322	Discrete Mathematics	3	--	-	3	30	10	60	--	--	100	3
BSC	SHU321B *SHU322B	Transform and Linear Algebra Differential Equation and Transform	3	1	-	4	30	10	60	--	--	100	4
MC	SHU323	Introduction to Constitution of India	1	--	-	1	--	20	30	--	---	50	0
HSMC	SHU324	Effective Technical Communication	0	--	-		30	10	60	--	--	100	3
ESC-LC	ETU332	Analog and Digital Integrated Circuit Lab	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU323	Data Structure & Algorithms Lab	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU324	IT Workshop (Sci Lab/MATLAB)	1	--	4	4	--	--	--	50	50	100	3
Total			14	1	12	12	150	70	330	100	100	750	23

SEM IV

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
			Theory Hrs	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
PCC	CSU421	Object Oriented Programming	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU422	Computer Organization	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU423	Operating System	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU424	Design and Analysis of Algorithms	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU425	Organizational Behavior		---	---	3	30	10	60	---	---	100	3
MC	SHU422	Environmental Sciences	1	--	-	1	--	20	30	--	--	50	0
PCC	CSU 426	Object Oriented Programming Lab	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU427	Computer Organization	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU428	Operating Systems Lab	1	--	4	4	--	--	--	50	50	100	3
Total			14	--	12	28	150	70	330	100	100	750	23

SEM V

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
							Theory			Practical		Total	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
PCC	CSU521	Database management systems	3	--	--	3	30	10	60			100	3
PCC	CSU522	Formal Language and Automata Theory	3	1	--	4	30	10	60			100	4
PCC	CSU523	Java and Python Programming	3	---	---	3	30	10	60			100	3
PCC	CSU524	Computer Networks	3	---	---	3	30	10	60			100	3
PEC	CSU525	Program Elective-I	3	---	---	3	30	10	60			100	3
PCC-LC	CSU526	Database management systems Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU527	Java and Python Programming Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU528	Computer Networks Lab	---	---	4	4	---	---	---	25	25	50	2
Total			15	1	12	28	150	50	300	75	75	650	22

SEM VI

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
							Theory			Practical		Total	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
PCC	CSU621	Compiler Design	3	---	---	3	30	10	60			100	3
PCC	CSU622	Software Engineering	3	---	---	3	30	10	60			100	3
PEC	CSU623	Program Elective-II	3	---	---	3	30	10	60			100	3
PEC	CSU624	Program Elective-III	3	---	---	3	30	10	60			100	3
OEC	CSU633	Open Elective-I	3	---	---	3	30	10	60			100	3
PCC-LC	CSU626	Compiler Design Lab	--	--	4	4				25	25	50	2
PCC-LC	CSU627	Minor Project	--	--	4	4				25	25	50	3
Total			15		8	23	150	50	300	50	50	600	20

SEM VII

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
							Theory			Practical		Total	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
PCC	CSU721	Digital Signal Processing	3	---	---	3	30	10	60			100	3
PCC	CSU722	Cyber Security	3	---	---	3	30	10	60			100	3
PCC	CSU723	Software Project Management	3	---	---	3	30	10	60			100	3
PEC	CSU724	Program Elective-IV	3	---	---	3	30	10	60			100	3
OEC	CSU733	Open Elective-II	2	---		2	30	10	60			100	3
PROJ	CSU726	Seminar	---	---	2	2				50	---	50	1
BSC	SHU725	Human Values and Ethics	1			1		20	30			50	0
Total			16		2	18	150	70	330	50	---	600	16

SEM VIII

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
							Theory			Practical		Total	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
PEC	CSU821	Program Elective-V	3	---	---	3	30	10	60			100	3
PEC	CSU822	Program Elective-VI	3	---	---	3	30	10	60			100	3
PROJ	CSU823	A. Project OR B. Industry Internship Project	---	---	24	24	---	---	---	200	200	400	12
Total			5		24	29	60	20	120	200	200	600	18

Note: Students going for internship at Industry will complete theory courses through online platform such as MOOCs, NPTEL etc or by self-study mode and will either directly appear for ESE only (Total Internal Marks (CT1+CT2) will be awarded proportional to marks secure in ESE) or they can appear for CT1 and CT2. TA marks will be awarded as per industrial project performance.

BSC Basic Science Courses
 PEC Professional Elective courses
 HSMC Humanities and Social Sciences including Management courses
 LC Laboratory course
 SI Summer Industry Internship

PCC Professional core courses
 ESC Engineering Science Courses
 OEC Open Elective courses
 MC Mandatory courses
 PROJ Project

Program Elective Courses

Program Elective-I (CSU525)	Program Elective-II (CSU623)	Program Elective-III (CSU624)	Program Elective-IV (CSU724)	Program Elective-V (CSU821)	Program Elective-VI (CSU822)
(A) Graph Theory	(A) Advanced Algorithms	(A) Parallel and Distributed Algorithms	(A) Computational Complexity	(A) Computational Geometry	(A) Queuing Theory and Modelling
(B) System Analysis & Design	(B) Distributed Systems	(B) Embedded Systems	(B) Low Power VLSI Circuits and Systems	(B) Advanced Operating Systems	(B) Fault Tolerant Computing
(C) Artificial Intelligence	(C) Machine Learning	(C) Data Mining	(C) Soft Computing	(C) Speech and Natural Language Processing	(C) Data Analytics
(D) Electronic Design Automation	(D) Computer Graphics	(D) Cloud Computing	(D) Human Computer Interaction	(D) Internet of Things	(D) Image Processing

Open Elective Courses (To be offered by Computer Science and Engineering Department)

Open Elective-I (CSU633)	Open Elective-II (CSU733)
Web Designing	Introduction to Computer Network
Data structure and Algorithm	Introduction to Database

Department of COMPUTER SCIENCE & ENGINEERING

Equivalence Scheme

Programme Name: - Computer Science & Engineering

Sr. No.	Course code with Name of course(old)	Credit	Course code with Name of course (new)	Credit
1	CSU701 System Software	3	CSU721 Compiler Design	3
2	CSU702 Microprocessor and Interfacing	3	No Equivalence	
3	CSU703 Elective –I: A) Advanced Computer Architecture	3	No Equivalence	
	B) Embedded System		CSU624(B) Embedded System	3
	C) Multimedia Technology		No Equivalence	
	D) Internet Technology		No Equivalence	
	E) Artificial Intelligence		CSU525(C) Artificial Intelligence	3
4	CSU704 Interdisciplinary Elective A) Nanotechnology	3	No Equivalence	
	B) Software Engineering		CSU622 Software Engineering	3
	C) Network Security		CSU725 Introduction to Network Security	3
5	CSU705 System Software Lab	1	CSU626 Compiler Design Lab	2
6	CSU706 Microprocessor and Interfacing Lab	1	No Equivalence	
7	CSU707 Elective –I Lab	1	No Equivalence	
8	CSU708 Project Phase I	2	No Equivalence	
9	CSU709 Seminar	2	CSU726 Seminar	1
10	CSU710 Industrial Training / Visit	1	No Equivalence	
11	CSU711 Industrial Lecture II	1	No Equivalence	
12	CSU712 Self Study III	2	No Equivalence	

Sr. No.	Course code with Name of course(old)	Credit	Course code with Name of course (new)	Credit
13	CSU801 Operation Research and Management	3	No Equivalence	
14	CSU802 Digital Signal Processing	3	CSU721 Digital Signal Processing	3
15	CSU803 Elective -II	3		
	A) Modeling and Simulation		No Equivalence	
	B) Parallel Computing	3	No Equivalence	
	C) Advanced Database Management System	3	No Equivalence	
	D)Artificial Neural Network	3	No Equivalence	
	E) Bioinformatics	3	No Equivalence	
16	CSU804 Elective-III			
	A) Distributed Operating Systems		No Equivalence	
	B) Natural Language Processing		CSU821 Program Elective –V (C) Speech and Natural Language Processing	3
	C) Robotics		No Equivalence	
	D) Advanced Web Technology		No Equivalence	
	E) Computer Graphics		Program Elective-II CSU623(D) Computer Graphics	3
17	CSU805 Operation Research and Management Lab		No Equivalence	
18	CSU806 Digital Signal Processing Lab		No Equivalence	
19	CSU807 Elective –II Lab		No Equivalence	
20	CSU808 Project phase - II		No Equivalence	
21	No Equivalence		CSU722 Cyber Security	3
22	No Equivalence		CSU724 Program Elective-IV	3
			(A)Computational Complexity	
			(B) Low Power VLSI Circuits and Systems	
			(C) Soft Computing	
			(D) Human Computer Interaction	

Sr. No.	Course code with Name of course(old)	Credit	Course code with Name of course (new)	Credit
23	No Equivalence		CSU725 Open Elective-II	3
			(B) Introduction to Database	
25	No Equivalence		CSU821 Program Elective-V	3
			(A)Computational Geometry	
			(B)Advanced Operating Systems	
			(D) Internet of Things	
26	No Equivalence		Program Elective-VI (CSU822)	3
			(A)Queuing Theory and Modelling	
			(B)Fault Tolerant Computing	
			(C)Data Analytics	
			(D) Image Processing	

CSU721 DIGITAL SIGNAL PROCESSING

Teaching Scheme: 03 T **Total: 03**
Evaluation Scheme: 30MSE +10 TA+ 60 ESE
Duration of ESE: 2hrs.30min.

Credits: 03
Total Marks: 100

Course Objectives:

- I. To study about discrete time systems.
- II. To learn about DSP algorithms for convolution, correlation, DFT, FFT etc.
- III. To make students aware about the meaning and implications of the properties of systems and signals.
- IV. To make students familiar with the most important methods in DSP, including digital filter design.

Discrete Time Signals: Introduction to DSP, Advantages, basic elements of DSP system, Elementary discrete-time sequences.

Discrete Time Systems: Description, representation, classification (linear versus non linear, time-invariant versus time variant, static versus dynamic, casual versus non causal , stable versus unstable)

LTI systems: The convolution sum, properties of convolution, Analysis of causal LTI systems, stability of LTI systems, step response of LTI systems, difference equation, solution of difference equations, Impulse response of LTI recursive system, Correlation of discrete time signals and types.

Fourier Transforms: Definition & properties of Fourier transform, Finite duration sequences and the discrete Fourier transform (DFT), properties, circular convolution, Fast algorithms for the computation of DFT: radix-2 algorithms, Bit Reversal Algorithm.

Z- Transform: Definition of Z- Transform, properties, rational Z-Transforms, evaluation of the inverse Z- Transforms, analysis of linear time invariant systems in Z-domain, transient and steady-state responses, causality, stability, pole-zero cancellation, relation with Fourier transform.

Digital Filters: Classification (LP, HP, BP, FIR and IIR filters), filter specifications, Impulse invariant transformation and bilinear transformation, Commonly used Analog filters and IIR Filter design example, Structures for realization of Discrete-Time systems.

Realization of FIR and IIR Systems: Direct Form, Cascade Form, Signal flow graph and Transposed structures, Cascade form, Lattice and Lattice-ladder.

Text Book:

1. Digital Signal Processing: Principles Algorithms and Applications, J G Proakis and D G Manolakis, 3rd Edition, Pearson Education Pvt .Ltd, 1996.

Reference Books:

1. Digital Signal Processing: A Computer-Based Approach by S K Mitra, 3rd Edition Tata McGraw Hill Publish Co. Ltd., 2001.
2. Digital Signal Processing a Practical Approach, E C Ifeachor and B W Jervis, 1st Edition, Pearson Education, 2002.
3. Discrete Time Signal Processing, A V Oppenheim, R W Schafer with J RBuck, 2nd Edition (PHI), 2005.

Course Outcomes:**On completion of course, the students will be able to:**

CSU 721.1 Use concepts of trigonometry, complex algebra, Fourier transform, z-transform to analyse the operations on signals and acquire knowledge about systems.

CSU721.2 Design, implementation, analysis and comparison of digital filters for processing of discrete time signals.

CSU721.3 Integrate computer-based tools for engineering applications.

CSU721.4 Employ signal processing strategies at multidisciplinary team activities.

CSU721.5 Assess the techniques, skills, and modern engineering tools necessary for analysis of different electrical signals and filtering out noise signals in engineering practice. Also develop creative and innovative designs that achieve desired performance criteria within specified objectives and constraints, understand the need for lifelong learning and continuing professional education.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU721.1	3	3	2	1	1	0	0	0	0	0	0	1	3	1	2
CSU721.2	3	2	3	1	3	0	0	0	0	0	0	1	3	1	3
CSU721.3	3	3	2	1	1	0	0	0	0	0	0	1	3	1	2
CSU721.4	2	2	2	1	1	0	0	1	3	1	0	1	2	1	1
CSU721.5	3	2	3	1	1	0	0	0	0	0	0	3	3	3	1

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU722 CYBER SECURITY

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objective

- I. To Understand key terms and concepts in Cryptography
- II. Exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an Organization
- III. Practice with an expertise in academics to design and implement security solutions
- IV. Develop cyber security strategies and policies

Introduction: Basic objectives of cryptography, secret-key and public-key cryptography, one-way and trapdoor one-way functions, cryptanalysis, attack models, classical cryptography.

Block ciphers: Modes of operation, DES and its variants, RCS, IDEA, SAFER, FEAL, BlowFish, AES, linear and differential cryptanalysis.

Stream ciphers: Stream ciphers based on linear feedback shift registers, SEAL, unconditional security.

Message digest: Properties of hash functions, MD2, MD5 and SHA-1, keyed hash functions, attacks on hash functions.

Public-key parameters: Modular arithmetic, gcd, primality testing, Chinese remainder theorem, modular square roots, finite fields. Design and Implementation of Security solution .

Public-key encryption: RSA, Rabin and ElGamal schemes, side channel attacks.

Digital signatures: RSA, DSA and NR signature schemes, blind and undeniable signatures.

Text Books

1. Handbook of Applied Cryptography, Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, CRC Press.
2. Cryptography and Network Security: Principles and Practice, William Stallings, Prentice Hall of India.

References

1. A course in number theory and cryptography, Neal Koblitz, Springer.
2. Introduction to Cryptography, Johannes A. Buchmann, Undergraduate Text in Mathematics, Springer.
3. Cryptography Theory and Practice, Doug Stinson, CRC Press.
4. Public-Key Cryptography: Theory and Practice, Das and C. E. Veni Madhavan, Pearson Education

Course Outcome:

On completion of course, the students will be able to:

CSU722.1 Analyse and Evaluate the cyber security needs of an organization

CSU 722.2 Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools

CSU 722.3 Design and develop a security architecture for an organization

CSU 722.4 Determine and analyse software vulnerabilities and security solutions to reduce the risk of exploitation

CSU722.5 Synthesize the Application by using encryption algorithm

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU722.1	3	2	0	2	0	0	1	0	0	0	0	0	3	0	0
CSU722.2	3	2	0	1	0	0	2	0	0	0	0	0	3	0	0
CSU722.3	3	2	2	0	2	1	0	0	0	0	0	2	2	2	0
CSU722.4	1	1	3	2	2	0	0	2	1	0	0	0	0	2	3
CSU722.5	3	2	3	1	3	0	0	0	0	0	0	1	3	1	3

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 723 SOFTWARE PROJECT MANAGEMENT

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course objective:

- I. To understand the Software Project Planning and Evaluation techniques.
- II. To plan and manage projects at each stage of the software development life cycle (SDLC).
- III. To learn about the activity planning and risk management principles.
- IV. To manage software projects and control software deliverables.
- V. To develop skills to manage the various phases involved in project management and people management.
- VI. To deliver successful software projects that support organization's strategic goals.

PROJECT EVALUATION AND PROJECT PLANNING:

Importance of Software Project Management Activities Methodologies Categorization of Software Projects Setting objectives Management Principles Management Control Project portfolio Management Cost-benefit evaluation technology Risk evaluation Strategic program Management Stepwise Project Planning.

PROJECT LIFE CYCLE AND EFFORT ESTIMATION:

Software process and Process Models Choice of Process models Rapid Application development Agile methods Dynamic System Development Method Extreme Programming Managing interactive processes Basics of Software estimation Effort and Cost estimation techniques COSMIC Full function points COCOMO II a Parametric Productivity Model.

ACTIVITY PLANNING AND RISK MANAGEMENT:

Objectives of Activity planning Project schedules Activities Sequencing and scheduling Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning – Risk Management – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

PROJECT MANAGEMENT AND CONTROL:

Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

STAFFING IN SOFTWARE PROJECTS:

Managing people – Organizational behaviour – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and

Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

TEXT BOOK:

1. Software Project Management, Bob Hughes, Mike Cotterell and Rajib Mall, Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

REFERENCES:

1. Effective Software Project Management, Robert K. Wysocki, Wiley Publication, 2011.
2. Software Project Management, Walker Royce, Addison-Wesley, 1998.
3. Managing Global Software Projects, Gopalaswamy Ramesh, McGraw Hill Education (India), Fourteenth Reprint 2013.

Program Outcomes:

On completion of course, the students will be able to

- CSU723.1 Understand Project Management principles while developing software.
- CSU723.2 Gain extensive knowledge about the basic project management concepts, framework and the process models.
- CSU723.3 Obtain adequate knowledge about software process models and software effort estimation techniques.
- CSU723.4 Estimate the risks involved in various project activities.
- CSU723.5 Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU723.1	3	2	1	1	2	0	2	0	0	1	0	0	2	2	0
CSU723.2	3	2	1	1	2	0	2	0	0	1	0	0	2	2	0
CSU723.3	3	2	1	3	2	0	2	0	0	1	0	0	2	2	1
CSU723.4	3	2	1	1	2	0	2	0	0	1	0	0	2	2	0
CSU723.5	3	2	1	1	2	0	2	0	0	1	0	0	2	2	1

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU724 PROGRAM ELECTIVE-IV
A) COMPUTATIONAL COMPLEXITY

Teaching Scheme: 03T + 00TU

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. Capability to communicate conclusions, knowledge and rationale for carrying these to both skilled and unskilled public in a clear and unambiguous way.
- II. Capability to apply the scientific method to study and analyse of phenomena and systems in any area of Computer Science.
- III. Capacity for mathematical modelling, calculation and experimental designing in technology particularly of research and innovation.
- IV. Capacity for abstraction to create and use models that reflect real situations.

Introduction. Easy and hard problems. Algorithms and complexity. **Turing machines.** Models of computation. Multi-tape deterministic and non-deterministic Turing machines. Decision problems. **The Halting Problem and Undecidable Languages.** Counting and diagonalisation. Tape reduction. Universal Turing machine. Undecidability of halting. Reductions. Rice's theorem.

Deterministic Complexity Classes. DTIME[t]. Linear Speed-up Theorem. PTime. Polynomial reducibility. Polytime algorithms: 2-satisfiability, 2-colourability.

NP and NP-completeness. Non-deterministic Turing machines. NTIME[t]. NP. Polynomial time verification. NP-completeness. Cook-Levin Theorem. Polynomial transformations: 3-satisfiability, clique, colourability, Hamilton cycle, partition problems. Pseudo-polynomial time. Strong NP-completeness. Knapsack. NP-hardness.

Space complexity and hierarchy theorems. DSPACE[s]. Linear Space Compression Theorem. PSPACE, NPSPACE. PSPACE = NPSPACE. PSPACE-completeness. Quantified Boolean Formula problem is PSPACE-complete. L, NL and NL-completeness. NL=coNL. Hierarchy theorems.

Optimization and approximation. Combinatorial optimisation problems. Relative error. Bin-packing problem. Polynomial and fully polynomial approximation schemes. Vertex cover, travelling salesman problem, minimum partition. **Randomized Complexity.** The classes BPP, RP, ZPP. Interactive proof systems: IP = PSPACE.

Text Book

1. Introduction to the Theory of Computation, M Sipser second edition - Thomson Course Technology, 2005.
2. Computational Complexity, Arora, Barak Cambridge University Press, 2009.

Reference Book

1. Complexity Theory, I Wegener. Springer, 2005.
2. Introduction to Algorithms, T H Cormen, S Clifford, C E Leiserson and R L Rivest. MIT Press, Second edition, 2001.
3. Computational Complexity, Oded Goldreich. Cambridge University press, 2001
4. Approximation Algorithms, Vijay V. Vazirani. Springer, Second edition, 2003.

Course Outcome

On completion of course, the students will be able to

CSU724 (A).1 Classify decision problems into appropriate complexity classes, including P, NP, PSPACE and complexity classes based on randomised machine models.

CSU724 (A).2 State precisely what it means to reduce one problem to another, and construct reductions for simple examples.

CSU724 (A).3 Classify optimisation problems into appropriate approximation complexity classes.

CSU724 (A).4 Use the concept of interactive proofs in the analysis of optimisation problems.

CSU724 (A).5 Define the recurring methods used to prove the relationship between complexity classes.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU724 (A).1	3	3	2	2	0	0	0	0	0	1	0	1	3	1	0
CSU724 (A).2	3	3	2	0	2	0	0	0	0	1	0	1	2	1	0
CSU724 (A).3	3	3	2	2	0	0	0	0	0	1	0	1	3	1	0
CSU724 (A).4	3	3	2	0	2	0	0	0	0	1	0	1	2	1	0
CSU724 (A).5	3	2	0	2	0	0	0	0	0	1	0	1	2	1	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 724 PROGRAM ELECTIVE-IV
B) LOW POWER VLSI CIRCUITS AND SYSTEMS

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2 Hours 30 Minutes

Course Objectives

- I. Addresses a profound analysis on the development of the CMOS & Bi-CMOS digital circuits for a low voltage low power environment.
- II. To study the concepts of device behaviour and modelling.
- III. To study the concepts of low voltage, low power logic circuits.

INTRODUCTION TO CMOS LOGIC: The Inverter, The NAND Gate, CMOS Logic Gates, NOR Gate, Compound Gates, Pass Transistors and Transmission Gates, Tristates, Multiplexers, Sequential Circuits, **CMOS Fabrication Layout:** Inverter Cross Section, Fabrication Process, Layout Design Rules, Gate Layouts, Stick Diagrams

MOS TRANSISTOR THEORY: Simple MOS Capacitance Models, Detailed MOS Gate Capacitance Model, Detailed MOS Diffusion Capacitance Model, **Nonideal I-V Effect:** Mobility Degradation and Velocity Saturation, Channel Length Modulation, Threshold Voltage Effects, Leakage, Temperature Dependence, Geometry Dependence.

CMOS PROCESSING TECHNOLOGY: Wafer Formation, Photolithography, Well and Channel Formation, Silicon Dioxide, Isolation, Gate Oxide, Gate and Source/Drain Formation, Contacts and Metallization, Passivation, Metrology, **Layout Design Rules:** Design Rule Background, Scribe Line and Other Structure, MOSIS Scalable CMOS Design Rules, Micron Design Rules.

POWER: Definition, Examples, Sources of Power Dissipation, **Dynamic Power:** Activity Factor, Capacitance, Voltage, Frequency, Short-Circuit Current, Static Power Sources, Power Gating, Multiple Threshold Voltages and Oxide Thicknesses, Variable Threshold Voltages, Input Vector Control, **Energy Delay Optimization:** Minimum Energy, Minimum Energy-Delay Product, Minimum Energy Under a Delay Constraint, **Low Power Architectures:** Microarchitecture, Parallelism and pipelining, Power Management Modes.

COMBINATIONAL CIRCUIT DESIGN: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass-Transistor Circuits. Circuit Pitfalls: Threshold Drops, Ratio Failures, Leakage, Charge Sharing, Power Supply Noise, Hot Spots. Silicon-On-Insulator Circuit Design: Floating Body Voltage, SOI Advantages, SOI Disadvantages, Implications for Circuit Styles.

SEQUENTIAL CIRCUIT DESIGN: Sequential Methods, Max-Delay Constraints, Min-Delay Constraints, Time Borrowing, Clock Skew, Conventional CMOS Latches, Conventional CMOS Flip-Flops, Pulsed Latches, Resettable Latches and Flip-Flops, Enabled Latches and Flip-Flops, Incorporating Logic into Latches, Klass Semi dynamic Flip-Flop, Differential Flip-Flop, Dual Edge-Triggered Flip-Flop, Radiation-Hardened Flip-Flop, True Single-Phase-Clock Latches and Flip Flops.

Text Book:

1. CMOS VLSI Design A circuit and System Perspective, Neil H. E. Weste, David Money Harris Forth Edition, Pearson Education, 2011.

Reference Books:

1. Digital Integrated Circuits, J.Rabaey, PH. N.J 1996, 2nd Edition.
2. CMOS Digital ICs, Sung-mokang and yusufleblebici, TMH, 3rdedition, 2003.
3. VLSI DSP Systems, Parhi, John Wiley & sons, 2003 Reprint.
4. IEEE Trans Electron Devices, IEEE J.Solid State Circuits, and other National and International Conferences and Symposia.

Course Outcomes:

On completion of course, the students will be able to:

- CSU724 (B).1** Capability to recognize advanced issues in VLSI systems, specific to the deep-submicron silicon technologies.
- CSU724 (B).2** Understand deep sub-micron CMOS technology and digital CMOS design styles.
- CSU724 (B).3** Design chips used for battery-powered systems and high performance circuits.
- CSU724 (B).4** Utilize logic simulation methods to design Low Power VLSI circuits.
- CSU724 (B).5** Implement practical and state of the art Low Power VLSI design, suitable for real life and Industry applications.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU724 (B).1	3	2	1	2	2	0	0	0	0	0	0	1	3	1	1
CSU724 (B).2	3	2	1	2	2	0	0	0	0	0	0	1	3	1	1
CSU724 (B).3	3	2	3	2	3	0	0	0	0	0	0	1	3	1	3
CSU724 (B).4	3	2	3	2	3	0	0	1	0	0	0	1	3	1	3
CSU724 (B).5	3	3	2	2	3	0	1	0	0	0	0	1	3	1	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU724 PROGRAM ELECTIVE-IV
C) SOFT COMPUTING

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course objective:

- I.** To gain a historical perspective of Soft Computing and its foundations.
- II.** To become familiar with basic principles of Evolutionary algorithms.
- III.** To provide the mathematical background for carrying out the optimization associated with neural network learning.
- IV.** To develop some familiarity with current research problems and research methods in Soft Computing by working on a research or design project.

Introduction to Soft Computing: Concept of computing systems. "Soft" computing versus "Hard" computing Characteristics of Soft computing Some applications of Soft computing techniques.

Genetic Algorithms: Concept of "Genetics" and "Evolution" and its application to probabilistic search techniques Basic GA framework and different GA architectures. GA operators: Encoding, Crossover, Selection, Mutation, etc. Solving single-objective optimization problems using GAs..

Artificial Neural Networks: Biological neurons and its working. Simulation of biologicalneurons to problem solving. Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function NetworksReinforcement Learning, Unsupervised Learning Neural Networks, Applications of ANNs to solve some real life problems.

Recent Trends: Advances in Neural networks and genetic algorithm, Study of neural network toolbox, Simple implementation of Artificial Neural Network, Recurrent Neural Network, Convolutional Neural Network.

Text Book

1. Neural Networks, Fuzzy Logis and Genetic Algorithms : Synthesis, and Applications, S. Rajasekaran, and G. A. Vijayalakshmi Pai, Prentice Hall of India, 2007.

Reference Book

1. An Introduction to Genetic Algorithms, Melanie Mitchell, MIT Press, 2000.
2. Genetic Algorithms In Search, Optimization And Machine Learning, David E. Goldberg, Pearson Education, 2002.
3. Practical Genetic Algorithms, Randy L. Haupt and sue Ellen Haupt, John Willey & Sons, 2002.
4. Soft Computing, D. K. Pratihar, Narosa, 2008.
5. Neuro-Fuzzy and soft Computing, J.-S. R. Jang, C.-T. Sun, and E. Mizutani, PHI Learning, 2009.
6. Neural Networks and Learning Machines, (3rd Edn.), Simon Haykin, PHI Learning, 2011

Course outcomes:

On completion of course, the students will be able to:

CSU 724(C) .1. Demonstrate fundamental understanding of Evolutionary algorithms, ANN and its foundations.

CSU 724(C) 2. Apply basic principles of soft computing and its applications.

CSU 724(C).3 Solving single-objective optimization problems using GAs.

CSU 724(C).4 Determine the application of ANN and Implementation of various ANN Classifier

CSU 724(C).5 Differentiate between Genetic Algorithm (GA) And Artificial Neural Network Algorithms

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU724 (C).1	3	2	0	1	0	0	0	0	0	0	1	0	3	0	0
CSU72(C).2	3	2	0	1	0	0	0	0	0	0	0	0	3	0	0
CSU722 (C).3	3	2	0	2	0	1	0	0	0	0	0	0	2	3	0
CSU722(C).4	2	2	3	1	3	0	0	0	2	0	1	0	0	3	3
CSU722(C).5	3	3	2	2	0	0	0	0	0	1	0	1	3	1	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

**CSU 724 PROGRAM ELECTIVE-IV
D) HUMAN COMPUTER INTERACTION**

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. Provide an overview of the concepts relating to the design of human-computer interfaces in ways making computer-based systems comprehensive, friendly and usable.
- II. Identify the impact of usable interfaces in the acceptance and performance utilization of information systems.
- III. Analyse Human-Computer Interaction principle and designs in Information Systems.
- IV. Study various HCI designs to gain knowledge on user-centric interfaces.

Introduction: The human, the computer, The interaction, Paradigms, Usability of Interactive systems, Guidelines, principles and theories

Design Process: Interaction design basics, HCI in software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support.

Models and Theories: Cognitive models, socio-organizational issues and stakeholder requirements, communication and collaboration models, task analysis, dialogue notation and design, models of the system, modelling rich interaction.

Interaction Style: Direct manipulation and virtual environments, Menu selection, Form filling and dialogue boxes, Command and natural languages, Interaction devices, Collaboration and social media participation.

Design Issues: Quality of service, balancing function and fashion, User Documentation and Online Help, Information Search, Information Visualization.

Outside Box: Group ware, Ubiquitous computing and augmented realities, Hypertext, Multimedia and worldwide web.

Text Books:

1. Human Computer Interaction, Alan Dix, Janet Finlay, ISBN: 978813171035, Pearson Education 2004.
2. Designing the User Interface-Strategies for Human Computing Interaction, Ben Shneiderman, ISBN: 9788131732557, Pearson Education 2010.

Reference Books:

1. Usability Engineering: Scenario-Based Development of Human Computer Interaction, Rosson. M. and Carroll J. 2002.
2. The Essential of Interaction Design, Cooper, et al, Wiley Publishing, 2007.
3. Usability Engineering, Nielson J. Morgan Kaufmann, San Francisco, ISBN: 0-12-518406-9, 1993.
4. The Resonant Interface: HCI Foundation for Interaction Design, Heim S., Addison-Wesley, 2007.

Course outcomes:

On completion of course, the students will be able to:

CSU724 (D).1 Analyse Human-Computer Interaction principle and designs in Information Systems.

CSU724 (D).2 Compare various HCI designs to gain knowledge on user-centric interfaces.

CSU724 (D).3 Evaluate the Internet sites considering; usability and user appreciation designs.

CSU724 (D).4 Design effective HCI for individuals and persons with disabilities.

CSU724 (D).5 Develop meaningful user interface.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU724 (D).1	3	2	2	1	3	0	0	0	0	0	0	1	1	1	0
CSU724(D).2	3	2	2	1	3	0	0	0	0	0	0	1	2	2	1
CSU724 (D).3	3	3	3	1	3	0	0	0	0	0	0	1	2	1	1
CSU724 (D).4	3	2	2	1	3	0	0	0	0	0	0	1	3	2	1
CSU724 (D).5	3	2	2	1	3	0	0	0	0	0	0	1	2	2	1

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 733 OPEN ELECTIVE-II
A) INTRODUCTION TO COMPUTER NETWORK

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. To understand the network security, services, attacks, mechanisms, types of attacks.
- II. To comprehend and apply authentication services, authentication algorithms.
- III. To comprehend and apply network layer security protocols, Transport layer security protocols, Web security protocols.

Introduction to Data communication: Components, Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media.

LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

TCP/IP Model

Introduction to the Internet Protocol: IP Addressing, IP Address Classes, Reserved IP Addresses, Public and Private IP Addresses, IPv4 and IPv6 Security, Addresses.

Introduction: Attack, Services and Mechanism, Model for Internetwork Security Cryptography : Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and Cryptanalysis, Public Key Encryption, Digital Signatures and Authentication

Overview of Network Security: Security services, Security Issues in TCP/IP suite, Sniffing, spoofing, buffer overflow, ARP poisoning, ICMP Exploits, DNS security, IP address spoofing, UDP exploits, TCP exploits.

Digital Signatures and Authentication: Requirements, Authentication functions, Message Authentication Codes, Security of Hash Functions and MACs, MD5 message Digest algorithm.

IP Security: Overview and Architecture, Secure E-mail and S/MIME, Domain Keys Identified Mail, Secure Socket Layers (SSL) and Transport Layer Security (TLS), HTTPS

Text Books:

1. Computer Networking: A top down Approach Featuring the internet, Jim Kurose, Keith Ross, 6th Edition, Addison Wesley, July2002.
2. Cryptography and Network Security: Principles and Practice, Stallings W., Seventh Edition, Pearson, 2017.

Reference Book:

1. Cryptography and Network Security, Kahate Atul, Tata McGraw-Hill, Third Edition, 2013.
2. Computer Networks, A.S. Tanenbaum, 4th Edition, PHI Publication, 2002.

Course Outcomes:

On completion of course, the students will be able to:

CSU725 (A).1 Ability to determine appropriate mechanisms for protecting the network.

CSU725 (A).2 Ability to design and develop security solutions for a given application or system.

CSU725 (A).3 Ability to develop a secure network stack.

CSU725 (A).4 Ability to determine security and authentications.

CSU725 (A).5 Ability to analyse models for internet work security.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU725 (A).1	2	2	0	0	1	0	0	2	0	0	0	0	0	0	0
CSU725 (A).2	1	3	2	0	1	0	0	2	0	0	0	2	1	0	0
CSU725 (A).3	2	1	1	2	1	2	2	0	0	2	2	2	1	2	1

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 733 OPEN ELECTIVE-II
B) INTRODUCTION TO DATABASE

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. To understand the basic concepts of DBMS
- II. To learn data models, conceptualize and depict a database system using ER diagram.
- III. To understand the different database models and language queries to access databases
- IV. To understand the normalization forms in building an effective database tables

Introduction: Database System Applications, Purpose of Database System, Views of data, data models, Database Languages, database architecture and components of DBMS, Database System Applications, Database Users and Administrators, Database System Structure, History of Database Systems. Entity-Relationship Model, Basic Concepts, Design Issues, Entity-Relationship Diagram, ER Model, notations, examples.

Relational Model: Relational Data Model, Concept of relations, schema-instance distinction, referential integrity constraints, keys, referential integrity and foreign keys, relational algebra operators, Extended Relational-Algebra Operations

SQL: Introduction, data definition in SQL, table, key and foreign key definitions, update behaviours. Querying in SQL, notion of aggregation, aggregation functions group by and having clauses, embedded SQL. Domain Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL, Encryption and Authentication.

Transactions: Transaction processing and Error recovery - concepts of transaction processing, ACID properties, concurrency control, locking based protocols for CC, error recovery and logging, undo, redo, undo-redo logging and recovery methods.

Current Issues: Rules, Knowledge Bases, Active and Deductive Databases, Multimedia Databases Multimedia Data Structures, Multimedia Query languages, Spatial Databases.

Text Book

1. Database System Concepts, Silberschatz, Abraham, Korth, Henry F., and Sudharshan, S., 6th Edition, Tata McGraw Hill, 2017.

Reference Books

1. Fundamentals of Database Systems, Elmasri, R. and Navathe, S. B. 5th Edition, Pearson/Addison Wesley, 2017.
2. Database Systems: A Practical Approach to Design, Implementation, and Management, Connolly, Thomas and Begg, Carlolyn, 5th Edition, Addison-Wesley, 2014.

Course Outcomes

CSU725 (B).1 Ability to comprehend the complex query processing techniques.

CSU725 (B).2 Ability to design and implement multimedia databases and writing query structure.
Ability to install, configure and interact with a relational database management system.

CSU725 (B).3 Ability to master the basics of SQL and construct queries using SQL.

CSU725 (B).4 Ability to develop skill set in file organization, Query Optimization, Transaction management, and database administration techniques.

CSU725 (B).5 Ability to understand concepts of transaction processing.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU725 (B).1	2	2	0	0	1	0	0	2	0	0	0	0	0	0	0
CSU725 (B).2	1	3	2	0	1	0	0	2	0	0	0	2	1	0	1
CSU725 (B).3	2	1	1	2	1	2	2	0	0	2	2	2	1	2	1
CSU725 (B).4	1	1	0	0	2	0	2	0	2	1	2	2	2	2	3
CSU725 (B).5	1	1	0	0	2	0	2	0	1	1	2	2	1	2	3

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 726 SEMINAR

Teaching Scheme: 02P
Evaluation Scheme: 50 ICA

Total – 02

Credits: 01
Total Marks: 50

Course Objectives:

- I. Establish motivation for any topic of interest not covered in curriculum and develop a thought process for technical presentation.
- II. Organize a detailed literature survey and build a document with respect to technical publications.
- III. Learn effective presentation and improve soft skills.
- IV. Make use of new and recent technology for creating technical reports.

The seminar is to be undertaken by single student

1. Student shall select a topic for seminar which is not covered in curriculum
2. Topics shall be registered within a month after beginning of VII Semester and shall be approved by the concerned guide and Program Head
3. Students should know the functional and technical details of selected topic after carrying out the conceptual study.
4. Before the end of semester, student shall deliver a seminar and submit the seminar report in following format:
 - Introduction
 - Literature Survey
 - Concept
 - Functional and Technical Details
 - Future scope
 - Applications

Course Outcomes:

After completing this course, Students shall be able:

- CSU726.1 To study research papers for understanding of a new field, in the absence of a textbook, to summaries and review them.
- CSU726.2 To identify promising new directions of various cutting edge technologies
- CSU726.3 To impart skills in preparing detailed report describing the topic and results
- CSU726.4 To effectively communicate by making an oral presentation before an evaluation committee.
- CSU726.5 To develop the interpersonal skills for presentation of topic.

CO-PO-PSO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU726.1	3	1	3	0	0	0	0	0	3	0	2	0	3	2	1
CSU726.2	2	3	2	3	0	0	0	0	2	0	3	0	1	3	0
CSU726.3	2	2	3	2	0	0	0	0	2	0	2	0	2	2	2
CSU726.4	2	2	3	2	0	0	0	0	2	0	2	0	2	3	3
CSU726.5	2	2	3	2	0	0	0	0	2	0	2	0	2	2	2

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 821 PROGRAM ELECTIVE-V
A) COMPUTATIONAL GEOMETRY

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objective

- I. Learn the several kinds of problems in Computational Geometry, as well as their applications.
- II. Learn the capacity of combining geometric tools with the appropriated data structures and algorithmic paradigms.
- III. Ability to solve basic problems that appear in computational geometry.
- IV. Ability to implement the solutions proposed in the class, as well as those that can be found in the basic references of the course.
- V. Ability to recognize the geometric problems behind the applications, and to propose adequate algorithmic tools to solve them.

Polygon Triangulation: Triangulation Theory, Area of Polygon, Segment intersection, Segment-triangle intersection. **Polygon Partitioning:** Monotone Partitioning, rafezoidalization, Partition into Monotone Mountains, Linear-Time Triangulation, Convex Partitioning.

Convex Hulls in Two Dimensions: Definitions of Convexity and Convex Hulls, Naive Algorithms for Extreme Points, Gift Wrapping, QuickHull, Graham's Algorithm, Lower Bound, Incremental Algorithm, Divide and Conquer

Convex Hulls in Three Dimensions: Polyhedra and data structures, Gift wrapping, Preparata-Hong algorithm, Incremental algorithm, Randomized incremental algorithm

Voronoi Diagrams: Definitions and Basic Properties, Delaunay Triangulations, Algorithms, Applications in Detail, Medial Axis, Connection to Convex Hulls, Connection to Arrangements

Arrangements: Combinatorics of Arrangements, Incremental Algorithm, Three and Higher Dimensions, Duality, Higher-Order Voronoi Diagrams, Applications

Search and Intersection: Segment-Segment Intersection, Segment- Triangle Intersection, Point in Polygon, Point in Polyhedron, Intersection of Convex Polygons, Intersection of Segments, Intersection of Non convex Polygons, Extreme Point of Convex Polygon, Extremal Polytope Queries, Planar Point Location

Motion Planning: Shortest Paths, Moving a Disk, Translating a Convex Polygon, Moving a Ladder, Robot Arm Motion, Separability.

Text Book

1. Computational Geometry: Algorithms and Applications, M. de Berg, M. van Kreveld, M. Overmars, O. Schwarzkopf, 2nd Edition, Springer-Verlag. 2000
2. , Computational Geometry in C, J. O'Rourke, 2nd edition, Cambridge Univ. Press, 1998.

Reference Book

1. Mathematical Illustrations: A Manual of Geometry and PostScript, B. Casselman, Springer-Verlag, (<http://www.math.ubc.ca/~cass/graphics/manual>) 2005
2. Computational Geometry: An Introduction Through Randomized Algorithms, K. Mulmuley, Prentice Hall. 1994

Course Outcomes

On the completion of course, the student will be able to:

CSU821 (A).1 Analyse randomized algorithms for small domain problems.

CSU821 (A).2 Use line-point duality to develop efficient algorithms.

CSU821 (A).3 Apply geometric techniques to real-world problems in graphics.

CSU821 (A).4 Solve linear programs geometrically.

CSU821 (A).5 Assess theoretical and practical problems that involve geometry and will adapt efficient methods to solve them.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU821 (A).1	3	3	2	2	0	0	0	0	0	1	0	1	3	1	0
CSU821 (A).2	3	3	2	0	2	0	0	0	0	1	0	1	2	1	0
CSU821 (A).3	3	3	2	2	0	0	0	0	0	1	0	1	3	1	0
CSU821 (A).4	3	3	2	0	2	0	0	0	0	1	0	1	2	1	0
CSU821 (A).5	3	3	2	2	0	0	0	0	0	1	0	1	3	1	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 821 PROGRAM ELECTIVE-V
B) ADVANCED OPERATING SYSTEMS

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. To study, learn, and understand the main concepts of advanced operating systems
- II. To understand the concept of distributed operating system
- III. To compare the traditional operating system and Advance operating system.
- IV. To understand the different case studies of Advance operating system

Theory and implementation aspects of distributed operating systems. Process Synchronization, Remote Procedure call,

Inter-process communication and co-ordination in large distributed systems. Distributed resource management. Message- and Stream-Oriented communication, Processes and threads, Code migration and distributed scheduling, Naming.

Clock Synchronization, Distributed mutual exclusion and distributed deadlocks, Distributed transaction Distributed file systems (NFS, AFS & coda)

Fundamentals of real time operating systems. Information management in distributed systems: security, integrity and concurrency problems. Fault tolerance issues.

OS issues related to the Internet, intranets, pervasive computing, embedded systems, mobile systems and wireless networks.

Case studies of contemporary operating systems, DCOM and JINI

Textbook

1. Distributed Systems: Principles and Paradigms, Andrew S. Tanenbaum and Maarten van Steen. Prentice Hall, 2nd Edition, 2007
2. Advanced Operating Systems and Kernel Applications, Techniques and Technologies Wiseman, Yair Information Science Publishing, 2009

References

1. Distributed Operating Systems & Algorithms, Randy Chow and Theodore Johnson. Addison-Wesley, 1997

Course Outcome

On completion of the course student should be able to

CSU821 (B).1 Analyse the general aspect of distributed operating system.

CSU821 (B).2 Understand and analysed the interposes communication and clock synchronization

CSU821 (B). 3 Identify, formulate and solve integrative operating system problem

CSU821 (B).4 Analyse the difference between DCOM and JINI

CSU821 (B).5 Understand and analysed the different AOS related issues.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU821 (B).1	3	2	0	1	0	0	3	0	0	0	0	0	3	0	0
CSU821 (B).2	3	2	0	1	0	0	3	0	0	0	0	0	3	1	0
CSU821 (B).3	3	2	1	0	1	0	2	0	0	0	0	0	3	0	0
CSU821 (B).4	3	2	1	0	1	0	2	0	0	0	0	0	3	0	0
CSU821 (B).5	3	2	0	1	0	0	3	0	0	0	0	0	3	1	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU 821 PROGRAM ELECTIVE-V
C) SPEECH AND NATURAL LANGUAGE PROCESSING

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives

- I. To introduce students to the fundamental concepts and techniques of speech and natural language processing (NLP).
- II. To gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
- III. To examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

Speech and Natural Language Processing: Introduction; Brief Review of Regular Expressions and Automata; Finite State Transducers; Word level Morphology and Computational Phonology;
Basic Text to Speech: Introduction to HMMs and Speech Recognition. Indian language case studies; Part of Speech Tagging; Parsing with CFGs; Probabilistic Parsing. Representation of Meaning;

Semantic Analysis: Lexical Semantics; Word Sense; Disambiguation; Discourse understanding; Natural Language Generation; Techniques of Machine Translation; Indian Language case studies.

Text Book:

1. Daniel Jurafsky and James H. Martin, Speech and Language Processing, Prentice-Hall.
2. Natural Language Processing with Python by Steven Bird, Ewan Klein, Edward Lopper

Reference Books:

1. Foundations of Statistical Natural Language Processing, Chris Manning and Hinrich Schuetze, MIT Press.
2. Handbook of Natural Language Processing, Second Edition—Nitin Indurkha, Fred J. Damerau, Fred J. Damerau

COURSE OUTCOMES

On completion of the course the student should be able to

CSU821 (C).1 Understand how key concepts from NLP are used to describe and analyze language.

CSU821.2 (C) Understand POS tagging and context free grammar for English language

CSU821.3 (C) Analyse semantics of English language for processing.

CSU821.4 (C) Analyse large volume text data generated from a range of real-world applications.

CSU821.5 (C) Understand the various techniques of Machine Translation

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU821 (C).1	3	2	1	1	1	0	0	0	0	0	0	1	3	1	0
CSU821 (C).2	3	3	1	2	1	0	0	0	0	0	0	1	3	0	1
CSU821 (C).3	3	2	2	2	1	0	0	0	0	0	0	1	3	0	1
CSU821 (C).4	3	2	2	2	1	0	0	0	0	0	0	1	3	0	1
CSU821 (C).5	3	2	2	2	1	0	0	0	0	0	0	1	3	0	1

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

**CSU 821 PROGRAM ELECTIVE-V
D) INTERNET OF THINGS**

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objective

- I. To understand about the fundamentals of Internet of Things and its building blocks along with their characteristics
- II. To understand the recent application domains of IoT in everyday life
- III. To understand the protocols and standards designed for IoT and the current research on it.
- IV. To understand the other associated technologies like cloud and fog computing in the domain of IoT

Introduction to Internet of Things: Application areas of IoT, Characteristics of IoT, Things in IoT, IoT stack, Enabling technologies, IoT challenges, IoT levels, IoT and cyber physical system, IoT and WSN

Sensors, Microcontrollers, and Their Interfacing: Sensor interfacing, Types of sensors, Controlling sensors, Microcontrollers, ARM

Protocols for IoT: Messaging protocols, Transport protocols, IPv4, IPv6, URI

Cloud for IoT: IoT and cloud, Fog computing, Security in cloud, Edge Computing, Case study

Application Building with IoT: Various application of IoT : Food, Healthcare, Lavatory maintenance, Water quality, Warehouse, Retail, Driver Assistance, Collision impact

Arduino and Raspberry Pi: Arduino Architecture, Programming and Application

Raspberry Pi: Architecture, Programming and Application

Text Books:

1. Internet of Things, Vasudevan, Nagrajan and Sundaram, Wiley India
2. IoT Fundamentals, David Hence at el, Cisco Press

Reference Books:

1. IoT Based Projects, Rajesh Singh at el, BPB
2. Internet of Things with ARDUINO and BOLT, Ashwin Pajankar, BPB

Course Outcomes:

After completion of the course, student will be able to

CSU 821(D).1 Able to understand building blocks of Internet of Things and characteristics

CSU 821(D).2 Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.

CSU 821(D).3 Use the IoT technologies in practical domains of society.

CSU 821(D).4 Gain knowledge about the state of the art methodologies in IoT application domains.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU821 (D).1	3	3	1	0	1	0	0	0	0	0	0	0	3	1	0
CSU821 (D).2	3	3	1	2	1	0	0	0	0	0	0	0	3	2	1
CSU821 (D).3	3	3	1	0	1	0	0	0	0	0	0	0	3	1	0
CSU821 (D).4	3	3	2	2	3	0	0	0	0	0	0	1	3	2	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU 822 PROGRAM ELECTIVE-VI
A) QUEUING THEORY AND MODELLING

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives

- I. To show how to use the theory of probability to describe and predict the behaviour of real systems (computer and telecommunications networks, others) that use fixed resources to handle random demands.
- II. To understand the concept of queuing models and apply in engineering.
- III. To understand the significance of advanced queuing models.

Introduction: (historical background, summary of technology and economics), Intuitive analysis of mathematical models, subtleties

Review of probability and stochastic processes: Random variable, birth-and-death processes, Statistical Equilibrium, Probability Generating function, Some Important Probability Distributions, simulation via inverse transform, Introduction to stochastic processes

One-dimensional birth-and-death processes : related queueing models, PASTA (Poisson Arrivals See Time Averages), Erlang B and Erlang C models, finite-source models,

Multidimensional birth-and-death processes: Introduction, Product Solution, Generating Function, Macrostates, Indirect Solution of Equations, Numerical Solutions of State Equation by Iterations, The Equivalent Random Method, The Method of Phases

Imbedded Markov Chains Queuing Model: Introduction, Little's theorem, Equality of State Distribution at Arrival and Departure Epochs, Mean Queue Length and Mean Waiting Time in the M/G/1 queues, Riemann—stieltjes Integral, Laplas-stieltjes Transforms, Some Results from Renewal, The M/G/1 queues, related models

Simulation and Queuing Model: Introduction, Generation of Stochastic Variables, Simulation Programming Language, Statistical Question, Examples

Text Book:

1. Introduction to Queueing Theory, Robert B. Cooper, North Holland, 2nd Edition.

Reference Books:

1. Data Networks, D. and R. Gallager. 2nd Ed., Prentice Hall, 1992 (ISBN 0-13-200916-1 paperback)
2. Introduction to Probability Models, Ross, S.M., 10th edition, Academic Press ISBN 978-0-12-375686-2.
3. A First Course in Stochastic Models, Tijms, H.C., Wiley, 2003 (ISBN 0-471-49881-5 paperback).
4. Hlynka's Queueing Theory Page: <http://web2.uwindsor.ca/math/hlynka/queue.html>

COURSE OUTCOMES

On completion of the course, the student will be able to

CSU822 (A).1 Examine the relationship between mathematical models (precise formulas, but limited applicability) and their corresponding simulation models (imprecise experimental data, but greater flexibility and realism)

CSU822 (A).2 Understand the fundamental concepts of probability

CSU822 (A).3 Provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering

CSU822 (A).4 Apply the concept of queuing model in Engineering

CSU822 (A).5 Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU822 (A).1	3	3	3	2	2	0	0	0	0	1	0	1	3	1	2
CSU822 (A).2	3	3	3	2	2	0	0	0	0	0	0	1	3	1	2
CSU822 (A).3	3	2	1	1	3	0	0	0	0	0	0	1	3	1	3
CSU822 (A).4	3	2	1	1	2	0	0	0	0	1	0	1	3	2	3
CSU822 (A).5	3	2	1	2	2	0	0	0	0	0	0	1	3	1	2

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

**CSU 822 PROGRAM ELECTIVE-VI
B) FAULT TOLERANT COMPUTING**

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objective:

- I. To understand the fault tolerant design principles
- II. To identify the requirement of fault tolerant systems
- III. To understand fault tolerant distributed systems and its requirement
- IV. To design algorithms for fault tolerant systems

Introduction to Fault-Tolerance: Error, Faults and Failures; Reliability and Availability; Dependability Measures.

Hardware Fault-Tolerance: Canonical and Resilient Structures; Reliability Evaluation Techniques and Models; Processor-level Fault Tolerance; Byzantine Failures and Agreements.

Information Redundancy: Error Detection/Correction Codes (Hamming, Parity, Checksum, Berger, Cyclic, Arithmetic); Encoding/Decoding circuits; Resilient Disk Systems (RAID).

Fault-Tolerant Networks: Network Topologies and their Resilience; Fault-tolerant Routing.

Software Fault-Tolerance: Single-Version Fault Tolerance; N-Version Programming; Recovery Approach; Exception and Conditional (Assert) Handling; Reliability Models.

Checkpointing: Optimal Checkpointing; Checkpointing in Distributed and Shared-memory Systems.

Text Book:

1. Fault Tolerant Systems, I. Koren, Morgan Kaufman , 2007
2. Fault Tolerant Computer System Design, D. K. Pradhan, Prentice Hall, 1996.

Reference Book:

1. Probability and Statistics with Reliability, Queuing and Computer Science Applications, Kishor S. Trivedi, John Wiley & Sons Inc., 2016.

Course Outcomes:

CSU 822(B).1 Understand the risk of computer failures and their comparison with other equipment failures.

CSU 822(B).2 Know the different advantages and limits of fault avoidance and fault tolerance techniques.

CSU 822(B).3 Gain knowledge in sources of faults and their prevention and forecasting

CSU822 (B).4 Analyse fault-tolerant or non-fault-tolerant on the basis of dependability requirements.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU822 (B).1	3	3	1	0	1	0	0	0	0	0	0	0	3	1	0
CSU822 (B).2	3	3	1	2	1	0	0	0	0	0	0	0	3	2	1
CSU822 (B).3	3	3	1	0	1	0	0	0	0	0	0	0	3	1	0
CSU822 (B).4	3	3	2	2	3	0	0	0	0	0	0	1	3	2	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

**CSU 822 PROGRAM ELECTIVE-VI
C) DATA ANALYTICS**

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. Explore the fundamental concepts of data analytics.
- II. Understand descriptive, inferential and predictive data analytic techniques.
- III. Find meaningful patterns in data.
- IV. Understand prescriptive data analytic techniques.
- V. Implement analytical algorithms.

Descriptive Statistics: Introduction to data analytics, Descriptive Statistics, Probability Distributions, and Inferential Statistics through hypothesis tests Permutation & Randomization Test.

Regression and ANOVA: Regression, ANOVA (Analysis of Variance).

Classification: An Overview of Classification, Logistic Regression, Generative Models for Classification, A Comparison of Classification Methods, Classification Methods.

Machine Learning: Introduction and Concepts, Differentiating algorithmic and model based frameworks, Regression, Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours.

Unsupervised Learning and Challenges for Big Data Analytics: Clustering, Associative Rule Mining Challenges for big data analytics.

Prescriptive analytics: Creating data for analytics through designed experiments, creating data for analytics through Active learning, creating data for analytics through Reinforcement learning.

Text Books:

1. The elements of statistical learning, Hastie, Trevor, et al, Vol. 2. No. 1. New York: Springer, 2009.
2. Applied statistics and probability for engineers, Montgomery, Douglas C., and George C. Runger, John Wiley & Sons, 2010

Reference Books:

1. Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, 2nd edition, 2021.
2. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series), Bart Baesens, John Wiley & Sons, 2014

Course Outcomes:

On completion of the course, students will be able to:

CSU822 (C).1 Understand the essentials of data analytics and the corresponding terminologies.

CSU822 (C).2 Analyse the steps involved in the Analytics process.

CSU822 (C).3 Identify meaningful patterns in data.

CSU822 (C).4 Understand use of descriptive, predictive and prescriptive analytics.

CSU822 (C).5 Design efficient algorithms for data analytics.

CO – PO –PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU822(C).1	3	3	2	2	0	3	1	2	3	2	2	2	0	3	3
CSU822(C).2	3	0	3	2	3	3	2	1	2	3	2	3	3	3	0
CSU822(C).3	0	3	3	2	2	2	1	3	2	3	3	0	0	0	3
CSU822(C).4	2	3	3	3	2	2	2	1	3	3	3	2	3	3	0
CSU822(C).5	3	3	3	3	3	3	3	2	3	3	2	2	3	3	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

**CSU 822 PROGRAM ELECTIVE-VI
D) IMAGE PROCESSING**

Teaching Scheme: 03T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objective

- I. To introduce the concepts of image processing and basic analytical methods to be used in image processing.
- II. To familiarize students with image enhancement and restoration techniques, To explain different image compression techniques
- III. To introduce segmentation and morphological processing techniques.

Introduction: Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization.

Spatial Domain Filtering: Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian.

Image Restoration: Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Restoration from projections.

Image Compression: Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, LZW coding, Sub-image size selection, Run length coding, Symbol-based coding, JBIG-2, Bit-plane encoding, Bit-allocation, Threshold Coding, JPEG, Lossless predictive coding, Lossy predictive coding

Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, basic morphologic algorithm

Image Segmentation: Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Iterative thresholding, Moving averages, Multivariable thresholding, Region based segmentation, Use of motion in segmentation

Text Book

1. Digital Image Processing, 3rd Edition, by Rafael C Gonzalez and Richard E Woods.
Publisher: Pearson Education.

References:

1. Digital Image Processing, R C Gonzalez & R E Woods, 3 rd /4 th Ed, PHI
2. Fundamentals of DIP, A. K. Jain, PHI
3. Digital Image Processing, Wiliam K Pratt, Wiley Student Publishers, 3ed.

4. Digital Image Processing using MATLAB, R C Ganzalez, R E Woods & S L Eddins, 2 nd Edition
5. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Prentice Hall. 2011
6. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning
7. <https://nptel.ac.in/courses/117/105/117105135/>

Course Outcomes:

After the successful completion of the course the students will be able to:

CSU822 (D).1 Analyse the different types of digital images.

CSU822 (D).2 Perform image enhancement techniques in spatial and frequency domain.

CSU822 (D).3 Elucidate the mathematical modelling of image restoration and compression

CSU822 (D).4 Apply the concept of image segmentation.

CSU822 (D).5 Analyse object detection and recognition techniques

CO – PO –PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU822(D).1	3	3	2	1	0	0	0	0	0	0	0	1	3	1	0
CSU822(D).2	3	3	3	1	3	0	0	0	0	0	0	1	3	2	1
CSU822(D).3	3	1	2	1	3	0	0	0	0	0	0	1	2	1	1
CSU822(D).4	3	2	1	1	3	0	0	0	0	0	0	1	3	1	0
CSU822(D).5	2	3	3	1	2	0	0	0	0	0	0	1	3	1	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU 823 PROJECT / INDUSTRY INTERSHIP PROJECT

Teaching Scheme: 24 P + 00 T Total: 024

Evaluation Scheme: 200 ICA + 200 ESE

Duration of ESE: 02.30 Hrs.

Credits: 12

Total Marks: 400

Course Objectives:

- I. To collect information on novel and latest development in core and allied area of the subject.
- II. To encourage the process of independent thinking and working together in a group.
- III. To implement innovative ideas for social benefit.
- IV. To develop the ability to describe, interpret and analyse technical issues.
- V. To help the students to critically evaluate their own work.

A) PROJECT

Student shall select a topic for Project as per guidelines of the institute in the field of Computer Science and Engineering.

1. Topics shall be registered within a 15 days after beginning of VIII Semester and shall be approved by the concerned guide and Program Head.
2. Students should know the functional and technical details of selected topic after carrying out the conceptual study.
3. Students should complete implementation of ideas given in synopsis, so that project work should be completed before end of semester.
4. Students shall submit the final project report in proper format as per guidelines given on the college website
5. For uniform and continuous evaluation, evaluation committee for each group shall be formed by Program Head in which guide must be a member. Internal marks should be awarded by committee at the end of semester based on continuous evaluation.
6. Final examination of project shall include demonstration, presentation of complete work and oral examination based on the project work.

B) INDUSTRY INTERSHIP PROJECT

- I. The aim of Industry Internship Project is to closely work with industry to apply theoretical knowledge in a real-world context providing real industrial project enabling learning focused on the application knowledge. This gives a student an opportunity to make their first traces in the industrial reality and start building a personal network, an important prerequisite for a successful industry career.
- II. The purpose of the INDUSTRY INTERSHIP PROJECT to solve real industrial problems by following established engineering methods, working in teams, and effectively communicating with various stakeholders.
- III. The students can work in group decided by the department as per availability of Faculty. The individual students can also undertake the Industry Institute Project subject to availability of Industry Mentor/Guide. Students/Group select the industry which is ready to provide INDUSTRY INTERSHIP PROJECT through oral/written communication.

Once selected the student group has to visit the industry/stay as per need. The institute will not provide any assistance in Travel and Stay. The student/ Group need to submit acceptance letter from Industry regarding allowing the student/groups for INDUSTRY INTERSHIP PROJECT stating the Project name or research area.

- IV. Each group has an Industry Project Guide and Institute Project Guide. The meeting with Project guide is once within week/two week at Institute. These meetings typically include assistance in finding solutions recent problems in the projects, technical support on applied software packages, and support with writing the final report. The project groups do multiple company visits where they meet the industrial contacts to formulate the problem, collect data and information, and gain necessary experiences from the industry.
- V. Furthermore, INDUSTRY INTERSHIP PROJECT includes seminars aiming to give the students experience of communicating to a larger audience, working in teams, etc. The Project monitoring will be done by Institute Guide to know whether learning objective is achieved or not.
- VI. The INDUSTRY INTERSHIP PROJECT undergone individual student/ Group will have to submit following documents on the successful completion of Industry Institute Project
 1. Authenticated attendance record from Industry internship project mentor/supervisor/Guide
 2. Industry internship project signed by Industry Mentor/Guide
 3. Industry internship project Completion Letter by Industry Mentor/ Guide
 4. Project evaluation report signed by Industry Mentor/ Guide

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Oral examination shall be conducted on the Project report, by the panel of examiners consisting of Project Guide, Course Coordinator and Expert appointed by Program Head.

ESE: The End Semester Examination for Project shall consist of Demonstration if any, presentation and oral examinations based on the project report.

Course Outcomes:

On successful completion of the course students will be able to:

- CSU823.1 Demonstrate a sound technical knowledge of their selected project topic.
- CSU823.2 Undertake problem identification, formulation and solution.
- CSU823.3 Design engineering solutions to complex problems utilising a systems approach.
- CSU823.4 Conduct an engineering project.
- CSU823.5 Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO – PO –PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU823.1	3	1	3	0	0	0	0	0	3	0	2	0	3	2	1
CSU823.2	2	3	2	3	0	0	0	0	2	0	3	0	1	3	0
CSU823.3	2	2	3	2	0	0	0	0	2	0	2	0	2	2	2
CSU823.4	2	2	3	2	0	0	0	0	2	0	2	0	2	3	3
CSU823.5	2	2	3	0	0	0	0	0	2	0	3	0	1	2	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

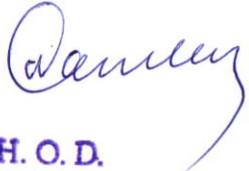
**GOVT. COLLEGE OF ENGINEERING,
AMRAVATI**



**B. TECH. (Computer Science & Engg.)
Third Year Curriculum
Department of Computer Science &
Engineering
2021-22**

Semester I


Teaching Scheme							Evaluation Scheme					Credits	
Category	Course Code	Course Title	Theory	Tutorial	Practical	Total	Theory			Practical			
			Hrs/week	Hrs/week	Hrs/week		MSE	TA	ESE	ICA	ESE		
MC	SHU100	Induction Program	Two weeks mandatory audit course									0	
BSC	SHU121	Physics	3	1	---	4	30	10	60	---	---	100	4
BSC	SHU122	Calculus and Linear Algebra	3	1	---	4	30	10	60	---	---	100	4
ESC	EEU121	Basic Electrical Engineering	3	---	---	3	30	10	60	---	---	100	3
ESC	CEU121	Engineering Mechanics	3	---	---	3	30	10	60	---	---	100	3
HSMC	SHU123	English	2	---	---	2	---	---	60	---	---	60	2
BSC/LC	SHU124	Physics Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	EEU122	Basic Electrical Engg Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	CEU122	Engineering Mechanics Lab	---	---	2	2	---	---	---	50	---	50	1
HSMC/LC	SHU125	English Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	MEU121	Workshop Practice I	---	---	2	2	---	---	---	50	---	50	1
Total			14	2	10	26	120	40	300	250	0	710	21


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Semester II

Teaching Scheme							Evaluation Scheme					Credits	
Category	Course Code	Course Title	Theory	Tutorial	Practical	Total	Theory			Practical			Total
			Hrs/week	Hrs/week	Hrs/week		MSE	TA	ESE	ICA	ESE		
BSC	SHU221	Chemistry	4	--	---	4	30	10	60	---	---	100	4
BSC	SHU222	Integral calculus and differential equations	3	1	---	4	30	10	60	---	---	100	4
ESC	CSU221	Programming for Problem solving	3	---	---	3	30	10	60	---	---	100	3
ESC	MEU221	Engineering Graphics	2	---	---	2	30	10	60	---	---	100	2
ESC	MEU222/ ETU221	Basic Mechanical Engineering/ Basic Electronics Engineering	2	---	---	2	30	10	60	---	---	100	2
BSC/LC	SHU223	Chemistry Lab	---	---	2	2	---	---	---	50	---	50	1
ESC/LC	CSU222	Programming for Problem solving Lab	---	---	4	4	---	---	---	50	---	50	2
ESC/LC	MEU223	Engineering Graphics Lab	---	---	4	4	---	---	---	50	---	50	2
ESC/LC	MEU224	Workshop Practice II	---	---	2	2	---	---	---	50	---	50	1
Total			14	1	12	27	150	50	300	200	0	700	21

TA: Teacher Assessment MSE: Mid Semester Examination ESE: End Semester Examination ICA: Internal Continuous Assessment
MSE Duration: 1.30 Hrs all courses


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Important Note:

MEU222 for only Electrical, Electronics & TC, Computer Science, Information Technology and Instrumentation Engineering branch



ETU221 for only Civil and Mechanical Engineering branch

In Semester I, the students of Civil, Mechanical, Electrical & Instrumentation Engineering shall be offered group A courses, and that of

Electronics & TC, Computer Science and Information Technology shall be offered group B courses. In Semester II, vice versa.

There should be direct correspondence of group A and group B courses.

Sr. No.	Group A Courses		Group B Courses	
	Course Code	Title of Course	Course Code	Title of Course
1	SHU121	Physics	SHU221	Chemistry
2	EEU121	Basic Electrical Engineering	CSU221	Programming for Problem solving
3	CEU121	Engineering Mechanics	MEU221	Engineering Graphics
4	SHU123	English	SHU223	Chemistry Lab
5	SHU124	Physics Lab	CSU222	Programming for Problem solving Lab
6	EEU122	Basic Electrical Engineering Lab	MEU223	Engineering Graphics Lab
7	CEU122	Engineering Mechanics Lab		
8	SHU125	English Lab		
Category of Course		Definition		Credits
BSC		Basic Science Courses		18
ESC		Engineering Science Courses		21
HSMC		Humanities and Social Sciences including Mgt.Courses		3
Total Credits				42



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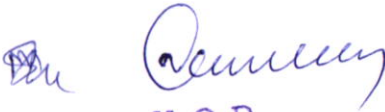
GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI.
Department of Computer Science & Engineering
Scheme for B. Tech. (Computer Science & Engineering)

SEM III

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
			Theory Hrs	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
ESC	ETU331	Analog and Digital Integrated Circuit	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU321	Data Structure & Algorithms	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU322	Discrete Mathematics	3	--	-	3	30	10	60	--	--	100	3
BSC	SHU321B *SHU322	Transform and Linear Algebra Differential Equation and Transform	3	1	-	4	30	10	60	--	--	100	4
MC	SHU323	Introduction to Constitution of India	1	--	-	1	--	20	30	-	--	50	0
HSMC	SHU324	Effective Technical Communication	3	--	-	3	30	10	60	--	--	100	3
ESC-LC	ETU332	Analog and Digital Integrated Circuit Lab	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU323	Data Structure & Algorithms Lab	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU324	IT Workshop (Sci Lab/MATLAB)	1	--	4	4	--	--	--	50	50	100	3
Total			17	1	12	12	150	70	330	100	100	750	23

SEM IV

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
			Theory Hrs	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
PCC	CSU421	Object Oriented Programming	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU422	Computer Organization	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU423	Operating System	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU424	Design and Analysis of Algorithms	3	--	-	3	30	10	60	--	--	100	3
PCC	CSU425	Organizational Behavior		---	---	3	30	10	60	---	---	100	3
MC	SHU422	Environmental Studies	1	--	-	1	--	20	30	--	--	50	0
PCC	CSU 426	Object Oriented Programming Lab	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU427	Computer Organization	--	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU428	Operating Systems Lab	1	--	4	4	--	--	--	25	25	50	2
PCC-LC	CSU429	Design and Analysis of Algorithms Lab		---	4	4	---	---	---	25	25	50	2
Total			14	1	16	32	150	70	330	100	100	750	23



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SEM V

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
PCC	CSU521	Database management systems	3	--	--	3	30	10	60			100	3
PCC	CSU522	Formal Language and Automata Theory	3	1	--	4	30	10	60			100	4
PCC	CSU523	Java and Python Programming	3	---	---	3	30	10	60			100	3
PCC	CSU524	Computer Networks	3	---	---	3	30	10	60			100	3
PEC	CSU525	Program Elective-I	3	---	---	3	30	10	60			100	3
PCC-LC	CSU526	Database management systems Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU527	Java and Python Programming Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU528	Computer Networks Lab	---	---	4	4	---	---	---	25	25	50	2
Total			15	1	12	28	150	50	300	75	75	650	22

SEM VI

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
PCC	CSU621	Compiler Design	3	---	---	3	30	10	60			100	3
PCC	CSU622	Software Engineering	3	---	---	3	30	10	60			100	3
PEC	CSU623	Program Elective-II	3	---	---	3	30	10	60			100	3
PEC	CSU624	Program Elective-III	3	---	---	3	30	10	60			100	3
OEC	CSU625	Open Elective-I	3	---	---	3	30	10	60			100	3
PCC-LC	CSU626	Compiler Design Lab	--	--	4	4				25	25	50	2
PCC-LC	CSU627	Minor Project	--	--	4	4				25	25	50	3
Total			15		8	23	150	50	300	50	50	600	20


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SEM VII

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theo			Practical			Total
							MSE	TA	ESE	ICA	ESE		
PCC	CSU721	Signal and Systems	3	---	---	3	30	10	60			100	3
PEC	CSU722	Program Elective-IV	3	---	---	3	30	10	60			100	3
OEC	CSU723	Open Elective-II	2	---		2	30	10	60			100	3
PCC	CSU724	Cyber Security	3	---	---	3	30	10	60			100	3
PCC	CSU725	Software Project Management	3	---	---	3	30	10	60			100	3
PROJ	CSU726	Seminar	---	---	2	2				50	---	50	1
BSC	SHU725	Human Values and Ethics	1			1		20	30			50	0
Total			16		2	18	150	70	330	50	---	600	16


SEM VIII

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theo			Practical			Total
							MSE	TA	ESE	ICA	ESE		
PEC	CSU821	Program Elective-V	3	---	---	3	30	10	60			100	3
PEC	CSU822	Program Elective-VI	3	---	---	3	30	10	60			100	3
PROJ	CSU823	A. Project OR B. Industry Internship Project	---	---	24	24	---	---	---	200	200	400	12
Total			5		24	29	60	20	120	200	200	600	18

Note: Students going for internship at Industry will complete theory courses through online platform such as MOOCs, NPTEL etc or by self-study mode and will either directly appear for ESE only (Total Internal Marks (CT1+CT2) will be awarded proportional to marks secure in ESE) or they can appear for CT1 and CT2. TA marks will be awarded as per industrial project performance.

BSC Basic Science Courses
 PEC Professional Elective courses
 HSMC Humanities and Social Sciences including Management courses
 LC Laboratory course
 SI Summer Industry Internship

PCC Professional core courses
 ESC Engineering Science Courses
 OEC Open Elective courses
 MC Mandatory courses
 PROJ Project



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Program Elective Courses

Program Elective-I (CSU525)	Program Elective-II (CSU623)	Program Elective-III (CSU624)	Program Elective-IV (CSU722)	Program Elective-V (CSU821)	Program Elective-VI (CSU822)
(A) Graph Theory	(A) Advanced Algorithms	(A) Parallel and Distributed Algorithms	(A) Computational Complexity	(A) Computational Geometry	(A) Queuing Theory and Modelling
(B) System Analysis & Design	(B) Distributed Systems	(B) Embedded Systems	(B) Low Power VLSI Circuits and Systems	(B) Advanced Operating Systems	(B) Fault Tolerant Computing
(C) Artificial Intelligence	(C) Machine Learning	(C) Data Mining	(C) Soft Computing	(C) Speech and Natural Language Processing	(D) Data Analytics
(D) Electronic Design Automation	(D) Computer Graphics	(D) Cloud Computing	(D) Human Computer Interaction	(D) Internet of Things	(D) Image Processing

Open Elective Courses (To be offered by Computer Science and Engineering Department)

Open Elective-I (CSU625)	Open Elective-II (CSU723)
Web Designing	Network Security
Data structure and Algorithm	Introduction to Database


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DEPARTMENT of COMPUTER SCIENCE & ENGINEERING

Equivalence Scheme

Program Name: - Computer Science & Engineering

Sr. No	Course code with Name of course (old)	Credit	Course code with Name of course(new)	Credit
1	ITU501 System Analysis and Design	3	CSU525 Program Elective-I (B) System Analysis and Design	3
2	ITU502 Database Management System	3	CSU521 Database Management Systems	3
3	CSU501 System Programming	3	No equivalence	
4	CSU502 Theory of Computation	3	CSU522 Formal Language and Automata Theory	4
5	CSU503 Principles of Management	3	No equivalence	
6	ITU503 System Analysis and Design lab	1	No equivalence	
7	ITU504 Database Management System lab	1	CSU526 Database Management Systems lab	2
8	CSU504 System Programming Lab	1	No equivalence	
9	CSU505 Hardware Lab	1	No equivalence	
10	ITU505 System administration-III Lab	2	No equivalence	
11	CSU506 Self Study I	2	No equivalence	
12			CSU523 Java and Python Programming	3
13			CSU525 Program Elective-I A) Graph Theory B) System Analysis & Design C) Artificial Intelligence D) Electronic Design Automation	3
14			CSU527 Java and Python Programming Lab	2
15	ITU601 Design and Analysis of Algorithms	3	CSU424 Design and Analysis of Algorithms	3
16	CSU601 Switching Theory and Logic Design	3	No equivalence	
17	CSU602 Operating System Design	3	CSU423 Operating System Design	3
18	CSU603 Computer Network	3	CSU524 Computer Network	3
19	CSU604 Software Project Management	3	CSU622 Software Engineering	3
20	ITU604 Design and Analysis of Algorithms Lab	1	CSU429 Design and Analysis of Algorithms Lab	2
21	CSU605 Switching Theory and Logic Design Lab	1	No equivalence	

(Signature)

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22	CSU606 Operating System Design Lab	1	CSU428 Operating System Design Lab	2
23	CSU607 Computer Network Lab	1	CSU528 Computer Network Lab	2
24	CSU608 Minor Project	2	No equivalence	
25	CSU609 Self Study II	2	No equivalence	
26	CSU610 Industrial Lecture I*	---	No equivalence	
27	No equivalence		CSU 621 Compiler Design	3
28	No equivalence		CSU623 Program Elective-II (A) Advanced Algorithms (B) Distributed Systems (C) Machine Learning (D) Computer Graphics	3
29	No equivalence		CSU624 Program Elective-III (A) Parallel and Distributed Algorithms (B) Embedded Systems (C) Data Mining (D) Cloud Computing	3
30	No equivalence		CSU625 Open Elective-I A) Web Designing B) Data structure and Algorithm	3
31	No equivalence		CSU626 Compiler Design Lab	2



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CSU521 DATABASE MANAGEMENT SYSTEM

Teaching Scheme: 03 L+00T Total - 03
Evaluation Scheme: 30MSE +10 TA+ 60 ESE
Duration of ESE: 2hrs.30min.

Credits: 03
Total Marks: 100

Course Objectives:

- I. To Understand the basic concepts of DBMS
- II. To learn data models, conceptualize and depict a database system using ER diagram.
- III. To understand the internal storage structures in a physical DB design.
- IV. To know the fundamental concepts of transaction processing techniques.

Introduction: Database System Applications, Purpose of Database System, Views of data, data models, Database Languages, database architecture and components of DBMS, Database System Applications, Database Users and Administrators, Database System Structure, History of Database Systems. Entity-Relationship Model, Basic Concepts, Design Issues, Entity-Relationship Diagram, ER Model, notations, examples.

Relational Model: Relational Data Model, Concept of relations, schema-instance distinction, referential integrity constraints, keys, referential integrity and foreign keys, relational algebra operators, Extended Relational-Algebra Operations SQL: Introduction, data definition in SQL, table, key and foreign key definitions, update behaviours. Querying in SQL, notion of aggregation, aggregation functions group by and having clauses, embedded SQL. Domain Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL, Encryption and Authentication.

Relational Database Design: Dependencies and Normal forms, dependency theory, functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, algorithms for 3NF and BCNF normalization, 4NF, and 5NF.

Query processing and optimization Evaluation of relational algebra expressions, query equivalence, join strategies, query optimization algorithms. **Storage strategies** Indices, B-trees, hashing.



Transactions: Transaction processing and Error recovery - concepts of transaction processing, ACID properties, concurrency control, locking based protocols for CC, error recovery and logging, undo, redo, undo-redo logging and recovery methods.

Advanced topics Object-oriented and object relational databases, logical databases, web databases, distributed databases, data warehousing and data mining.

Text Books:

1. Silberschatz Abraham, Korth Henry F., and Sudharshan S., "Database System Concepts", 6th edition Tata McGraw Hill, Sixth Edition, 2017.
2. Elmasri Ramez and Navathe Shamkant B., "Fundamentals of Database Systems", Pearson Education, Seventh Edition, 2017.

Reference Books:

 
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1. Date C. J., Kannan A. and Swamynathan S., "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006

2. Chodorow Kristina, "MongoDB: The Definitive Guide", 2 nd edition, O'Reilly, 2013

Course Outcomes:

CSU521.1 Ability to install, configure and interact with a relational database management system.

CSU521.2 Ability to master the basics of SQL and construct queries using SQL.

CSU521.3 Ability to obtain sound knowledge in the theory, principles and applications of database management system.

CSU521.4 Ability to identify issues in data storage, transaction, and concurrency control of DBMS.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU521.1	3	1	0	0	0	0	0	2	0	0	0	0	0	0	0
CSU521.2	3	1	2	0	3	0	0	2	0	0	0	2	3	0	0
CSU521.3	2	3	3	2	3	2	2	0	0	2	2	2	3	2	3
CSU521.4	3	3	0	0	2	0	2	0	2	3	2	2	2	2	1

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU522 FORMAL LANGUAGES AND AUTOMATA THEORY

Teaching Scheme: 03T + 01TU

Total: 04

Credits: 04

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. Develop a formal notation for strings, languages and machines.
- II. Design finite automata to accept a set of strings of a language.
- III. Prove that a given language is regular and apply the closure properties of languages.
- IV. Design context free grammars to generate strings from a context free language and convert them into normal forms.
- V. Prove equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
- VI. Identify the hierarchy of formal languages, grammars and machines.
- VII. Distinguish between computability and non-computability and Decidability and undecidability

Required background: Knowledge of CSU322 Discrete Mathematics

Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

Regular languages and finite automata: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.

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Context-free languages and pushdown automata: Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

Context-sensitive languages: Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

Turing machines: The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

Undecidability: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice's theorem, undecidable problems about languages.

Text-Book :

1. Introduction to Automata Theory, Languages, and Computation, John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman , Pearson Education Asia.

References Book:

1. Elements of the Theory of Computation, Harry R. Lewis and Christos H. Papadimitriou, Pearson Education Asia.
2. Automata and Computability, Undergraduate Texts in Computer Science, Dexter C. Kozen, Springer.
3. Introduction to the Theory of Computation, Michael Sipser, PWS Publishing.
4. Introduction to Languages and The Theory of Computation, John Martin, Tata McGraw Hill

COURSE OUTCOMES

On completion of the course the student should be able to

- CSU522.1 Write a formal notation for strings, languages and machines.
- CSU522.2 Design finite automata to accept a set of strings of a language.
- CSU522.3 For a given language determine whether the given language is regular or not.
- CSU522.4 Design context free grammars to generate strings of context free language.
- CSU522.5 Understand the associations between language classes and machine models.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU522.1	3	1	0	0	0	0	0	0	0	0	0	1	2	0	0
CSU522.2	3	3	3	0	2	0	0	1	0	0	0	0	3	3	0
CSU522.3	1	2	1	0	1	0	0	0	0	0	0	0	1	0	0
CSU522.4	2	3	0	1	1	0	0	0	0	0	0	0	3	3	0
CSU522.5	1	2	0	0	2	0	0	0	0	0	0	3	2	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated




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CSU 523 JAVA AND PYTHON PROGRAMMING THEORY

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2 Hours 30 Minutes

Course Objectives

- I. Understand and learn the syntax, semantics, and fundamentals of the Java & Python programming language.
- II. Understand and learn the concepts of Object Oriented Programming for the problem solving using Java and Python.
- III. Understanding the different types of exceptions and its handling mechanism.
- IV. Develop the programming skills to create fully functional and efficient real time applications as per the requirements.

Introduction to Java:

Features of Java, Basic Elements of Java Program, Data Types, Variables and its Scope, Type Conversion and Casting, Handling Input and Output. Classes, Object, Methods and Constructor. Exception Handling Mechanism.

Polymorphism, Inheritance, Interfaces and Packages:

Polymorphism, Inheritance and its Types, 'super' keyword, Abstract Classes and Methods, Interfaces, Nested Classes and Interfaces. Packages, Finding Packages and CLASSPATH, Access Protection.

Multithreading Programming in Java:

The Java Thread Model, The Main Thread, Creating Thread, Creating Multiple Thread, Thread Priorities, Synchronization, Inter-thread Communication, Deadlock, Suspending-Resuming-Stopping Thread.

Basic Web Programming:

Applets AWT, Swings, Event Handling in Java, JDBC/ODBC, Java Networking, Servlets

Introduction to Python: About Python, Python Goals, Why Python and its drawbacks, Versions of Python, **Data types, variables, basic input-output operations, Type Conversion, Strings, basic operators, Control Statements.**

Functions, Lists, tuples, and dictionaries: Declaring, Defining and Calling Functions, Basic list, tuples and dictionaries operations.

Errors and Exception in Python: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, Exception Chaining, User-defined Exceptions, Defining Clean-up Actions, Predefined Clean-up Actions

Implementing OOP concepts in Python: Classes, Objects, Constructor, Polymorphism, Inheritance, Packages, and Handling GUI in Python.

Text-Book:

1. Java: The Complete Reference, Eleventh Edition, 11th Edition, Herbert Schildt, Released December 2018, Publisher(s): McGraw-Hill, ISBN: 9781260440249
2. Object-Oriented Programming with C++ and Java, Debasis Samanta, Prentice Hall India.
3. T. R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016

References Book:



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1. Programming with Java, E Balagurusamy, McGraw Hill Education India.
2. THE Java™ Programming Language, Fourth Edition, Ken Arnold, James Gosling, David Holmes, Addison Wesley Professional
3. Fundamentals of Python: First Programs, Kenneth Lambert, Cengage Learning, 1st Ed., 2012.
4. An Introduction to Python, Guido van Rossum, Network Theory Ltd, 2011
5. <https://docs.python.org/3/tutorial/index.html>

References for Java

1. <https://ict.iitk.ac.in/product/core-java-eict-with-project-work/>
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092-introduction-to-programming-in-java-january-iap-2010/index.htm>
3. https://onlinecourses.nptel.ac.in/noc21_cs03/preview
4. [https://nitkkr.ac.in/docs/New%20B.Tech%20\(CO\)Scheme%20&%20Syllabi.pdf](https://nitkkr.ac.in/docs/New%20B.Tech%20(CO)Scheme%20&%20Syllabi.pdf)
5. <https://www.nitw.ac.in/media/Scheme&Syllabus-2014/BTECH-CSE-Syllabus.pdf>
6. <https://cse.iitkgp.ac.in/~dsamanta/java/index.htm>

References for Python

1. <https://docs.python.org/3/tutorial/index.html> (Documentation by Python Official Site)
2. <https://edube.org/study/pe1>
3. <https://edube.org/study/pe2>
4. <https://ict.iitk.ac.in/product/python-eict-with-project-work/>
5. https://onlinecourses.nptel.ac.in/noc21_cs33/preview
6. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/>

COURSE OUTCOMES

On completion of the course the student should be able to

- CSU523.1** Use an integrated development environment to write, compile, run, and test simple object-oriented Java and Python programs.
- CSU523.2** Analyze the problem statement and use object oriented programming concepts to solve these problems.
- CSU523.3** Analyze the run time exceptions and able to handle those runtime exceptions.
- CSU523.4** Create fully functional, usable, interactive and real time applications (desktop, mobile, web, mathematical, scientific, data science applications), games and much more.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU523.1	3	2	0	0	2	0	1	0	0	0	0	1	2	0	0
CSU523.2	3	3	3	0	2	0	1	0	2	0	0	1	3	2	0
CSU523.3	3	2	0	0	0	0	0	0	0	0	0	0	2	0	0
CSU523.4	1	3	3	2	0	0	0	3	0	1	0	1	0	2	3

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU524 COMPUTER NETWORK

Teaching Scheme: 03 T

Total – 03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

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Course objective:

- I. Introduce students to the basic concepts of computer networking.
- II. Expose students to core data communication protocols.
- III. Solidify understanding of concepts and networking protocols through a series of lab exercises.
- IV. Solidify understanding of the inner working of networking protocols by a term project involving with socket programming

Introduction to Data communication: Components, Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

Protocols and Architecture: Course logistics. Layering abstraction, Network architecture and protocols; Performance of networks: delay and throughput.

Application layer: HTTP, TELNET, FTP, EMAIL, Socket Programming, DNS, CDNs, server design, SMTP, web services, P2P

Transport layer: UDP and TCP, Reliability and congestion control in TCP, TCP analysis.

Network layer: Introduction, Routing protocols, Inter-domain routing, BGP, Router architecture, Resource allocation and QoS

Physical and Data Link layer: Physical layer overview; Data Link layer Introduction, multiple access protocols, switching, VLANs, MPLS, End-to-End Congestion Control.

Text Book:

1. Computer Networking: A top down Approach Featuring the internet, Jim Kurose, Keith Ross, 6th Edition, Addison Wesley, July 2002.
2. Computer Networks, A Systems Approach, Larry Peterson and Bruce Davie.

Reference Book:

1. Computer Networks, A.S. Tanenbaum, 4th Edition, PHI Publication, 2002.
2. Data and Computer Communication, William Stallings, 6th Edition, PHI Publication, 2007.
3. Data Communication and Networking, Behrouz A. Forouzan, 4th Edition, McGraw- Hill.
4. www.nptel.iitk.ac.in

Course Outcome:

- CSU524.1.** Understand the concepts of computer networking.
- CSU524.2.** Understand core data communication protocols, in particular, the mechanisms required to achieve reliable data communication.
- CSU524.3.** Understand core routing algorithms.
- CSU524.4.** Understand flow control and congestion control used in the Transmission Control Protocol.



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CSU524.5.Design and implement simple networked applications.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU524.1	3	1	0	0	0	0	2	0	0	0	0	1	2	0	0
CSU524.2	3	0	0	2	1	0	3	0	0	0	0	2	2	0	0
CSU524.3	3	0	0	3	1	0	3	0	0	0	0	2	2	0	0
CSU524.4	2	1	0	0	0	0	3	2	0	0	0	1	2	0	0
CSU524.5	1	2	3	0	0	0	0	0	0	0	3	2	3	3	2

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

PROGRAM ELECTIVE-I
CSU525 (A) GRAPH THEORY

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To understand the fundamental concepts and apply graph theory based tools in solving practical problems
- II. To have an idea of matching in graphs and study some applications of matching in day to day life problems.
- III. To study the idea of colouring graph, external problems and graphs on surface.
- IV. To understand the concept of digraphs, Euler digraphs, random graphs and Hamiltonian digraphs.
- V. To convert the everyday problems to graph theory problems and apply proof techniques with proper network flow

(Required background knowledge of CSU322 – Discrete Mathematics)

Basic Concepts: Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group; **Trees:** Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem, minimum spanning trees; **Connectivity:** Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger's theorem; **Paths and Cycles:** Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, girth, circumference, the Chinese Postman Problem, the Traveling Salesman problem, diameter and maximum degree, shortest paths;

Matching: Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartite and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f-factor theorem;

External problems: Independent sets and covering numbers, Turan's theorem, Ramsey theorems; **Colorings:** Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem; **Graphs on surfaces:** Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces;

Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, branching;



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Networks and flows: Flow cuts, max flow min cut theorem, perfect square; Dominating sets, the reconstruction problem, intersection graphs, perfect graphs.

Random Graphs: The basic models - use of expectations, simple properties of almost all graphs, almost determined variables – use of variance, Hamiltonian cycles, the phase transition.

Text-Book :

1. Introduction to Graph Theory, Douglas B. West, Prentice.Hall of India.
2. Graph Theory with Applications to Engineering and Computer Science, Narsingh Deo, Prentice-Hall.

References Book:

1. Graph Theory, Frank Harary, Narosa.
2. Network Flows: Theory, Algorithms, and Applications, R. Ahuja, T. Magnanti, and J. Orlin, Prentice-Hall.
3. Modern Graph Theory, Bollobas, Bela, Springer
4. Graph Theory, Diestel, R. Springer

COURSE OUTCOMES

On completion of the course the student should be able to

CSU525 (A).1The students will be able to apply principles and concepts of graph theory in practical situations.

CSU525 (A).2 Thorough understanding of the concepts in digraph, domination, perfect graphs and random graphs.

CSU525 (A).3 Familiarity in implementing the acquired knowledge of graph matching, coloring, surface use and network flow appropriately.

CSU525 (A).4 Mastery in executing various proof techniques on different graphs.

CO/PO/Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU525(A).1	3	2	2	0	0	0	0	0	0	0	0	1	3	0	0
CSU525(A).2	3	2	0	0	0	0	0	0	0	0	0	0	2	0	0
CSU525(A).3	2	3	0	1	0	0	0	0	0	0	0	0	3	1	0
CSU525(A).4	2	2	0	0	3	0	0	0	0	0	0	1	3	0	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU525 (B) SYSTEM ANALYSIS AND DESIGN

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. Introduces students to the whole systems development process
- II. To introduce variety of new software used by analysts, designers to manage projects
- III. Analyze and document systems, design new systems and implement their plans.
- IV. Good understanding of project management functions and estimation techniques.

Introduction : System Analysis & Design concepts, Role of system analyst, Review of SDLC, Organization as systems, Levels of management culture, Project fundamentals, Feasibility study, Activity planning & control, Managing analysis & design activities,


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Sampling and investigating hard data, Interviewing, Planning & conducting interview & reporting, Joint application design, using questionnaires, Planning, designing and administering the questionnaire.

Conservation of a decision-makers behaviour and office environment Prototyping: User Reactions, Approaches to prototyping & developing prototype, Data flow approach to requirements, developing DFDs, Logical & Physical DFDs, examples of DFDs, data dictionary concept, data repository, creating & using data dictionary.

Overview of process specifications: Structured English, decision tables/trees, decision support system & decision making concepts relevant to DSS, semi structured decisions, Multiple-criteria decision-making.

System Proposal: Ascertaining hardware/software needs, Identifying & forecasting cost/benefit & comparing cost/benefit, writing and presenting the systems proposals, Principles of delivery, output design objectives, designing printed output, screen output, Input design objectives, form design, screen design for input.

Introduction to OOSAD : Object-oriented Analysis, object-oriented design.

Text-Book:

1. System Analysis and Design, Kenneth E. Kendall & Julie E.Kendal, 5th Edition, Prentice Hall, 2005.
2. System Analysis & Design, Yeates, 2nd edition, Pearson publication, 2004

Reference Books:

1. Fundamentals of System Analysis & Design J.Fitzgerald & A.Fitzgerald ,3rd Edition, John Wiley Publication, 1987.
2. <https://nptel.ac.in/courses/106/108/106108102/>

COURSE OUTCOMES


On completion of the course the student should be able to

- CSU525(B).1** A firm basis for understanding the life cycle of a systems development project.
- CSU525(B).2** An understanding of the analysis and development techniques required as a team member of a medium-scale information systems development project.
- CSU525(B).3** An understanding of the ways in which an analyst's interaction with system sponsors and users play a part in information systems development.
- CSU525(B).4** Experience in developing systems project documentation

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU525(B).1	2	2	3	0	2	0	0	0	0	0	0	1	2	0	0
CSU525(B).2	1	2	2	0	0	0	0	0	3	2	3	0	2	0	0
CSU525(B).3	0	0	0	0	0	0	0	2	2	3	2	0	0	0	0
CSU525(B).4	0	0	0	0	0	0	0	2	0	3	0	0	0	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated


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CSU 525 (C) ARTIFICIAL INTELLIGENCE

Teaching Scheme: 03 L

Total-03

Credit: 03

Evaluation Scheme: 30MSE+10TA + 60 ESE

Total Marks: 100

Duration of ESE: 2:30 hrs

Course Objective

- I. To gain a historical perspective of AI and its foundations.
- II. To become familiar with basic principles of AI toward problem solving, perception, knowledge representation, and learning.
- III. To investigate applications of AI techniques in intelligent agents, artificial neural networks and other models.
- IV. To explore the current scope, potential, limitations, and implications of intelligent systems

Introduction: AI and intelligent agents. Basics of problem-solving: problem representation paradigms, state space, satisfiability vs optimality, pattern classification problems, example domains.

Search Techniques: Problem size, complexity, Solving Problems by Searching such as heuristic search techniques, stochastic search methods, and constraint satisfaction problems

Game Playing: minimax, Knowledge and Reasoning: Building a Knowledge Base, Propositional logic, first order Logic, situation calculus. Theorem Proving in First Order Logic.

Knowledge Acquisition: Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks. Belief functions, certainty factors, and fuzzy sets.

Learning: Overview of different forms of learning, Learnability theory, learning Decision Trees, Neural Networks, rule based.

Introduction to Natural Language Processing, AI languages and systems


Text Book

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, Prentice-Hall.
2. Artificial Intelligence: A New Synthesis, Nils J. Nilsson, Morgan-Kaufmann.
3. AI: Structures and Strategies for Complex problem solving, George F.Luger and William A. Stubblefield, 2nd edition, Benjamin Cummings Publishers, 1997.

Reference Book

1. Introduction to Knowledge Systems, Mark Stefik, Morgan Kaufman, 1995.
2. Artificial Intelligence, Winston P.H., 3rd edition, Addison Wesley, 1995.
3. Artificial Intelligence, Shivshankar B Nair, E. Rich and K.Knight, Tata McGraw Hill, 1992.
4. Artificial Intelligence, E. Charniack and D. McDermott, Addison Wesley, 1987.
5. A classical approach to Artificial Intelligence, Munesh Chandra Trivedi, Khanna Publications
6. Artificial Intelligence and Machine Learning, Chandra S.S. & H.S. Anand, PHI Publications
7. <https://nptel.ac.in/courses/106/105/106105077/>

Course Outcomes:



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Upon successful completion of this course, the student shall be able to:

CSU 525 (C).1 Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

CSU 525 (C).2 Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CSU 525 (C).3 Implement various applications of AI techniques in intelligent agents, artificial neural networks.

CSU 525 (C).4 Demonstrate ability to share in discussions of AI, its current scope and limitations, and societal implications

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU525(C).1	3	1	0	0	2	0	0	0	0	0	0	0	2	0	0
CSU525(C).2	3	3	2	1	2	1	0	0	0	0	0	1	3	0	0
CSU525(C).3	2	2	3	1	2	1	0	0	0	0	0	0	3	3	1
CSU525(C).4	2	2	3	1	2	1	0	0	0	0	0	0	3	3	1
CSU525(C).5	3	2	0	0	0	0	2	0	0	2	0	2	2	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU525 (D) ELECTRONIC DESIGN AUTOMATION

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To introduce the fundamental concepts Electronic Design Automation
- II. To impart knowledge about the optimization of combinational circuits
- III. To enable the students to understand the various techniques for partitioning
- IV. To Understanding the concepts of digital circuit and system modelling

Two-level and multi-level logic optimization of combinational circuits, state assignment of finite state machines. Technology mapping for FPGAs. Techniques for partitioning, floor planning, placement and routing. Architectural models, scheduling, allocation and binding for high-level synthesis.



Hardware-software codesign. Test generation, fault simulation, built-in self test, test structures. Verilog and VHDL.

Text-Book :

1. Contemporary Logic Design, R. H. Katz, Addison-Wesley.
2. Algorithms for VLSI Physical Design Automation, N. A. Sherwani, Kluwer Academic Publishers.
3. VLSI Physical Design Automation: Theory and Practice, S. M. Sait and H. Youssef, World Scientific.

Reference Books:

1. Application-Specific Integrated Circuits, M. J. S. Smith, Addison-Wesley.
2. Modern VLSI Design: Systems on Silicon, W. Wolf, Pearson Education.
3. Verilog VHDL Synthesis: A Practical Primer, J. Bhasker, B S Publications.

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4. High-level Synthesis: Introduction to Chip and System Design, D. D. Gajski, N. D. Dutt, A. C. Wu and A. Y. Yin, Kluwer Academic Publishers.
5. Digital Systems Testing and Testable Design, M. Abramovici, M. A. Breuer and A. D. Friedman, IEEE Press.
6. Built-in Test for VLSI: Pseudo-random Techniques, P. Bardell, W. H. McAnney and J. Savir, John Wiley and Sons.
7. An Introduction to Physical Design, M. Sarrafzadeh and C. K. Wong, McGraw Hill

COURSE OUTCOMES

On completion of the course the student should be able to

CSU525 (D).1 Understanding and utilizing the concepts of digital circuit and system modelling

CSU525 (D).2 To evaluate the quality of a design mapping and mapping approach

CSU525 (D).3 Design and develop modular programming skills

CSU525 (D).4 To implement design automation algorithms

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU525(D).1	3	3	0	0	2	0	0	0	0	0	0	0	1	0	0
CSU525(D).2	3	2	1	0	0	0	0	0	0	0	0	2	2	0	0
CSU525(D).3	1	1	3	0	3	0	2	0	0	0	1	0	0	3	3
CSU525(D).4	1	1	3	0	0	0	2	0	0	0	1	0	1	3	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 526 DATABASE MANAGEMENT SYSTEMS LABOURTARY

Teaching Scheme: 04 P

Total 04

Credit: 02

Evaluation Scheme: 25 ICA + 25 EXT

Total Marks: 50

Course Objectives:

- I. To give a good formal foundation on the relational model of data.
- II. To present SQL and procedural interfaces to SQL comprehensively.

The sample list of programs based on ORACLE or MY SQL is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to achieve the minimum expected outcomes.

List of Experiments:

1. SQL and installation of SQL server/oracle.
2. Data Definition Language (DDL) commands in RDBMS
3. Data Manipulation Language (DML) and Data Control Language (DCL)
4. Data types and create a database and write the program to carry out the following operation.
5. Create tables department and employee with required constraints.
6. Working with null values, matching the pattern from the table.

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7. Aggregate functions: grouping the result of a query.
8. Set operators, Nested Queries, Joins and Sequences.
9. Views, indexes, database security and privileges: Grant and Revoke commands, Commit and Rollback commands.
10. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
11. Triggers and Cursor Management in PL/SQL.
12. Procedures and Functions
13. Automatic Backup of Files and Recovery of Files.
14. As a designer identify the views that may have to be supported and create views.
15. Mini Project Using Oracle 9i or MY SQL

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE – The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

Lab Outcomes:

CSU 526.1 Ability to design and implement a database schema for a given problem-domain.

CSU 526.2 Ability to normalize a database.

CSU 526.3 Populate and query a database using SQL DML/DDDL commands.

CO/PO/ Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU526.1	0	0	3	0	3	0	0	0	0	0	3	2	0	3	0
CSU526.2	0	3	3	0	2	0	0	0	0	0	1	0	2	3	0
CSU526.3	1	1	3	0	3	1	0	0	0	0	0	0	2	1	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU 527 JAVA AND PYTHON PROGRAMMING LAB

Teaching Scheme: 04P

Total: 04

Credits: 02

Evaluation Scheme: 25 Internal + 25 External

Total Marks: 50

ESE Duration: 3 Hours

Course Objectives

- I. Understand and learn the syntax, semantics, and fundamentals of the Java & Python programming language.
- II. Understand and learn the concepts of Object Oriented Programming for the problem solving using Java and Python.
- III. Understanding the different types of exceptions and its handling mechanism.
- IV. Develop the programming skills to create fully functional and efficient real time applications as per the requirements.




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LAB Experiments

8 to 10 Experiments for JAVA and PYTHON each based on syllabus in CSU 523 JAVA AND PYTHON PROGRAMMING

Sample List

Note: This is just a sample list of programs to be performed in lab. However course coordinator may prepare their own list

JAVA

Exercise - 1 (Basics)

- Write a JAVA program to display default value of all primitive data type of JAVA
- Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminant D and basing on value of D , describe the nature of root.
- Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
- Write a case study on public static void main (250 words)

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

- Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- Write a JAVA program to sort for an element in a given list of elements using bubble sort
- Write a JAVA program to sort for an element in a given list of elements using merge sort.
- Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3 (Class, Objects)

- Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
- Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

- Write a JAVA program to implement constructor overloading.
- Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)


- Write a JAVA program to implement Single Inheritance
- Write a JAVA program to implement multi-level Inheritance
- Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

- Write a JAVA program give example for “super” keyword.
- Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

- Write a JAVA program that describes exception handling mechanism
- Write a JAVA program Illustrating Multiple catch clauses


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Exercise – 8 (Runtime Polymorphism)

- a). Write a JAVA program that implements Runtime polymorphism
- b). Write a Case study on run time polymorphism, inheritance that implements in aboveproblem

Exercise – 9 (User defined Exception)

- a). Write a JAVA program for creation of Illustrating throw
- b). Write a JAVA program for creation of Illustrating finally
- c). Write a JAVA program for creation of Java Built-in Exceptionsd).Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

- a). Write a JAVA program that creates threads by extending Thread class .First thread display“Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds ,(Repeat the same by implementing Runnable)
- b). Write a program illustrating isAlive and join ()
- c). Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

- a).Write a JAVA program Producer Consumer Problem
- b).Write a case study on thread Synchronization after solving the above producer consumerproblem

Exercise – 12 (Packages)

- a). Write a JAVA program illustrate class path
- b). Write a case study on including in class path in your os environment of your package.c). Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)

- a).Write a JAVA program to paint like paint brush in applet.
- b) Write a JAVA program to display analog clock using Applet.
- c). Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

- a).Write a JAVA program that display the x and y position of the cursor movement usingMouse.
- b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Exercise - 15 (Swings)

- a).Write a JAVA program to build a Calculator in Swings
- b). Write a JAVA program to display the digital watch in swing tutorial.

Exercise – 16 (Swings - Continued)

- a). Write a JAVA program that to create a single ball bouncing inside a JPanel.b). Write a JAVA program JTree as displaying a real tree upside down



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Exercise – 17 (Servlets with JDBC)

- a). Develop fully functional Login Application

PYTHON

Basics

- a) Running instructions in Interactive interpreter and a Python Script
b) Write a program to purposefully raise Indentation Error and correct it

Operations

- a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Control Flow

- a) Write a Program for checking whether the given number is a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of $1/2$, $1/3$, $1/4$, ..., $1/10$
c) Write a program using a for loop that loops over a sequence. What is sequence?
d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Control Flow -Continued

- a) Find the sum of all the primes below two million.
b) Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ... By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

DS

- a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.
c) Write a program combine lists that combines these lists into a dictionary.
d) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a textfile?

Files

- a) Write a program to print each line of a file in reverse order.



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b) Write a program to compute the number of characters, words and lines in a file.

Functions

a) Write a function ball collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius. If (distance between two balls centers) \leq (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

c) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

d) Write a function dups to find all duplicates in the list.

e) Write a function unique to find all the unique elements of a list.

Functions -Problem Solving

a) Write a function cumulative product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Multi-D Lists

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Modules

a) Install packages requests, flask and explore them. Using (pip)

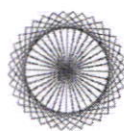
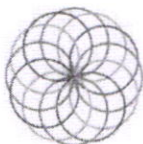
b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)

c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

Graphics

a) Write a GUI for an Expression Calculator using tk

b) Write a program to implement the following figures using turtle



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ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE – The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

COURSE OUTCOMES

On completion of the course the student should be able to

- CSU527.1-** Use an integrated development environment to write, compile, run, and test simple object-oriented Java and Python programs.
- CSU527.2-** Analyze the problem statement and use object oriented programming concepts to solve these problems.
- CSU527.3-** Analyze the run time exceptions and able to handle those runtime exceptions.
- CSU527.4-** Create fully functional, usable, interactive and real time applications (desktop, mobile, web, mathematical, scientific, data science applications), games and much more.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU527.1	1	2	3	0	2	0	1	1	0	0	0	0	2	0	0
CSU527.2	2	3	3	0	0	0	1	0	0	0	0	0	3	2	0
CSU527.3	3	2	0	0	0	0	0	0	0	0	0	0	3	0	0
CSU527.4	1	3	3	2	0	0	0	3	0	1	0	0	3	2	2

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU528 COMPUTER NETWORK LAB

Teaching Scheme: 04 P

Total 04

Credits: 02

Evaluation Scheme: 25 ICA + 25ESE

Total Marks: 50

Course Objectives:

- I. To implement a simple LAN with hubs, bridges and switches.
- II. To describe how computer networks are organized with the concept of layered approach.

Minimum eight experiments shall be performed to cover entire curriculum of CSU627 (Computer Network) and the list given is just a guideline.

List of Experiments:

1. Types of Network Cables.
2. Wired and Wireless NIC.
3. Install and configure Network Devices: HUB, Switch and Routers.
4. Creating a Local Area Network.
5. Configure Host IP, Subnet Mask and Default Gateway in a System in LAN (TCP/IP Configuration)
6. Network Commands: Ipconfig, Ping / Tracer and NetStat.
7. Network Debugging.
8. Transferring files in LAN.

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9. Print server in a LAN, Sharing the Printer.
10. Router Configuration Using Packet Tracer.
11. Connection oriented Client server applications with TCP Assignment.
12. Connectionless Client server applications with UDP Assignment.
13. Programs using RPC remote procedure call
14. Client server applications using concurrent server, Multi-protocol server and super server.
15. Chat and mail server implementation.
16. Implementation of Telnet, FTP
17. Stop and Wait Protocol and Sliding Window.
18. Go back-N And Selective Repeat Protocols.
19. High-Level Data Link Control.
20. Socket Programming and Client – Server Model
21. Network Topologies.
22. Distance Vector Routing Protocol and Link State Vector Routing Protocol.
23. Address Resolution Protocol.
24. Simulate the Implementing Routing Protocols using Border Gateway Protocol (BGP).
25. Simulate the OPEN SHORTEST PATH FIRST routing protocol based on the cost assigned to the path.

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

Lab Outcomes:

CSU528.1 Understand fundamental underlying principles of computer networking.

CSU528.2 Analyze performance of various communication protocols

CSU528.3 Analyze and Design Modern networked applications.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU528.1	3	0	0	1	3	0	2	0	0	0	0	1	2	0	0
CSU528.2	3	0	0	2	1	3	3	0	0	1	0	2	2	0	0
CSU528.3	1	3	3	0	0	0	0	0	0	0	3	2	2	0	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU621 COMPILER DESIGN

Teaching Scheme: 03L

Total: 03

Credits: 03


Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 mins.

Course Objectives

- I. To understand and list the different stages in the process of compilation.
- II. Identify different methods of lexical analysis
- III. Design top-down and bottom-up parsers
- IV. Identify synthesized and inherited attributes


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- V. Develop syntax directed translation schemes
- VI. Develop algorithms to generate code for a target machine

Required background knowledge: CSU522 Formal Language and Automata Theory

Introduction: Language processor, phases of compilation and overview.

Lexical Analysis (scanner): Role of lexical analyzer, input buffering, specification and recognition of tokens, scanner generator (lex, flex)

Syntax Analysis (Parser): LL(1) grammar and top-down parsing, operator grammar, LR(0), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)

Semantic Analysis: Syntax directed definition, evaluation and flow of attribute in a syntax tree, translation scheme, symbol tables.

Intermediate Code Generation: Translation of different language features, different types of intermediate forms, Type checking, **Run-time environment:** storage organization and allocation strategies parameter passing mechanism.

Code generation & optimization: Issues in code generation, basic blocks and flow graphs, optimization of basic blocks, peephole optimization, register allocation and assignment, sources of optimization, loops in flow graph.

Text-Book:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, 2nd edition, Pearson Addison-Wesley, 2013.
2. Engineering a Compiler, Keith D. Cooper and Linda Torczon, 2nd edition, Morgan Kaufmann, 2011.

References Book:

1. Compiler Construction– Principles and Practice, Kenneth C. Louden, 1st edition, PWS Publishing, 1997.
2. Modern Compiler Implementation C, Andrew W. Appel, 1st edition, Cambridge University Press, 2004.

COURSE OUTCOMES

On completion of the course the student should be able to

- CSU621.1 Develop the lexical analyzer for a given grammar specification.
- CSU621.2 Design top-down and bottom-up parsers for a given parser specification
- CSU621.3 Develop syntax directed translation schemes
- CSU621.4 Design algorithms to generate code for a target machine

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU621.1	3	2	2	0	2	0	0	0	0	0	0	2	2	0	2
CSU621.2	2	2	3	0	2	0	0	1	0	0	1	0	2	0	0
CSU621.3	2	2	3	0	1	0	0	0	0	0	0	0	3	0	0
CSU621.4	2	3	2	0	0	0	0	1	0	0	0	0	0	3	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU622 SOFTWARE ENGINEERING

Teaching Scheme : 03L

Total 03

Credits 03

Evaluation Scheme: 30MSE+10TA+ 60ESE

Total Marks: 100


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Course Objectives

- I. To develop an ability to look at the Computer Science discipline from Software Engineering Systems perspective.
- II. To develop understanding of generic processes of software development and learn different techniques and methodologies used in development of large software systems.
- III. To develop analytical ability to employ various strategies in selecting from various models of different stages of software development.
- IV. To develop ability to understand role of teamwork in software development and ability to effectively communicate in written forms at various stages of the developmental process.
- V. To develop ability to pursue life-long learning as required for software developers for different skills at conceptual, strategic, and operational level.

Introduction to software engineering: Scope and necessity of software engineering- Evolution of software design techniques-Recent challenges in software industry

Software life cycle model: Need for software life cycle model-Different life cycle models Waterfall model-Iterative waterfall model Prototyping model-Evolutionary model-Spiral model-Agile development methodologies-Rational unified process (RUP) - Extreme Programming (XP)

Requirement analysis and specification: Requirements engineering-Types of system requirements-Role of system analyst-Software requirement specification-Formal requirement specification

System Design: System modelling- Unified modelling language (UML)-Design Challenges Design Practices- Top-down and bottom-up design- Experimental prototyping Collaborative design Basic concepts in user interface design: Characteristics of a user interface-Types of user interfaces-Component based graphical user interface design

Software Testing and Quality Management: Role of testing-Testing strategies-Unit tests-Integration testing-Top down integration-Bottom up integration Validation testing-Alpha testing-Beta testing Other forms of high-level testing-Stress testing Code inspections-Manual testing-Automated testing-Breaking tests-Regression testing Examples of testing frame works (Tinderbox, JUnit)

Quality concepts, quality assurance, software reviews, statistical quality assurance.

Software configuration management and advance topics : Elements of configuration management system, process configuration for web engineering, component-based development, clean room software engineering, formal methods, software reengineering, Software Maintenance.

Text Books:



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1. Software Engineering: A Practitioner's Approach, Roger S Pressman, McGraw-Hill Higher Education, 7th Edition.
2. Software Engineering, Ian Sommerville, Pearson Education, 9th Edition.

References:

1. A concise introduction to software engineering, P. Jalote, Springer Verlag, 2008.
2. An integrated approach to software engineering, P. Jalote Springer Verlag, third edition 2005.

Course Outcomes:

After completion of this course student will be able to

CSU622.1 Look at the large scale software development from a broader perspective, and function in multidisciplinary teams.

CSU622.2 Apply knowledge gained in the course to practical software development situations in methodical way.

CSU622.3 Design software systems to meet desired needs with realistic constraints.

CSU622.4 Communicate effectively in software development activities.

CSU622.5 Get an idea about contemporary issues in Software development and engage in life-long learning, understand professional and ethical responsibility.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU622.1	3	3	0	0	0	0	0	0	2	0	3	0	2	0	0
CSU622.2	3	3	1	0	0	2	1	0	0	0	0	0	2	0	0
CSU622.3	2	3	3	0	0	0	1	0	0	0	0	0	2	3	0
CSU622.4	0	0	0	0	0	0	0	0	3	3	3	0	0	0	0
CSU622.5	0	0	0	1	0	0	0	3	2	2	2	3	1	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

PROGRAM ELECTIVE-II
CSU 623 (A) ADVANCED ALGORITHMS

Teaching Scheme: 03L

Total: 03

Credit: 03

Evaluation Scheme: 30MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2 Hrs. 30 min.

COURSE OBJECTIVE

- I. To introduce students to the advanced methods of designing and analysing algorithms
- II. The student should be able to choose appropriate algorithms and use it for a specific problem
- III. To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems
- IV. To understand different classes of problems concerning their computation difficulties.

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Graph: Definitions and Elementary Algorithms: depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path

Flow-Networks: Maxflow-minicut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

One or more of the following topics based on time and interest Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm

Text-Book:

1. Introduction to Algorithms, Cormen, Leiserson, Rivest, Stein.
2. The Design and Analysis of Computer Algorithms, Aho, Hopcroft, Ullman.

Reference Books:

1. Algorithm Design, Kleinberg and Tardos

COURSE OUTCOMES

After completion of course, students would be able to:

CSU623 (A).1 Analyze the complexity/performance of different algorithms.

CSU623 (A).2 Determine the appropriate data structure for solving a particular set of problems.

CSU623 (A).3 Categorize the different problems in various classes according to their complexity.

CSU623 (A).4 Have an insight of recent activities in the field of the advanced data structure.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU623(A).1	3	3	0	0	0	0	0	0	0	0	0	1	2	0	0
CSU623(A).2	2	3	3	0	0	1	0	0	0	0	0	0	3	2	0
CSU623(A).3	3	3	0	0	0	0	2	0	0	0	0	0	3	0	0
CSU623(A).4	3	2	2	1	0	0	0	1	0	0	0	0	2	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU623 (B) DISTRIBUTED SYSTEMS

Teaching Scheme: 03L

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

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Course Objectives

- I. To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems
- II. To learn the principles, architectures, algorithms and programming models used in distributed systems
- III. To learn the distributed object and databases

Basic concepts. Models of computation: shared memory and message passing systems, synchronous and asynchronous systems. Logical time and event ordering. Global state and snapshot algorithms, mutual exclusion, clock synchronization, leader election, deadlock detection, termination detection, spanning tree construction.

Programming models: Request-reply protocols, remote procedure calls, distributed shared memory.

Fault tolerance and recovery: basic concepts, fault models, agreement problems and its applications, commit protocols, voting protocols, check pointing and recovery, reliable communication.

Distributed File Systems: File service architecture, Case study: Sun Network File System, Case study: The Andrew File System, Enhancements and further developments

Security and Authentication: basic concepts, Kerberos. Resource sharing and load balancing.

Special topics: distributed objects, distributed databases, directory services, web services.

Text-Book :

1. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg & Gordon Blair, 5th ed, Addison-Wesley, 2012
2. Andrew S. Tanenbaum, Distributed Operating Systems, ACM Press.

References Book:

1. Advanced Concepts in Operating Systems, Mukesh Singhal and Niranjana Shivaratri, McGraw-Hill.
2. Distributed Algorithms, Nancy Lynch, Morgan Kaufmann.
3. Distributed Systems, Jie Wu, CRC Press.
4. Distributed Computing: Fundamentals, Simulations and Advanced Topics, Hagit Attiya, Jennifer Welch, McGraw-Hill.
5. Distributed Systems, Sape Mullender (ed.), Addison-Wesley.

COURSE OUTCOMES

On completion of the course the student should be able to

CSU623 (B).1 Apply knowledge of distributed systems techniques and methodologies.

CSU623 (B).2 Explain the design and development of distributed systems and distributed systems applications.

CSU623 (B).3 Use the application of fundamental Computer Science methods and algorithms in the development of distributed systems and distributed systems applications.

CSU623 (B).4 Understand the importance of security in distributed systems

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU623(B).1	3	2	0	0	0	0	0	2	0	0	0	0	3	1	0
CSU623(B).2	3	2	3	0	0	0	2	2	0	0	0	0	2	3	0
CSU623(B).3	2	3	1	1	0	0	0	0	0	0	0	1	2	0	0



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CSU623(B).4	3	2	0	2	0	1	2	3	0	0	0	0	1	0	0
0- Not correlated	1 - Weakly Correlated			2- Moderately Correlated			3- Strongly Correlated								

CSU623 (C) MACHINE LEARNING

Teaching Scheme : 03L **Total 03** **Credits: 03**
Evaluation Scheme: 30MSE +10TA+ 60ESE **Total Marks: 100**
Duration of ESE: 2Hrs.30min

Course Objectives

- I. To explore supervised, unsupervised and reinforcement learning paradigms of machine learning.
- II. To design and implement machine learning solutions to classification, regression, and clustering problems.
- III. To design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- IV. To learn to apply machine learning algorithms on real world problems.

Required Knowledge: Calculus & Linear Algebra; Programming language

Introduction to Machine Learning: The concept learning task. General-to-specific ordering of hypotheses. Version spaces. Inductive bias. Decision Tree Learning. Rule Learning: Propositional and First-Order, Over-fitting, Cross-Validation. Experimental Evaluation of Learning Algorithms Instance-Based Learning: k-Nearest neighbour algorithm, Radial basis functions. Case-based learning. Computational Learning Theory: probably approximately correct (PAC) learning. Sample complexity. Computational complexity of training.

Supervised Learning: Linear and Logistic Regression, Assessing performance of Regression- Error measures, Over-fitting- Catalysts for Over-fitting, Case study of Polynomial Regression. Gradient Descent, Support Vector Machines, Decision Trees, ML and MAP Estimates, K-Nearest Neighbour, Naive Bayes.
Binary Classification- Assessing Classification performance, Multiclass Classification.

Unsupervised learning algorithms: K-Means clustering, Expectation Maximization, Gaussian Mixture Models. PAC Learnability, Learning with Partially Observable Data (EM). Dimensionality Reduction and Principal Component Analysis (PCA). Bias Variance Trade-off. Model Selection and Feature Selection. Regularization. Learning Theory. Introduction to Markov Decision Processes.

Reinforcement Learning: Ensemble learning- Boosting, Bagging, Random forests and some application areas of machine learning e.g. applications on the web mining, Image recognition, text and speech recognition.

Text Book:

1. Machine Learning, Tom Mitchell, McGraw-Hill, 1997.
2. Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Peter Flach, Cambridge University Press, Edition 2012.




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3. Introduction to Statistical Machine Learning with Applications in R, Hastie, Tibshirani, Friedman, Springer, 2nd Edition-2012.

Reference Books

1. Introduction to Machine Learning, Ethem Alpaydin, PHI 2nd Edition-2013.
2. Reinforcement and Systematic Machine Learning for Decision Making, Parag Kulkarni, Wiley IEEE Press, Edition July 2012.
3. <https://nptel.ac.in/courses/106/105/106105152/>

Course Outcomes

After this completion of this course student will be able to

- CSU623(C).1** Understand fundamental issues and challenges of machine learning, data model selection and model complexity.
- CSU623(C).2** Analyze the strengths and weaknesses of many popular machine learning approaches.
- CSU623(C).3** Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning.
- CSU623(C).4** Design and implement various machine learning algorithm in a range of real world applications.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU623(C).1	3	3	0	0	0	0	0	0	0	0	0	2	2	0	0
CSU623(C).2	2	3	1	1	0	0	1	0	0	0	0	0	2	0	0
CSU623(C).3	3	3	2	2	1	0	0	0	0	0	0	0	0	2	0
CSU623(C).4	0	2	3	3	0	0	1	1	0	0	2	2	3	3	1

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU 623 (D) COMPUTER GRAPHICS

Teaching Scheme: 03 L

Total-03

Credit: 03

Evaluation Scheme: 30MSE+10TA + 60 ESE

Total Marks:100

Duration of ESE: 2:30 hrs

Course Objective

- I. To provide overview of computer graphics.
- II. To understand the mathematical concepts and algorithms used in computer graphics in two and three dimensions.
- III. To learn the graphics programming experience with WebGL.
- IV. To discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

Introduction: Display of entities, Geometric computation and representation, Graphics Environments; Working Principles of display devices: refreshing raster scan devices, vector devices, Cathode Ray Tube Terminals, Plotters; Display of colors: Look Up Tables, display of gray shades, Half toning, Graphics Pipeline.

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Display and drawing of graphics primitives: point, line, polygon, circle, curves and text; Coordinate Conventions: world coordinates, device coordinates, normalized device coordinates, view-port and window,

Computations on polygons: point inclusion problem, polygon filling, polygon intersection, clipping, polygonization of a point set, convex hull computation, triangulation of polygons;

Transformations in 2D and 3D: translation, rotation, scaling, reflection, Projection: perspective and parallel projections, isometric projection, Transformation matrices;

Volume and Surface Representation: polygonal meshes, parametric curves and surfaces, Surfaces and Volumes by rotation of curves and surfaces, Hidden surface and line elimination: Elimination of back surfaces, painters' algorithms,

Rendering and Visualization: Shading model, Constant, Ray tracing algorithm, Radiosity Computation; fundamental concepts of Computer Animation and WebGL

Text Book

1. Computer Graphics: Principles and Practice, 3rd ed. J. Hughes, A. Van Dam, et. al. Addison - Wesley, 2013.
2. Computer Graphics with OpenGL, 4th ed. (or 3rd ed.), D. Hearn and M.P. Baker, Prentice-Hall, 2010.

References

1. Fundamentals of Computer Graphics, P. Shirley et al., A.K. Peters, 4th edition, 2015.
2. The OpenGL Programming Guide, Neider, Davis, Woo, Addison-Wesley.
3. <https://nptel.ac.in/courses/106/106/106106090/>

Course Outcomes

CSU623 (D).1 Describe the graphics environment and graphics devices.

CSU623 (D).2 Implements various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.

CSU623 (D).3 Describe the importance of viewing and projections.

CSU623 (D).4 Define the fundamentals of animation and its related technologies.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU623(D).1	3	2	0	0	0	0	0	0	0	0	0	1	2	0	0
CSU623(D).2	2	3	3	0	2	1	0	1	0	0	0	0	2	3	0
CSU623(D).3	2	2	0	2	0	0	1	0	0	0	0	2	2	2	0
CSU623(D).4	3	2	0	1	2	0	1	2	0	0	1	0	3	0	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

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PROGRAM ELECTIVE III

CSU624 (A) PARALLEL AND DISTRIBUTED ALGORITHMS

Teaching Scheme: 03 L

Total - 03

Credits: 03

Evaluation Scheme: 30MSE +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. To learn parallel and distributed algorithms development techniques for shared memory and message passing models.
- II. To study the complexity and correctness models for parallel algorithms.
- III. To study the complexity and correctness models for parallel algorithms.
- IV. To provide students with contemporary knowledge in parallel and distributed computing.
- V. To focus on performance and flexibility issues related to systems design decisions.
- VI. To introduce a variety of methodologies and approaches for reasoning about concurrent and distributed algorithms.

Parallel Algorithms: Parallel Programming Models: Shared-memory model (PRAM, MIMD, SIMD), network model (line, ring, mesh, hypercube), performance measurement of parallel algorithms.

Algorithm Design Techniques for PRAM Models: Balancing, divide and conquer, parallel prefix computation, pointer jumping, symmetry breaking, pipelining, accelerated cascading. Algorithms for PRAM Models: List ranking, sorting and searching, tree algorithms, graph algorithms, string algorithms.

Algorithms for Network Models: Matrix algorithms, sorting, graph algorithms, routing, Relationship with PRAM models. Parallel Complexity: Lower bounds for PRAM models, the complexity class NC, P-completeness.

Distributed Algorithms Basic concepts and Models of computation: shared memory and message passing systems, synchronous and asynchronous systems. Logical time and event ordering. Global state and snapshot algorithms, clock synchronization.

Distributed Operating Systems: Mutual exclusion, deadlock detection. Classical Algorithms: Leader election, termination detection, distributed graph algorithms.

Fault tolerance and recovery: basic concepts, fault models, agreement problems and its applications, commit protocols, voting protocols, checkpointing and recovery, reliable communication. Security and Authentication: basic concepts, Kerberos. Resource sharing and load balancing.

Text books:

1. An Introduction to Parallel Algorithms, Joseph F Jaja, Addison-Wesley, 1992.
2. Advanced Concepts in Operating Systems, Mukesh Singhal and Niranjan Shivaratri, McGraw-Hill.

Reference books:



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1. Parallel Computing: Theory and Practice, Michael J Quinn, second edition, McGraw Hill, 1994/2002.
2. Parallel Programming in C with MPI and OpenMP, Michael J Quinn, first edition, McGraw Hill, 2004/2003. 39
3. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, second edition, Addison-Wesley/Pearson, 1994/2003.
4. Distributed Algorithms, Nancy Lynch, Morgan Kaufmann.
5. Distributed Operating Systems, Andrew S. Tanenbaum, ACM Press.

Course Outcomes:

- CSU 624 (A).1.** Design and analyze the parallel algorithms for real world problems and implement them on available parallel computer systems.
- CSU 624 (A).2.** Analyze the concepts and issues related to distributed systems.
- CSU 624 (A).3.** Design and develop the programs for distributed environment.
- CSU 624 (A).4.** Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc.
- CSU 624 (A).5.** Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU624(A).1	3	3	3	0	0	0	0	0	0	0	0	0	3	0	0
CSU624(A).2	2	2	2	0	0	0	1	0	0	0	0	1	2	0	0
CSU624(A).3	1	2	3	0	3	0	0	0	0	0	2	2	1	2	1
CSU624(A).4	3	3	2	0	0	0	0	0	0	0	0	1	3	0	0
CSU624(A).5	2	3	0	0	0	0	0	0	0	0	0	1	2	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU624 (B) EMBEDDED SYSTEM

Teaching Scheme: 03L

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. Develop an understanding of the technologies behind the embedded computing systems.
- II. To introduce students to the design issues of embedded systems.
- III. Enable students to analyze and develop software programs for embedded systems

Introduction to embedded systems: Processor in the system, Hardware units required in the exemplary cases, Software embedded into a system, Final Machine implementable software for a product, Software in Processor specific assembly language and high level language, Device drivers, device management using an operating systems, Software design for scheduling multiple tasks and devices using RTOS, Embedded SoC in VLSI circuits.

Structural units of the processor: Allocation of memory to program segment and blocks, memory map of the system, Memory blocks for different data sets and structures, Virtual Devices, Device drivers for parallel port, serial and timing devices, Context and periods for context switching, deadline and interrupt latency. **Embedded programming in assembly language and C:** Function pointers, Function queues and ISR queues, Queues for

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implementing protocol for a network, Queuing of functions on interrupts, Use of FIFO queues, Stacks, Lists and Ordered Lists.

Modeling process: Use of dataflow & control data flow graphs, Programming model for event controlled or response time constraint, Real time programs, Inter process Communication and Synchronization, Multiple processes in an application, Sharing data by multiple tasks, use of finite states machine model & Petri net Model, Use of Semaphores for a task or for Critical section of code, Mutex & P & V, Priority inversion problems & deadlock situations IPC issues, Use of Semaphore flags or Mutex as resource key, use of message queues, mailboxes, pipes, virtual sockets, RPCs.

Introduction to RTOS: RTOS Services, Schedule management for multiple tasks in Real Time, Handling of interrupt source call, RTOS task scheduling models, Cooperative Round Robin Scheduling using a Circular Queue of ready tasks and using ordered list as per precedence constraints, cycling scheduling in Time Sharing, fixed Real Time scheduling, Precedence assignment in Scheduling algorithms, fifteen-point strategy for Synchronization, Embedded Linux Kernel. Advances in Embedded System.

Text Book:

1. Embedded Systems, Architecture, Programming & Design, Rajkamal, 2nd edition, Tata McGraw Hill, 2007

Reference Books:

1. Real Time Systems, Jane W. S. Liu, 1st Edition, Pearson Education, 2004.
2. Embedded System Design: A Unified Hardware/Software Introduction, by Frank Vahid, Tony Givargis, 1st Edition, John Wiley & Sons publication, 2002

COURSE OUTCOMES

On completion of the course the student should be able to

CSU624 (B).1 Understand hardware and software design requirements of embedded systems.

CSU624 (B).2 Analyse the embedded system’s specification and develop software programs.

CSU624 (B).3 Evaluate the requirements of programming Embedded Systems, related software architectures and tool chain for Embedded Systems.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU624(B).1	3	2	0	0	0	0	2	1	0	0	0	0	3	0	0
CSU624(B).2	2	2	3	0	0	0	1	1	0	0	0	1	3	1	0
CSU624(B).3	2	3	0	0	2	0	0	0	0	2	0	0	3	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU624 (C) DATA MINING

Teaching Scheme: 03L

Total 03

Credits: 03

Evaluation Scheme: 30MSE+10TA+ 60ESE

Total Marks: 100

Duration of ESE: 2Hrs.30min

Course Objectives:




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- I. To introduce the basic concepts of Data Mining techniques.
- II. Examine the types of the data to be mined and apply pre-processing methods on raw data.
- III. Apply basic classification, clustering and outlier analysis on a set of data.

Required knowledge: Data base Management System

Introduction to data mining: Motivation and significance of data mining, data mining functionalities, interestingness measures, Data Reduction – Data Discretization and Concept Hierarchy Generation. Classification of data mining system, major issues in data mining.

Mining frequent patterns, associations and correlations: Basic concepts, efficient and scalable frequent item set mining algorithms, mining various kinds of association rules – multilevel and multidimensional, association rule mining versus correlation analysis, constraint based association mining.

Classification and prediction: Definition, decision tree induction, Bayesian classification, and rule based classification, classification by back propagation and support vector machines, associative classification, lazy learners, prediction, accuracy and error measures.

Cluster analysis: Definition, clustering algorithms - partitioning, hierarchical, density based, grid based and model based; Clustering high dimensional data, constraint based cluster analysis, outlier analysis – density based and distance based.

Data mining on complex data and applications: Algorithms for mining of spatial data, multimedia data, text data; Data mining applications, social impacts of data mining, trends in data mining.

Text Books:

1. Data Mining - Concepts and Techniques, Han, J. and Kamber, M., 3rd Ed., Morgan Kaufmann Series. 2011
2. Data Mining - Methods and Techniques, Ali, A. B. M. S. and Wasimi, S. A., Cengage Publishers. 2009

Reference Books:

1. Introduction to Data Mining, Tan, P.N., Steinbach, M. and Kumar, V., Addison Wesley – Pearson. 2008
2. Data Mining Techniques, Pujari, A. K., 4th Ed., Sangam Books. 2008

Course Outcomes:

At the end of the course the student will be able to:

CSU624 (C).1 Analyse and evaluate performance of algorithms for Association Rules.

CSU624 (C).2 Analyse Classification and Clustering algorithms.

CSU624 (C).3 Apply the techniques of clustering, classification, association finding.



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CSU624 (C).4 Apply techniques for feature selection and visualization to real world data.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU624(C).1	3	3	2	0	0	0	1	0	0	0	2	1	3	2	0
CSU624(C).2	3	3	2	1	0	0	1	0	0	0	2	0	3	0	0
CSU624(C).3	2	2	1	0	2	0	0	2		0	0	0	2	3	0
CSU624(C).4	2	2	1	0	3	2	2	0	0	0	0	2	3	0	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU624 (D) CLOUD COMPUTING

Teaching Scheme: 03L

Total - 03

Credits: 03

Evaluation Scheme: 30MSE +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. To understand the basics of Cloud Computing.
- II. To understand the architecture and concept of different Cloud Computing model.
- III. To understand the movement from a traditional network infrastructure to a Cloud solution.
- IV. To Design/Develop/Deploy cloud applications using Amazon Web Services (AWS).

Cloud Computing Basics: Cloud Computing overview, Applications, Internets and the Cloud, First moves in the Cloud, Benefits, Limitations and Security Concerns in the Cloud Computing.

Cloud Computing Technology: Hardware and Infrastructure: Clients, Security, Network, Services. Accessing the Cloud: Platforms, Web Applications, Web APIs, Web Browsers.

Cloud Storage and Standards: Cloud Storage Overview, Cloud Storage Providers. Standards: Application, Client, Infrastructure, Service.

Cloud Computing at Work: Software as a Service: Overview, Driving Forces, Company Offerings, Industries. Developing Applications: Google, Microsoft, Intuit Quick Base, Cast Iron Cloud, Bungee Connect, Development.

Organizations and Cloud Computing: Cloud Computing with the Titans: Google, EMC, NetApp, Microsoft, Amazon, IBM, Partnerships, The Business case for going to the Cloud.

Programming Models: Distributed Programming for the Cloud Data-Parallel Analytics with Hadoop MapReduce (YARN) Iterative Data-Parallel Analytics with Apache Spark Graph-Parallel Analytics with GraphLab 2.0 (PowerGraph)

Text Books:

1. Velte Anthony T., Velte Toby J. and Elsenpeter Robert, "Cloud Computing: A Practical Approach", McGraw Hill, Indian edition, 2010

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- Buyya Rajkumar, Broberg James and Goscinski Anderzej, "Cloud Computing: Principles and Paradigms", Wiley Publication, 2011.

Reference Books:

- Sosinsky Barrie, "Cloud Computing: Bible", Wiley Publication, 2011.
- Hwang K., Dongarra J., Fox G.C., Distributed and Cloud Computing, Morgan-Kaufman.

Course Outcomes:

- CSU624 (D).1** Apply knowledge to gain insight about basic technology behind the Cloud.
CSU624 (D).2 Apply to comprehend the Cloud computing applications.
CSU624 (D).3 Identify the appropriate cloud services for a given application.
CSU624 (D).4 Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS
CSU624 (D).5 Analyse various cloud programming models and apply them to solve problems on the cloud.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU624(D).1	3	3	0	0	0	3	1	0	0	0	0	1	3	0	0
CSU624(D).2	2	3	1	0	0	0	0	0	0	0	0	0	3	0	0
CSU624(D).3	2	3	1	0	0	0	0	0	0	0	0	0	2	0	0
CSU624(D).4	2	2	3	0	2	0	0	0	0	0	1	0	3	1	0
CSU624(D).5	2	3	3	0	1	0	0	1	0	0	0	1	3	2	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

OPEN ELECTIVE-I
CSU 625 (A) WEB DESIGNING

Teaching Scheme: 03L

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2 Hours 30 Minutes

Course Objectives

- I. Understand the process of Web Development.
- II. To develop the skill & knowledge of Web page design.
- III. To use variety of strategies and tools to create websites.
- IV. Develop the skills to create fully functional and responsive web sites.

Fundamentals of Web Development

Introduction to Web Development, Domain Names & Hosting, Client and Server Programming Languages, Static & Dynamic Web Contents, Responsive Web Designing, Careers in Web Technologies

HTML, DHTML, XHTML and HTML5


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Structure of HTML, Basic HTML Tags, Advanced HTML Tags, Difference between HTML & DHTML & XHTML, DHTML and XHTML Basic tags, Introduction to Doc Types, Creating HTML Pages, Working with HTML5.

Cascading Style Sheets

Introduction to CSS, Types of style sheets, Types of CSS Selectors, Complete CSS properties, Converting Table layout to CSS, Custom CSS Layout Design, Creating simple and dropdown menus, Creating Appealing forms using CSS

Java Script

Introduction to Java Scripting, Types of Java Scripts, Variables, operators, loops, Objects, Events and DOM, Common java script functions, Java Script Validations, Implementing Menus and Galleries etc., Introduction to Ajax, Real time Ajax Examples.

How to Create Website

Client Requirements/Specifications, Creating a concept and layout, Choosing a Colour Scheme, Choosing Stock Photography, Texture and Typography, Design a Professional Layout, Conversation of PSD to CSS, Implementing JavaScript.

Text-Book:

1. Learning Web Design- A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics by Jennifer Niederst Robbins, 4th Edition, O'Reilly
2. Web Design with HTML and CSS Digital Classroom, by Jeremy Osborn, Jennifer Smith, and the AGI Training Team, Wiley Publishing, Inc.

References Book:

1. HTML, XHTML, and CSS Bible by Steven M. Schafer, Fifth Edition, Wiley Publishing, Inc.
2. JavaScript for impatient programmers by Axel Rauschmayer

COURSE OUTCOMES

On completion of the course the student should be able to

CSU 625 (A).1 Use different languages to develop the web pages

CSU 625 (A).2 Analyze the requirements from web site owner and deliver to their satisfaction

CSU 625 (A).3 Play a role as UI and UX designer

CSU 625 (A).4 Create fully functional, usable, interactive, user friendly and responsive Web Sites.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU625(A).1	3	2	0	0	2	0	1	0	0	0	0	1	2	0	0
CSU625(A).2	3	3	3	0	2	0	1	0	2	0	0	1	3	2	0
CSU625(A).3	3	2	0	0	0	0	0	0	0	0	0	0	2	0	0
CSU625(A).4	1	3	3	2	0	0	0	3	0	1	0	1	0	2	3

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU 625 (B) DATA STRUCTURES

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2 Hours 30 Minutes

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Course Objectives

- I. To impart the knowledge of data structures and algorithms.
- II. To analyse the algorithm with respect to time and space which will prove the efficiency of algorithm.
- III. To assess how the choice of data structures and algorithm design methods impacts the performance of programs
- IV. To convert algorithms into efficient programs

Basic of Data Structure and Algorithm

- Understanding the concept of Problem Solving, Design of Algorithms and Data Structures.
- Basic Terminologies: Elementary Data Organizations, Data Structures Operations and Types, Abstract Data Type (ADT)
- Writing Algorithms, Mathematical Notations and Functions, Algorithmic Notation
- Introduction to Searching Algorithms: Linear and Binary Search, Analysis of an Algorithm: Complexity and Rate of Growth, Asymptotic Notations, Time-Space Trade-Off
- Introduction to Sorting Algorithms: Bubble, Selection, Insertion, Quick, Merge, Radix

Note: In this unit all the algorithms are implemented through a basic data structure called Array.

Linked List

- Introduction to Linked List, Types of Linked List.
- Representation of Linked List in Memory
- Algorithms of several operation on Linked List and there analysis
- String Processing: Storing Strings, String Operations, Word/Text Processing, String Pattern Matching Algorithms

Stack and Queue

- Introduction to Stack, Representation of Stack in Memory using Array and Linked List
- Arithmetic Expression, Polish Notation, Application of Stack
- Tower of Hanoi Problem, Recursion
- Introduction to Queue, Representation of Queue in Memory using Array and Linked List,
- Types of Queues, Application of Queues

Tree

- Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree
- Tree operations on each of the trees and their algorithms with complexity analysis
- Applications of Binary Trees
- Heap Sort

Graph

- Graph: Basic Terminologies and Representations
- Graph search and traversal algorithms and complexity analysis.
- Minimum Spanning Tree Algorithms (Kruskal and Prim), Single Source Shortest Path (Dijkstra's) and Shortest Path Algorithms (Warshalls)

Text-Book:



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1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill
2. Computer Algorithms, E. Horowitz et al., Computer Science Press

References Book:

1. Data Structures with C by Seymour Lipschutz, Mc Graw Hill Education

COURSE OUTCOMES

On completion of the course the student should be able to

CSU 625 (B).1 Understand basic terminology of data organization with the available data structures and their behavior.

CSU 625 (B).2 Analyze, understand and implement appropriate data structure for a given specific problem.

CSU 625 (B).3 Perform quantitative analysis of algorithm.

CSU 625 (B).4 Demonstrate ability to devise an efficient algorithm and transform into efficient code.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU625(B).1	3	2	2	0	0	0	0	0	0	0	0	0	2	0	0
CSU625(B).2	3	3	2	0	2	0	0	0	0	0	0	0	3	2	0
CSU625(B).3	2	3	0	0	2	0	0	0	0	0	0	0	2	0	0
CSU625(B).4	2	3	3	1	0	0	0	0	0	0	2	0	2	3	0

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CSU626 COMPILER DESIGN LABORATORY

Teaching Scheme: 04 P

Total: 04

Credits: 02

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

ESE Duration: 3Hrs.

Course Objectives:

- To implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
- To implement NFA and DFA from a given regular expression
- To implement front end of the compiler by means of generating Intermediate codes.
- To implement code optimization techniques.

The aim is to write a compiler for a small language.

Familiarity with compiled codes (assembly language) of RISC and CISC machines, writing a scanner, writing predictive parser for a small language, small experiment with scanner (lex/flex) and parser (yacc/bison) generator (such as translation of regular expression to NFA or the construction or parse tree), writing scanner-parse specification for a small language, translation of the language to an intermediate form (e.g. three-address code), generation of target code (in assembly language). Code improvement (optional).

Sample list of Experiments:

1. Design a Lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
2. Implement the lexical analyzer using JLex, flex or lex or other lexical analyser generating stools.
3. Design Predictive parser for the given language.

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4. Design LALR bottom up parser for the given language.
5. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
6. Write program to generate machine code from the abstract syntax tree generated by the parser.
7. Implementation of Symbol Table.
8. Generation of Code for a given Intermediate Code.

References

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, Addison-Wesley.
2. Keith D. Cooper and Linda Torczon, Engineering a Compiler, Elsevier.
3. Andrew W. Appel, Modern Compiler Implementation in C/Java, Cambridge University Press.
4. Allen I. Holob, Compiler Design in C, Prentice-Hall.
5. Steven S. Muchnik, Advanced Compiler Design and Implementation, Elsevier.
6. Randy Allen and Ken Kennedy, Optimizing Compilers for Modern Architectures, Elsevier.
7. Michael L. Scott, Programming Language Pragmatics, Elsevier.
8. <http://www.nptel.iitm.ac.in/downloads/106108052/>

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

Course Outcomes:

On completion of the course the student should be able to .

- CSU626.1** Design Lexical analyzer for given language using C and LEX tools.
CSU626.2 Design and convert BNF rules into YACC form to generate various parsers.
CSU626.3 Generate machine code from the intermediate code forms
CSU626.4 Implement Symbol table

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU626.1	3	2	2	0	3	0	0	0	0	0	0	2	2	0	2
CSU626.2	2	2	3	0	2	0	0	1	0	0	1	0	1	2	0
CSU626.3	2	3	2	0	2	0	0	0	0	0	0	0	3	1	2
CSU626.4	2	2	1	0	0	0	0	0	0	0	0	0	0	3	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

CSU627 MINOR PROJECT

Teaching Scheme: 04 P

Total: 04

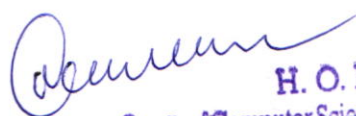
Credits: 02

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

ESE Duration: 3Hrs.

Course Objectives

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- I. Apply knowledge of Computer Science and Engineering to solve an identified problem
- II. Use software development life cycle activities in the project development
- III. Develop communication skills, technical writing skills
- IV. Develop ability to work in a team.

The project will consist of the work on the topic selected for the project. The project must be done in a group not exceeding three students. The candidates are expected to select the project topic, do the requirements analysis, and carry out the necessary design procedure for the completion of project.

Guidelines for completing the Minor Project:

Weekly report of students work after finalization of topic of project should be submitted to the faculty during designated hours meant for Minor Project.

It should have following stages:

Stage 1: Finalization of Project Groups and Project Topic.

Stage 2: Presentation on selected topic.

Stage 3: Development of Project

Stage 4: Pre submission changes/improvements suggested by faculty

Stage 5: Final submission of project with Demo, Presentation, Viva and Report.

Course Outcomes

CSU 627.1 Apply the software development cycle with emphasis on different processes - requirements, design, and implementation phases for the development of the identified project work.

CSU 627.2 Work as a team and to focus on getting project done within time with each student being held accountable for their part of the project.

CSU 627.3 Present technical report of project work clearly defining work objectives, process to achieve objectives, development methodology, objectives reached, contribution, implications and findings, visualize results and conclusions.

CO/PO Mappings:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSU627.1	3	2	0	2	0	0	0	0	0	0	0	0	2	0	0
CSU627.2	2	2	3	0	2	1	0	2	3	2	3	0	0	3	2
CSU627.3	1	2	0	0	1	0	1	2	0	3	3	1	3	0	0

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

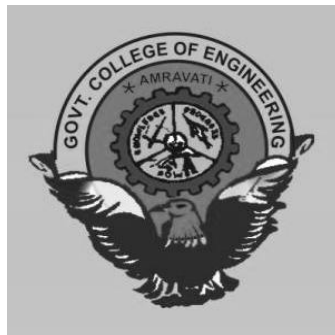
3- Strongly Correlated

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**GOVT. COLLEGE OF ENGINEERING
AMRAVATI**

**DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING**



PROPOSED CURRICULUM

For

B. TECH. (Computer Science and Engineering)

2020- 2021

Program Objectives

The Undergraduate students will demonstrate.

- I. To create graduates with foundation knowledge of computer science and engineering, who can contribute towards emerging technologies.
- II. To develop an ability to identify, formulate and develop solution to solve real life computational challenges.
- III. To create graduates with sufficient capabilities in computer science and scientific computing who can become researchers and developers to satisfy the needs of the core computer technology industry.
- IV. To inculcate attitude of innovative driven entrepreneurship (IDE).
- V. To make the students aware of professional and social ethics and prepare them with basic soft skills essential for working in societal and professional teams.

Program Outcomes (POs):

The Undergraduate Students will have ability to

1. Apply knowledge of fundamental programming, mathematics, algorithms and technologies in Computer Science & Engineering to solve real life problems faced by the industry.
2. Demonstrate knowledge of fundamentals of hardware technology relevant to understanding Computer Science basics.
3. Demonstrate capability to work in teams and in professional, ethical, legal and social responsible framework.
4. An ability to communicate general and technical topics in written and verbal forms with diverse stakeholders.
5. Demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software (FOSS) tools in developing software.
6. A potential to perform good in the examinations for higher education.
7. Expand their qualities of learning and demonstrating latest technology.

B. Tech. (Computer Science and Engineering)

SEM III													
Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
			Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
ESC	ETU331	Analog and Digital Integrated Circuit	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU321	Data Structure and Algorithms	3		---	3	30	10	60	---	---	100	3
PCC	CSU322	Discrete Mathematics	3		---	3	30	10	60	---	---	100	3
BSC	SHU321B	Transform and Linear Algebra	2	1		3	30	10	60	---	---	100	3
	SHU322B	Differential Equation and Transform	2	1	---	3							
HSMC	SHU323	Humanities	3	---	---	3	30	10	60	---	---	100	3
MC	SHU322	Introduction to Constitution of India	---	---	---	---	---	---	60	---	---	60	0
ESC-LC	ETU332	Analog and Digital Integrated Circuit Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU323	Data structure and Algorithms Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU324	IT Workshop (Sci Lab/MATLAB)	1	---	4	5	---	---	---	25	25	50	3
Total			15	1	12	28	150	50	360	75	75	710	22

B. Tech. (Computer Science and Engineering)

SEM IV													
Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
							Theory			Practical		Total	
			Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
PCC	CSU421	Object Oriented Programming	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU422	Computer Organization and Architecture	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU423	Operating System	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU424	Design and Analysis of Algorithms	3	1	---	4	30	10	60	---	---	100	4
HSMC	CSU425	Organizational Behaviour	3	---	---	3	30	10	60	---	---	100	3
MC	SHU421	Environmental Sciences	---	---	---	---	---	---	60	---	---	60	0
PCC	CSU 426	Object Oriented Programming Lab	---	---	4	4	--	--	---	25	25	50	2
PCC-LC	CSU427	Computer Organization and Architecture Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU428	Operating Systems Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU429	Design and Analysis of Algorithms Lab	---	---	4	4	---	---	---	25	25	50	2
Total			15	1	16	32	150	50	360	100	100	760	24

Program Elective Courses

- BSC Basic Science Courses
- ESC Engineering Science Courses
- HSMC Humanities and Social Sciences including Management courses
- PCC Professional core courses
- PEC Professional Elective courses
- OEC Open Elective courses
- LC Laboratory course
- MC Mandatory courses
- SI Summer Industry Internship
- PROJ Project

Open Elective Courses (To be offered by Computer Science and Engineering Department)

Open Elective-I	Open Elective-II
Cyber Law and Ethics	Network Security
Web Designing	Software Engineering
Data structure and Algorithm	

Program Elective-I	Program Elective-II	Program Elective-III	Program Elective-IV	Program Elective-V	Program Elective-VI
Graph Theory	Advanced Algorithms	Parallel and Distributed Algorithms	Computational Complexity	Computational Geometry	Queuing Theory and Modelling
Software Engineering	Distributed Systems	Embedded Systems	Low Power Circuits and Systems	Advanced Operating Systems	Fault Tolerant Computing
Artificial Intelligence	Machine Learning	Data Mining	Soft Computing	Speech and Natural Language Processing	Data Analytics
Electronic Design Automation	Computer Graphics	Cloud Computing	Human Computer Interaction	Digital Signal Processing	Image Processing

Department of COMPUTER SCIENCE & ENGINEERING

Equivalence Scheme

Programme Name: - Computer Science & Engineering

Sr. No	Course code with Name of course(old)		Credit	Course code with Name of course (new)		Credit
	SHU 304	Engineering Mathematics-III	3	NO EQUIVALANCE		
	ETU 311	Electronic Device & Circuits	3	NO EQUIVALANCE		
	CSU 301	Programming Methodology	4	NO EQUIVALANCE		
	CSU 302	Computer Organization & Architecture	4	CSU422	Computer Organization & Architecture	3
	CSU 303	Discrete Mathematics & Graph Theory	3	CSU322	Discrete Mathematics	3
	SHU 305	General Proficiency II	2	NO EQUIVALANCE		
	ETU 312	Electronic Device & Circuits Lab	1	NO EQUIVALANCE		
	CSU 304	Programming Methodology Lab	1	NO EQUIVALANCE		
	CSU 305	Computer Organization & Architecture Lab	1	CSU427	Computer Organization & Architecture Lab	1
	CSU 306	Linux Administration-I Lab	1	NO EQUIVALANCE		
	CSU 401	Numerical Methods & Computer Programming	3	NO EQUIVALANCE		

Sr. No	Course code with Name of course(old)		Credit	Course code with Name of course (new)		Credit
	CSU 402	Data Structure	4	CSU321	Data structure and Algorithms	3
	CSU 403	Object Oriented Programming	3	CSU421	Object Oriented Programming	3
	ETU 411	Analog & Digital ICs	3	NO EQUIVALANCE		
	ITU 402	Data Communication	3	NO EQUIVALANCE		
	CSU404	Data Structure Lab	2	CSU323	Data structure and Algorithms Lab	2
	CSU405	Object Oriented Programming Lab	1	CSU 426	Object Oriented Programming Lab	2
	ETU412	Analog & Digital ICs Lab	1	NO EQUIVALANCE		
	ITU403	Data Communication Lab	1	NO EQUIVALANCE		
	CSU406	System Administration – II Lab	1	NO EQUIVALANCE		
	NO EQUIVALANCE			ETU331	Analog & Digital Integrated Circuit	3
	NO EQUIVALANCE			SHU323	Humanities	3
	NO EQUIVALANCE			SHU322	Introduction to Constitution of India	0
	NO EQUIVALANCE			CSU324	IT Workshop (Sci Lab/MATLAB)	3
	CSU602 Operating System		3	CSU423	Operating System	3
	ITU501 Design and Analysis of Algorithms		3	CSU424	Design and Analysis of Algorithms	3
	NO EQUIVALANCE			CSU425	Organizational Behaviour	3
	NO EQUIVALANCE			SHU421	Environmental Sciences	0

Sr. No.	Course code with Name of course(old)	Credit	Course code with Name of course (new)		Credit
	NO EQUIVALANCE		SHU321E	Transform And Linear Algebra	2
	CSU608 Operating System Lab	1	CSU428	Operating Systems Lab	2
	CSU606 Design and Analysis of Algorithm Lab	1	CSU429	Design and Analysis of Algorithm Lab	2

ETU331 ANALOG AND DIGITAL INTEGRATED CIRCUIT

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE+ 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I.** Understand basic analog and digital electronics.
- II.** Learn the properties of semiconductor and operational amplifiers.
- III.** Understand the concept of combinational and sequential logic and their application.
- IV.** Understand the basics of Timer 555 and memories.

Basic concept and application of BJT & MOSFET:

Metal Oxide Semiconductor Field-Effect Transistors (MOSFET) and their Applications: MOSFET as an amplifier, small-signal equivalent circuits, single-stage MOSFET amplifier (common-source mode); MOSFET as a switch.

Operational amplifiers: Properties and characteristics study of typical opamp, Performance limitations, linear application of opamps, IC 741 opamp and its application, Feedback: basic concepts of negative feedback; four ideal feedback topologies;

Oscillators: basic principles of sinusoidal oscillation; Example circuits; Types and characteristics of voltage series feedback, current series feedback, current shunt feedback, and voltage shunt feedback. Barkhausen criteria, RC oscillators - Wein Bridge and phase shift, LC oscillators- Hartley, colpitt's, clapp and crystal oscillators. General features of a time base signal, UJT relaxation oscillator.

Multivibrator: Monostable , Astable and Bistable multivibrator.

Introduction and application of Ic 555:

Pin configuration, Basic of 555 timer, block diagram, working principle of IC555 and data sheet and its application, waveform generator, important features of 555 timer, 555 timer as astable multivibrator and monostable multivibrator, 555 timer as oscillator, 555 timer as RAMP generator,

Combination digital circuits:

Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization

Sequential Digital Circuits:

A 1-bit memory, the circuit properties of Bi-stable latch, the SR flip flop, J- K, T and D types flip-flops, applications of flip-flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

Memories:

Introduction and classification of ROM, ROM organization, Static and Dynamic RAM, DRAM Refreshing, Representative circuits for cells using BJT and FET's, Timing diagrams of memories, Memory expansion using IC's, Flash memory, CCD, Magnetic Memories.

Course Outcomes:

After completion of the course students will able to-

ETU331.1 Describe the functioning and selection of OP-AMP as per application.

ETU331.2 Design and testing of OP-AMP based circuits.

ETU331.3 Design and implement Combinational and Sequential logic circuits.

ETU331.4 Describe the functioning of memories and their application

Text Books:

1. Electronic Devices and Circuits (2nd edition, 2008), by J. Millman, C. Halkias and Satyabrata jit, Tata McGraw Hill.
2. Sedra A. S. and Smith K. C., Microelectronic Circuits, Oxford University Press (2006).
3. The art of electronics. by Paul Horowitz and Winfield Hill (1998)
4. Logic and Computer Design Fundamentals. Morris Menno (2007)

CSU321 DATA STRUCTURE AND ALGORITHM

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To impart the knowledge of data structures and algorithms.
- II. To analyse the algorithm with respect to time and space which will prove the efficiency of algorithm.
- III. To assess how the choice of data structures and algorithm design methods impacts the performance of programs
- IV. To convert algorithms into efficient programs

Basic of Data Structure and Algorithm: Understanding the concept of Problem Solving, Design of Algorithms and Data Structures. Basic Terminologies: Elementary Data Organizations, Data Structures Operations and Types, Abstract Data Type (ADT), Writing Algorithms, Mathematical Notations and Functions, Algorithmic Notation, Introduction to Searching Algorithms: Linear and Binary Search, Analysis of an Algorithm: Complexity and Rate of Growth, Asymptotic Notations, Time-Space Trade-Off, Dictionaries, Introduction to Sorting Algorithms: Bubble, Selection, Insertion, Quick, Merge, Radix

Note: In this unit all the algorithms are implemented through a basic data structure called Array

Linked List: Introduction to Linked List, Types of Linked List, Representation of Linked List in Memory, Algorithms of several operation on Linked List and there analysis, String Processing: Storing Strings, String Operations, Word/Text Processing, String Pattern Matching Algorithms.

Stack and Queue: Introduction to Stack, Representation of Stack in Memory using Array and Linked List, Arithmetic Expression, Polish Notation, Application of Stack, Tower of Hanoi Problem, Recursion, Introduction to Queue, Representation of Queue in Memory using Array and Linked List, Types of Queues, Application of Queues.

Tree: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, Red Black Tree, Tree operations on each of the trees and their algorithms with complexity analysis, Applications of Binary Trees, Introduction to B Tree (Disk Based Data Structure), Heap Sort.

Graph: Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis, Minimum Spanning Tree Algorithms (Kruskal and Prim), Single Source Shortest Path (Dijkstra's) and Shortest Path Algorithms (Warshalls), Hashing in Data Structures.

Text Book

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al. 2nd edition Computer Science Press

Course Outcomes

CSU321.1 Understand basic terminology of data organization with the available data structures and their behaviour.

CSU321.2 Analysing and understanding, the implementation of data structures on computer memory so that, one must be able to choose appropriate data structure for a given specific problem.

CSU321.3 After implementation a student must be capable of doing quantitative analysis of algorithm.

CSU321.4 Demonstrate ability to devise an efficient algorithm and transform into efficient code.

CSU322 DISCRETE MATHEMATICS

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I.** Learn basic terminology, formal logic, proofs, sets, relations, functions, recursion
- II.** Use formal logic proof and logical reasoning to solve problems
- III.** Relate the ideas of mathematical induction to recursion and recursively defined structures
- IV.** Learning graphs, trees and related algorithms, Relate, interpret and apply these concepts to various areas of computer science

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic. Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

Relations, Functions, Recurrence Relations Definitions, Properties of Binary Relations, Equivalence Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains. Theorem on chain, Warshall's Algorithm & transitive closure

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

Text Books :

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference Books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

Course Outcomes

CSU322.1 For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives

CSU322.2 For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference

CSU322.3 Students would be able to classify its algebraic structure for a given a mathematical problem.

CSU322.4 Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. To develop the given problem as graph networks and solve with techniques of graph theory.

SHU321B TRANSFORM AND LINEAR ALGEBRA

Teaching Scheme: 02TH+01TU

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To study about the mathematical tool like z-transform and its properties.
- II. To introduce the concept of linear algebra which is important in computer software.

- III. To introduce the concept of orthogonally and inner product.
- IV. To familiarize the students with basic concepts of probability and conditional probability, continuous and discrete probability distributions.

Z-transform : Definition, Region of Convergence, Properties of Z-transform, Inverse Z-transform: Partial fraction method, Residue method; Convolution Theorem, Application to solution of difference equations with constant coefficients.

Vector spaces: Vector spaces and subspaces, null spaces, column spaces and linear transformations, Linear dependence and independence, bases, coordinate systems, dimensions of vector space.

Random variables and Probability Distributions:

Basic concepts of probability and its properties; Conditional probability and independent events; Random variables, discrete and continuous random variables, distribution functions, Mean and variance of Binomial, Poisson and Normal distributions.

Basic Statistics: (10 lectures)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression

Text Books:

1. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2010.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th edition, 2020.
3. Engineering Mathematics (for semester III), Veerarajan T., Tata McGraw-Hill, New Delhi, 2010.

Reference Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Introduction to Probability Theory, P. G. Hoel, S. C. Port and C. J. Stone, Universal Book Stall, 2003 (Reprint).
3. A First Course in Probability, S. Ross, 6th Ed., Pearson Education India, 2002.
4. An Introduction to Probability Theory and its Applications, W. Feller, Vol. 1, 3rd Ed., Wiley, 1968.

Course Outcomes

After successful completion of the course the students will be able to

SHU321B.1 use the concept of probability and random variables and various discrete and continuous probability distributions in practical problems.

SHU321B.2 Apply the tool of transform in solving engineering problems.

SHU321B.3 Analyse the problems related to engineering with the knowledge of linear algebra.

SHU322B DIFFERENTIAL EQUATION AND TRANSFORM

Teaching Scheme: 02TH+01TU

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To study about the mathematical tool like z-transform and its properties.
- II. To introduce the concept of linear algebra which is important in computer software.
- III. To introduce the concept of orthogonally and inner product.
- IV. To familiarize the students with basic concepts of probability and conditional probability.
- V. To study continuous and discrete probability distributions.

Ordinary differential equations of higher orders: (08hours)

Linear differential equation with constant coefficient, complementary function, particular integral, complete solution; method of variation of parameters.

Integral Calculus: (08 hours)

Beta and Gamma functions and their properties; Evaluation of double integrals (Cartesian & polar), change of order of integration.

Z-transform: (08hrs)

Definition, Region of Convergence, Properties of Z-transform, Inverse Z-transform: Partial fraction method, Residue method; Convolution Theorem, Application to solution of difference equations with constant coefficients.

Vector spaces: (08hrs)

Vector spaces and subspaces, null spaces, column spaces and linear transformations, Linear dependence and independence, bases, coordinate systems, dimensions of vector Space.

Random variables and Probability Distributions: (08hrs)

Basic concepts of probability and its properties; Conditional probability and independent events; Random variables, discrete and continuous random variables, distribution functions, Binomial, Poisson and Normal distributions.

Course Outcomes

After successful completion of the course the students will be able to

SHU322B.1 Use the concept of probability and random variables and various discrete and continuous probability distributions in practical problems.

SHU322B.2 Apply the tool of transform in solving engineering problems.

SHU322B.3 Analyse the problems related to engineering with the knowledge of linear algebra.

Text Books:

4. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi

Publications, Reprint,2010.

5. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 44th edition, 2020.
6. Engineering Mathematics (for semester III), Veerarajan T., Tata McGraw-Hill, New Delhi,2010.

Reference Books:

5. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
6. Introduction to Probability Theory,P. G. Hoel, S. C. Port and C. J. Stone, Universal Book Stall, 2003(Reprint).
7. A First Course in Probability, S. Ross, 6th Ed., Pearson Education India, 2002.
8. An Introduction to Probability Theory and its Applications. Feller, Vol. 1, 3rd Ed., Wiley,1968.

SHU322 INTRODUCTION TO CONSTITUTION OF INDIA

Teaching Scheme: 00
Evaluation Scheme: 60 ESE
ESE Duration: 2Hrs. 30 min.

Total: 03

Credits: 03
Total Marks: 60

Course Objectives:

- I.** To acquaint students about constitution of India, Fundamental rights, fundamental duties.
- II.** To understand electoral process and role of central, state and local government and its administration.
- III.** To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Introduction to Constitution of India

Salient features of the Constitution of India, Preamble of the Constitution, fundamental rights and fundamental duties, Directive Principles of State Policy and relevance of directive principles. Parliamentary Form of Government in India- President, Vice-President, Prime Minister along with council of Minister, Parliament, Supreme court, Electoral process in India. Amendment Procedure.

State executives Governor, chief minister, state legislature, high courts of state

Role and functions of local self-government- Municipalities in India, with special reference to 73rd amendment. Panchayat Raj in India with special reference to 74th amendment.

Text Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

On the successful completion of this course, Students shall be able to-

SHU322.1 Understand and remember the knowledge of basic information about Indian Constitution.

SHU322.2 Apply the knowledge of fundamental rights and fundamental duties.

SHU323 HUMANITIES (EFFECTIVE TECHNICAL COMMUNICATION)

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To understand the basics of Technical writing and editing**
- II. To understand and analyse the self-development**

Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

Self-Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Text Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

Course Outcome

SHU323.1. Students will able to speak and communicate English

ETU332 ANALOG & DIGITAL CIRCUITS LAB

Teaching Scheme: 04P

Total: 04

Credits: 02

Evaluation Scheme: 25 INT+25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I.** Understand basic analog and digital electronics.
- II.** Learn the properties of semiconductor and operational amplifiers.
- III.** Understand the concept of combinational and sequential logic and their application.
- IV.** Understand the basics of Timer 555 and memories.

Project-1. Oscillator design, & amplifier design,

Project-2. Sequential design & combinational design

Project-3. Memory design

Project-4. Minor project on Design of LED lighting system for household application; street lighting system; soft starting of DC machine.

Course Outcomes:

After completion of the course students will able to-

ETU332.1 Describe the functioning and selection of OP-AMP as per application.

ETU332.2 Design and testing of OP-AMP based circuits.

ETU332.3 Design and implement Combinational and Sequential logic circuits.

ETU332.4 Describe the functioning of memories and their application

CSU323 DATA STRUCTURE & ALGORITHM LAB

Teaching Scheme: 04P

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I.** To impart the knowledge of data structures and algorithms.
- II.** To analyse the algorithm with respect to time and space which will prove the efficiency of algorithm.
- III.** To assess how the choice of data structures and algorithm design methods impacts the performance of programs
- IV.** To convert algorithms into efficient programs

Project 1 will be comprised of static sized array data structure involving sorting, searching, ADT such as dictionaries.

Project 2 will be comprised of linked list different types and string pattern matching algorithms

Project 3 will comprise of applications of stack and queue

Project 4 will comprise of Graph algorithm and its applications

Project 5 will comprise of Tree algorithms and its application

Project 6 will be a major application comprises most of the required contents of syllabus.

Note: Project 1 to 5 can be completed individually or group of two students and Project 6 containing at least 4 different modules which can be completed in the group of 3 to 4 students

Course Outcomes

CSU323.1 Understand basic terminology of data organization with the available data structures and their behaviour.

CSU323.2 Analysing and understanding, the implementation of data structures on computer memory so that, one must able to choose appropriate data structure for a given specific problem.

CSU323.3 After implementation a student must be capable of doing quantitative analysis of algorithm.

CSU323.4 Demonstrate ability to devise an efficient algorithm and transform into efficient code.

CSU324 IT WORKSHOP (Sci Lab/MATLAB)

Teaching Scheme: 01 Tut + 04P

Total: 05

Credits: 03

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To understand the basics of matlab
- II. To Analyse the different functions of Matlab
- III. To analyse different data visualization in matlab

Any three Based on given guidelines

Project 1- Digital Signal Processing using Matlab

Project 2- Identifying Vehicle Number plates using Matlab

Project 3- Automatic Certificate Generation using Matlab

Project-4 JPEG Compression using Matlab

Project-5 Portable Media Player

Project -6 Design a GUI that show the export of students data such as students passed and failed in all subject, placement of students in various department visualize that using Matlab

Course Outcome

CSU324.1 students will able to understand the basic of matlab and design the project using matlab

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To Understand and demonstrate the concepts of object-oriented design, polymorphism, information hiding, and inheritance
- II. Take a problem and develop the structures to represent objects and the algorithms to perform operations.
- III. Use class library to develop projects involving several C++ files and class libraries.
- IV. To understand the concept of C#

Classes and Abstract data types and their specification. How to implement an ADT. Concrete state space, concrete invariant, abstraction **function.** Implementing operations, Features of object-oriented programming. Encapsulation, overloading, object identity, polymorphism, Friend Function,

Inheritance: Types of Inheritance

Polymorphism: Run time polymorphism, Compile time polymorphism, virtual function

Memory management. File Processing

Model-view-controller pattern. Commands as methods and as objects. Implementing OO language features.

Generic types and collections: templates, exceptions, container

Design patterns. Introduction and classification. Singleton Pattern.

Introduction to C#

Text-Book :

1. Object-Oriented Programming in C++ by Robert Lafore , 4th Edition, Pearson Education ,2002.
2. C++ Programming Language by Bjarne Stroustrup,3rd Edition, Addison-Wesley, 2002.

References Book:

1. Complete Reference C++ by Herbert Schildt ,4th Edition,Tata McGrawHill,2004.

COURSE OUTCOMES

On completion of the course the student should be able to

- | | |
|-----------------|--|
| CSU421.1 | Understand the relative merits of C++ as an object oriented programming language |
| CSU421.2 | to produce object-oriented software using C++ |
| CSU421.3 | Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism |
| CSU421.4 | Understand advanced features of C++ specifically stream I/O, templates and operator overloading |

CSU422 COMPUTER ORGANIZATION AND ARCHITECTURE

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective

- I. To understand the basic of computer peripherals which computers work
- II. To impart the knowledge on micro programming.
- III. To analyse how I/O devices are accessed and its principles.
- IV. To understand the concept of pipelining techniques.

Introduction: Computer components and its functions, Processing unit, bus architecture, execution of a complete instruction, sequencing of control signals, Computer peripherals, I/O devices such as video terminals, video displays, graphic input devices, printers, magnetic disk, magnetic tape, CDROM systems, Threading and Multithreading .

Addressing modes, their application in implementation of HLL constructs and data structures, instruction formats, expanding op-code method, Micro programmed control, microinstruction format, microinstruction sequencing, bit slice concept.

Arithmetic, number representations and their operations, design of fast address, signed multiplication, Booth's Algorithm, bit-pair recording, division , floating point numbers and operations, guard bits and rounding.

Main memory organization, various technologies used in memory design, higher order memory design, multi module memories and interleaving, cache memory, concept of cache memory, mapping functions, replacement algorithms.

External devices: I/O modules, Programmed I/O, Interrupt I/O, I/O channels

Input-output organization, I/O mapped I/O and memory mapped I/O, Direct Memory Access (DMA), interrupts and interrupt handling mechanisms, device identification, vectored interrupts, interrupt nesting, I/O interfaces, synchronous vs. asynchronous data transfer, I/O channels.

RISC philosophy, pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations, basic concepts in parallel processing & classification of parallel architectures. Introduction of Superscalar and vector superscalar.

TextBooks:

1. Computer Organization & Architecture By Stalling W, 6th Edition , Pearson Education 2003

References:

1. Computer Organization & Design, the Hardware/ Software Interface, Patterson D. A, Hennessy J. L.
2. Computer Organization , Hamacher, Carl V. et al, McGraw Hill
3. Structured Computer Organization , Tanenbaum A.S, Prentice Hall of India Ltd

Course Outcomes:

CSU422.1 Students will learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design.

CSU422.2 Students will be able to identify where, when and how enhancements of computer performance can be accomplished.

CSU422.3 Students will learn the sufficient background necessary to read more advance texts as well as journal articles on the field.

CSU422.4 Student will see how to use concepts of computer organization in real-life settings using various PC performance improvements, more recent applications of computer organization in advanced digital systems

CSU423 –OPERATING SYSTEM

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I.** To learn Fundamental, the mechanisms of OS to handle processes, threads and their communication
- II.** To learn the mechanisms involved in memory management in contemporary OS
- III.** To gain knowledge on operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- IV.** To know the aspects of concurrency management control of asynchronous processes, deadlocks, memory management, processor and disk scheduling and file system organization.

Introduction: Concept of Operating Systems, Goals of Operating System, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Overview of Operating system, multiprogramming, time sharing, real time and distributed operating systems, Concept of Virtual Machine.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, **Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling Criteria, Scheduling algorithms. **Inter-process Communication and Process Synchronization:** Critical Section, Race Conditions, Mutual Exclusion, Semaphores, Classical IPC Problems

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation, fragmentation and Paging, **Virtual Memory:** Hardware and control structures, Page fault, Page Replacement algorithms.

File Management: Access methods, File operation, Directory structure, File System structure, Allocation methods, File Protection.

Case study: UNIX Operating System

Text Books:

1. Operating System concepts and principles, A. Silberschatz & P.B. Galvin, 8th Edition Wiley India, 2009.
2. Modern Operating System ,Tanenbaum, 3rd Edition, Prentice Hall India, ,2003.

Reference Books:

1. Operating Systems: Internals and design Principle, W. Stallings, 6th Edition, Pearson Education(LPE) , 2009.
2. Design of Linux Operating system, M.J. Bach, 3rd Edition, Prentice Hall, 2004.
3. www.nptel.iitm.ac.in
4. www.nptel.iitkgp.ac.in

Course Outcome

Students will able to

CSU423.1 learn, Describe, contrast and compare differing structures for operating systems

CSU423.2 Understand the process management policies and scheduling of processes by CPU

CSU423.3 Evaluate the requirement for Process synchronization, deadlock and memory management.

CSU423.4 Interpret various OS functions used in Linux

CSU424 – DESIGN AND ANALYSIS OF ALGORITHMS

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To write rigorous correctness proofs for algorithms designed using different algorithm design techniques and understand their efficiency using different analysis methods.
- II. Synthesize efficient algorithms in common engineering design situations.
- III. To emphasize the relationship between algorithms and programming
- IV. To demonstrate familiarity with NP-Complete problems

Algorithms: Algorithms as Technology, Algorithm Design Techniques, Asymptotic notations of analysis of algorithms, analysing control structures, complexity, worst case and average case analysis. **Mathematical foundations:** summation of arithmetic and geometric series, bounding summations using integration, recurrence relations.

Sorting Algorithms : Sorting Algorithms and their analysis using incremental approach such as insertion sort, bubble sort, selection sort, sorting in linear time.

Greedy method : basic strategy, application to job sequencing with deadlines problem, Elements of Greedy Methods.

Divide and conquer : Divide and conquer basic strategy, Recurrences, binary search, quick sort, merge sort. Maximum sub array and matrix multiplication problem.

Dynamic programming: basic strategy, Rod Cutting Problem, Elements of Dynamic Programming.

Graph and Tree Algorithms: Elementary Graph Algorithms, DFS, BFS, minimum cost spanning trees, single source shortest path, Network Flow, Topological Sorting

Backtracking basic strategy, 8- Queen's problem, graph colouring, Hamiltonian cycles etc.

Advance Topics: Basic Concepts of NP-hard and NP-complete problems, non-deterministic algorithms, Randomization Algorithms and Approximation Algorithms, RSA Cryptography Algorithm, Compression.

Course Outcomes

CSU424.1 Students will be Analyze the asymptotic performance of algorithms.

CSU424.2 Students will be understood the rigorous correctness proofs for algorithms.

CSU424.3 Students will be Demonstrate a familiarity with major algorithms and data structures.

CSU424.4 Students will be Apply important algorithmic design paradigms and methods of analysis.

Text Books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al. Computer Science Press

Reference Books

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.

2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

CSU425 -MANAGEMENT (ORGANIZATIONAL BEHAVIOUR)

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective

- I.** To give a basic perspective of Management theories and Practices.
- II.** To study other functional areas of management and to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

Role of Management – Concept – Significance – Functions – principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency

Decision Making & Controlling – Process – Techniques. Planning – Process – Problems — Making It Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective

Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johor window- Transactional Analysis

Group Dynamics & Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler

Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management

TextBook:

1. Organizational Behavior, Stephen P. Robbins, Pearson Education.
2. Management and Organizational behavior, Pierce Gardner, Cengage.

References:

1. Organizational Behavior , Mishra .M.N ,Vikas

2. Management and Organizational Behaviour, Subbarao P, Himalaya Publishing House.
Organizational Behaviour, S.S.Khanka, S.Chand

Course Outcome

CSU425.1 Students will learn the principles of Management in management system.

CSU425.2 Students will be able to Organizational Behavior.

CSU425.3 Students will learn the Concept of Motivation.

CSU425.4 Students will learn the Understanding Individual Behavior, Qualities of good Leader, Change Management – Conflict Management

SHU421 ENVIROMENTAL SCIENCES

Teaching Scheme: 00

Total: 00

Credits: 00

Evaluation Scheme: 60 ESE

Total Marks: 60

ESE Duration: 2Hrs. 30 min.

Course Objective

- I.** To critically evaluate the science and policy ramifications of diverse energy portfolios on air and water quality, climate, weapons proliferation and societal stability;
- II.** To apply quantitative reasoning skills to environmental problems including basic calculations related to energy, water, and air issues and the use of statistical methods in data analysis and argumentation.

The Multidisciplinary Nature of Environmental Studies:- Definition, scope and importance, Need for public awareness.

Social issues and Environment:- From Unsustainable to sustainable development, urban problems related to energy, Water conservation, rainwater harvesting, and watershed management Resettlement and rehabilitation of people, problems.

Environmental ethics:- Issues and possible solution, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation. Consumerism and Waste products, Environment protection act, Air (prevention & control) act, Water (prevention and control) act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation.

Human population and environment:- Environment and human health, Human rights, Role of Information Technology in Environment and human health, Public awareness.

Natural Recourses:- Conventional energy resources: definition, classification, composition, energy content types: coal, petroleum, natural gases, hydrogeothermal, nuclear, environmental

implication of energy uses. Non conventional energy resources: solar energy, wind energy, tidal energy, geothermal energy, hydropowers and biogas.

Ecosystem and Biodiversity:-Concept of ecosystem, Structure and function of ecosystem, Producer, consumer, decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of following ecosystem: Forest ecosystem, Grass land ecosystem, Desert ecosystem Aquatic ecosystem (Rivers and ocean).

Introduction- definition: genetics, species and ecosystem, diversity. Biogeographically classification of India. Conservation of biodiversity- In-situ and Ex-situ conservation of Biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local level. India as mega diversity nation. Hot spot of biodiversity.

Environmental Pollution:- Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste, Management, Causes effects and control measures, Role of individual in prevention of pollution, Hazardous waste management, Biomedical waste management, Disaster management: floods, earthquake, cyclone and landslides.

Text Book

1. The Biodiversity of India, Bharucha Erach ,Marin Publishing Pvt. Ltd., Ahmedabad
- 2) Brunner R.C., 1989,Hazardous Waste Incineration, McGraw Hill Inc.
- 3) Marine pollution, Clark R.S., Clanderson Press Oxford (TB)
- 4) Environmental Chemistry, De A.K. Wiley Estern Lmt.
- 5) Environmental Chemistry, Sharma B.K., 2001 Goel Publ., House, Meerat.
- 6) Environmental Management, Wagner K.D., 1998, W.B. Saunders Co., Philadel phia, USA
- 7) Environmental Studies, Benny Joseph, 1st edition,2005,Tata Mcgraw-Hill Publ.

Course outcome

After studying the course, the students will be able to:

SHU421.1 Convey the Environmental awareness among peoples.

SHU421.2 Apply Conservation of various natural resources and environmental factors.

SHU421.3 Aware about social and environmental issues.

CSU 426 OBJECT ORIENTED PROGRAMMING LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To Understand and demonstrate the concepts of object-oriented design, polymorphism, information hiding, and inheritance
- II. Take a problem and develop the structures to represent objects and the algorithms to perform operations.
- III. Use class library to develop projects involving several several C++ files and class libraries.
- IV. To understand the concept of C#

Project-1. To developed Student Information System

Project-2. To Developed Employee information system

Project-3. To Developed Banking System

COURSE OUTCOMES

On completion of the course the student should be able to

- CSU426.1** Understand the relative merits of C++ as an object oriented programming language
- CSU426.2** to produce object-oriented software using C++
- CSU426.3** Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism
- CSU426.4** Understand advanced features of C++ specifically stream I/O, templates and operator overloading

CSU 427 COMPUTER ARCHITECTURE LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To understand the basic of computer peripherals which computers work
- II. To impart the knowledge on micro programming.
- III. To analyse how I/O devices are accessed and its principles.
- IV. To understand the concept of pipelining techniques.

Project :1 Designing I/O devices such as video terminals, video displays.

Project :3 Designing and organizing main memory

Project :3 Designing and simulations of simple processors.

Project :4 Design ALU using Logisim.

Course Outcomes :

CSU427.1 Students will learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design.

CSU427.2 Students will be able to identify where, when and how enhancements of computer performance can be accomplished.

CSU427.3 Students will learn the sufficient background necessary to read more advance texts as well as journal articles on the field.

CSU427.4 Student will see how to use concepts of computer organization in real-life settings using various PC performance improvements, more recent applications of computer organization in advanced digital systems

CSU 428 OPERATING SYSTEM LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I.** To learn Fundamental, the mechanisms of OS to handle processes, threads and their communication
- II.** To learn the mechanisms involved in memory management in contemporary OS
- III.** To gain knowledge on operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- IV.** To know the aspects of concurrency management control of asynchronous processes, deadlocks, memory management, processor and disk scheduling and file system organization.

Project -1

Create a simulator for scheduling a given set of processes in user space only. The simulator should read from a configuration file a set of parameters for each process: Length of time for which process will execute, priority of the process and the preferred scheduling policy - FIFO or Round Robin, the time at which the process executes and if it is a CPU intensive process _or an I/O intensive process. Apart from this read the quantum of time given to each process and the number of priority levels for scheduling the process. Now simulate a scheduling algorithm which uses FIFO/Round Robin with priority based scheduling. At the end of the run print the following quantities for each process: a. Number of times the process was scheduled. b. A timeline for the process containing the state transitions - Ready, waiting, Running and Terminated and the timestamp for each transition. c. Time taken to complete the process. d. Number of times the process waited for I/O. e. The priority of the process and preferred scheduling algorithm. After printing the above values print the average time of completion for each process. From the calculated parameters determine which scheduling algorithm was better for CPU intensive and I/O intensive processes. Suggest ways in which the scheduling algorithm can be improved and why?

Project -2

Create two processes which communicate using a shared memory segment. The first process finds out the list of all processes running on the system with their name, process id, number of files opened and total time running and creates a linked list containing this data about every process running in the shared memory. The second process reads this linked list and formats it in HTML and saves it in a file. This is done by the processes every half an hour. (Hint: Use jproc file system on Linux to find out process information.)

Project -3

Implement Bankers algorithm for N customer.

Course Outcome

Students will able to

CSU428.1 learn, Describe, contrast and compare differing structures for operating systems

CSU428.2 Understand the process management policies and scheduling of processes by CPU

CSU428.3 Evaluate the requirement for Process synchronization, deadlock and memory management.

CSU428.4 Interpret various OS functions used in Linux

CSU 429 DESIGN AND ANALYSIS OF ALGORITHMS LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I.** To write rigorous correctness proofs for algorithms designed using different algorithm design techniques and understand their efficiency using different analysis methods.
- II.** Synthesize efficient algorithms in common engineering design situations.
- III.** To emphasize the relationship between algorithms and programming
- IV.** To demonstrate familiarity with NP-Complete problems

Project 1 will be comprised of solving any particular problem with incremental approach and Divide & conquer design technique

Project 2 will be develop application based on Dynamic Programming design technique

Project 3 will be develop application based on Greedy Method design technique

Project 4 will be develop application based on Back Tracking design technique

Project 5 will be a major application comprises most of the required contents of syllabus.

Note: Project 1 to 4 can be completed individually or group of two students and Project 5 containing at least 4 different modules which can be completed in the group of 3 to 4 students

Course Outcomes

CSU429.1 Students will be Analyze the asymptotic performance of algorithms.

CSU429.2 Students will be understood the rigorous correctness proofs for algorithms.

CSU429.3 Students will be Demonstrate a familiarity with major algorithms and data structures.

CSU429.4 Students will be Apply important algorithmic design paradigms and methods of analysis.

Equivalence Scheme for online courses

Programme Name: - Computer Science & Engineering

Sr. No.	Course code with Name of course (old/new)		Credit	Course code with Name of course (online)		Name of Online platform	Credit
1.	CSU302	Computer Organization & Architecture	3	noc20-cs64	Computer Architecture & Organization	NPTL	
2.	CSU303	Discrete Mathematics & Graph Theory	3	noc20-cs82	Discrete Mathematics	NPTL	
3	CSU402	Data Structure	4	noc20-cs70	Programming, Data structure and Algorithms using Python	NPTL	
4	CSU403	Object Oriented Technology	4	noc20-cs59	Object Oriented Analysis & Design	NPTL	
5	ITU502	Database management System	3	noc20-cs60	Database management System	NPTL	
6	ITU601	Design and Analysis of Algorithm	3	noc20-cs71	Design and Analysis of Algorithms	NPTL	
7	CSU602	Operating System Design	3	noc20-cs75	Introduction to operating systems	NPTL	
8	CSU604	Software Project Management	3	noc20-cs68	Software Engineering	NPTL	

**GOVT. COLLEGE OF ENGINEERING
AMRAVATI**

**DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING**



CURRICULUM

For

**B. Tech. Second Year
(Computer Science and Engineering)**

2020 – 21

Program Objectives

The Undergraduate students will demonstrate.

- I. To create graduates with foundation knowledge of computer science and engineering, who can contribute towards emerging technologies.
- II. To develop an ability to identify, formulate and develop solution to solve real life computational challenges.
- III. To create graduates with sufficient capabilities in computer science and scientific computing who can become researchers and developers to satisfy the needs of the core computer technology industry.
- IV. To inculcate attitude of innovative driven entrepreneurship (IDE).
- V. To make the students aware of professional and social ethics and prepare them with basic soft skills essential for working in societal and professional teams.

Program Outcomes (POs):

The Undergraduate Students will have ability to

1. Apply knowledge of fundamental programming, mathematics, algorithms and technologies in Computer Science & Engineering to solve real life problems faced by the industry.
2. Demonstrate knowledge of fundamentals of hardware technology relevant to understanding Computer Science basics.
3. Demonstrate capability to work in teams and in professional, ethical, legal and social responsible framework.
4. An ability to communicate general and technical topics in written and verbal forms with diverse stakeholders.
5. Demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software (FOSS) tools in developing software.
6. A potential to perform good in the examinations for higher education.
7. Expand their qualities of learning and demonstrating latest technology.



B. Tech. (Computer Science and Engineering)

SEM III

Category	Course Code	Name of the Course	Teaching Scheme					Evaluation Scheme					Credits
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
ESC	ETU331	Analog and Digital Integrated Circuit	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU321	Data Structure and Algorithms	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU322	Discrete Mathematics	3	---	---	3	30	10	60	---	---	100	3
BSC	SHU321B SHU322B	Transform and Linear Algebra Differential Equation and Transform	3	1	---	4	30	10	60	---	---	100	4
MC	SHU323	Introduction to Constitution of India	1	---	---	---	---	20	30	---	---	50	0
HSMC	SHU324	Effective technical communication	3	---	---	3	30	10	60	---	---	100	3
ESC-LC	ETU332	Analog and Digital Integrated Circuit Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU323	Data structure and Algorithms Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU324	IT Workshop (Sci Lab/MATLAB)	1	---	4	5	---	---	---	25	25	50	3
		Total	17	1	12	29	150	70	330	75	75	700	23

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B. Tech. (Computer Science and Engineering)

SEM IV														
Category	Course Code	Name of the Course	Teaching Scheme					Evaluation Scheme					Credits	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total		
							MSE	TA	ESE	ICA	ESE			
PCC	CSU421	Object Oriented Programming	3	1	---	4	30	10	60	---	---	---	100	4
PCC	CSU422	Computer Organization and Architecture	3	---	---	3	30	10	60	---	---	---	100	3
PCC	CSU423	Operating System	3	---	---	3	30	10	60	---	---	---	100	3
PCC	CSU424	Design and Analysis of Algorithms	3	---	---	---	30	10	60	---	---	---	100	3
HSMC	CSU425	Organizational Behaviour	3	---	---	3	30	10	60	---	---	---	100	3
MC	SHU421	Environmental Sciences <i>Studies</i>	1	---	---	---	---	20	30	---	---	---	50	0
PCC	CSU 426	Object Oriented Programming Lab	---	---	4	4	--	--	---	25	25	50	50	2
PCC-LC	CSU427	Computer Organization and Architecture Lab	---	---	4	4	---	---	---	25	25	50	50	2
PCC-LC	CSU428	Operating Systems Lab	---	---	4	4	---	---	---	25	25	50	50	2
PCC-LC	CSU429	Design and Analysis of Algorithms Lab	---	---	4	4	---	---	---	25	25	50	50	2
		Total	16	1	16	29	150	70	330	100	100	750	750	24

Handwritten mark

Handwritten mark

B. Tech. (Computer Science and Engineering)

SEM V													
Category	Course Code	Name of the Course	Teaching Scheme					Evaluation Scheme					Credits
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
PCC	CSU521	Database Management Systems	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU522	Formal Language and Automata Theory	3	1	---	4	30	10	60	---	---	100	4
PCC	CSU523	Java and Python Programming	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU524	Computer Networks	3	---	---	3	30	10	60	---	---	100	3
PEC	CSU525	Program Elective-I	3	---	---	3	30	10	60	---	---	100	3
BSC	SHU525	Human Values and Ethics	1	--	---	1	---	20	30	---	---	50	0
PCC-LC	CSU526	Database Management Systems Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU527	Java and Python Programming Lab	---	---	4	4	---	---	---	25	25	50	2
Total			16	1	8	25	150	70	330	50	50	650	20

B. Tech. (Computer Science and Engineering)

SEM VI

Category	Course Code	Name of the Course	Teaching Scheme					Evaluation Scheme					Credits
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total	
							MSE	TA	ESE	ICA	ESE		
PCC	CSU621	Compiler Design	3	---	---	3	30	10	60	---	---	100	3
PCC	CSU622	Software Project Management	3	---	---	3	30	10	60	---	---	100	3
PEC	CSU623	Program Elective-II	3	---	---	3	30	10	60	---	---	100	3
PEC	CSU624	Program Elective-III	3	---	---	3	30	10	60	---	---	100	3
OEC	CSU625	Open Elective-I	3	---	---	3	30	10	60	---	---	100	3
PCC-LC	CSU626	Compiler Design Lab	---	---	4	4	---	---	---	25	25	50	2
PCC-LC	CSU627	Computer Networks Lab	---	---	4	4	---	---	---	25	25	50	2
PROJ	CSU628	Minor Project	---	---	6	6	---	---	---	50	50	100	3
		Total	15	0	14	29	150	50	300	100	100	700	22

B. Tech. (Computer Science and Engineering)

SEM VII														
Category	Course Code	Name of the Course	Teaching Scheme					Evaluation Scheme					Credits	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total		
							MSE	TA	ESE	ICA	ESE			
ESC	CSU721	Signals and Systems	3		---	3	30	10	---	60	---	---	100	3
PEC	CSU722	Program Elective-IV	3	---	---	3	30	10	---	60	---	---	100	3
PEC	CSU723	Program Elective-V	3	---	---	3	30	10	---	60	---	---	100	3
PCC	CSU724	Cyber Security	3	---	---	3	30	10	---	60	---	---	100	3
PCC	CSU725	Software Engineering	3	---	---	3	30	10	---	60	---	---	100	3
PROJ	CSU726	Seminar			2	2	---	---	---	---	50	---	50	1
		Total	15	0	2	17	150	60	300	50	---	---	550	16

B. Tech. (Computer Science and Engineering)

SEM VIII														
Category	Course Code	Name of the Course	Teaching Scheme					Evaluation Scheme					Credits	
			Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total		
							MSE	TA	ESE	ICA	ESE			
PEC	CSU821	Program Elective-VI	3	---	---	3	30	10	---	60	---	---	100	3
OEC	CSU822	Open Elective-II	2	---	---	2	30	10	---	60	---	---	100	2
PROJ	CSU823	A. Project OR B. Industry Internship Project	---	---	24	24	---	---	---	---	200	200	400	12
		Total	5	0	24	29	60	20	120	200	200	---	600	17

Note: Students going for internship at Industry will complete theory courses through online platform such as MOOCs, NPTEL etc or by self-study mode and will either directly appear for ESE only (Total Internal Marks (CT1+CT2) will be awarded proportional to marks secure in ESE) or they can appear for CT1 and CT2. TA marks will be awarded as per industrial project performance.

BSC Basic Science Courses
ESC Engineering Science Courses
HSMC Humanities and Social Sciences including Management courses
PCC Professional core courses
PEC Professional Elective courses
OEC Open Elective courses
LC Laboratory course
MC Mandatory courses
SI Summer Industry Internship
PROJ Project

Program Elective Courses

Program Elective-I	Program Elective-II	Program Elective-III	Program Elective-IV	Program Elective-V	Program Elective-VI
Graph Theory	Advanced Algorithms	Parallel and Distributed Algorithms	Computational Complexity	Computational Geometry	Queuing Theory and Modelling
System Engineering	Distributed Systems	Embedded Systems	Low Power Circuits and Systems	Advanced Operating Systems	Fault Tolerant Computing
Artificial Intelligence	Machine Learning	Data Mining	Soft Computing	Speech and Natural Language Processing	Data Analytics
Electronic Design Automation	Computer Graphics	Cloud Computing	Human Computer Interaction	Digital Signal Processing	Image Processing

Open Elective Courses (To be offered by Computer Science and Engineering Department)

Open Elective-I	Open Elective-II
Web Designing	Network Security
Data structure and Algorithm	Internet of Things

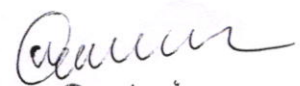



Equivalence Scheme

Programme Name: - Computer Science & Engineering


जाविक क्र.
संगणक विज्ञान व अभियांत्रिकी विभाग
शासकीय अभियांत्रिकी महाविद्यालय
अमरावती, दि. 04/03/2021


Sr. No	Course code with Name of course(old)		Credit	Course code with Name of course (new)		Credit
1	CSU 301	Programming Methodology	4	NO EQUIVALANCE		
2	CSU 302	Computer Organization & Architecture	4	CSU422	Computer Organization & Architecture	3
3	CSU 303	Discrete Mathematics & Graph Theory	3	CSU322	Discrete Mathematics	3
4	CSU 304	Programming Methodology Lab	1	NO EQUIVALANCE		
5	CSU 305	Computer Organization & Architecture Lab	1	CSU427	Computer Organization & Architecture Lab	1
6	CSU 306	Linux Administration-I Lab	1	NO EQUIVALANCE		
7	CSU 401	Numerical Methods & Computer Programming	3	NO EQUIVALANCE		
8	CSU 402	Data Structure	4	CSU321	Data structure and Algorithms	3
9	CSU 403	Object Oriented Programming	3	CSU421	Object Oriented Programming	3
10	ITU 402	Data Communication	3	NO EQUIVALANCE		
11	CSU404	Data Structure Lab	2	CSU323	Data structure and Algorithms Lab	2
12	CSU405	Object Oriented Programming Lab	1	CSU 426	Object Oriented Programming Lab	2
13	ITU403	Data Communication Lab	1	NO EQUIVALANCE		


संगणक विज्ञान व अभियांत्रिकी विभाग

शासकीय अभियांत्रिकी महाविद्यालय

Sr. No	Course code with Name of course(old)		Credit	Course code with Name of course (new)		Credit
14	CSU406	System Administration – II Lab	1	NO EQUIVALANCE		
15	NO EQUIVALANCE			ETU331	Analog & Digital Integrated Circuit	3
16	NO EQUIVALANCE			CSU324	IT Workshop (Sci Lab/MATLAB)	3
17	CSU602 Operating System		3	CSU423	Operating System	3
18	ITU501 Design and Analysis of Algorithms		3	CSU424	Design and Analysis of Algorithms	3
19	NO EQUIVALANCE			CSU425	Organizational Behaviour	3
20	CSU608 Operating System Lab		1	CSU428	Operating Systems Lab	2
21	CSU606 Design and Analysis of Algorithm Lab		1	CSU429	Design and Analysis of Algorithm Lab	2


 P. P. Shetty
 BOS Member secretary


 विभाग प्रमुख
 संगणक विज्ञान व अभियांत्रिकी विभाग
 शासकीय अभियांत्रिकी महाविद्यालय
 अमरावती.

Department of Computer Science & Engineering

Equivalence Scheme for online courses

Programme Name: - Computer Science & Engineering

Sr. No.	Course code with Name of course (old/new)		Credit	Course code with Name of course (online)		Name of Online platform	Credit
1.	CSU302	Computer Organization & Architecture	3	noc20-cs64	Computer Architecture & Organization	NPTL	
2.	CSU303	Discrete Mathematics & Graph Theory	3	noc20-cs82	Discrete Mathematics	NPTL	
3	CSU402	Data Structure	4	noc20-cs70	Programming, Data structure and Algorithms using Python	NPTL	
4	CSU403	Object Oriented Technology	4	noc20-cs59	Object Oriented Analysis & Design	NPTL	
5	ITU502	Database management System	3	noc20-cs60	Database management System	NPTL	
6	ITU601	Design and Analysis of Algorithm	3	noc20-cs71	Design and Analysis of Algorithms	NPTL	
7	CSU602	Operating System Design	3	noc20-cs75	Introduction to operating systems	NPTL	
8	CSU604	Software Project Management	3	noc20-cs68	Software Engineering	NPTL	



Equivalence B. Tech. Second Year SH Courses A.Y. 2020-21

S.N.	Course in old scheme			Equivalent course in new Scheme		
	Course Code	Course name	No. of Credits	Course Code	Course name	No. of Credits
1	SHU301	Engineering Mathematics- III	03	SHU321A	Differential Equations And Probability	03
2		No Equivalence		SHU322A	Integral Calculus And Probability	03
3	SHU304	Engineering Mathematics- III	03	SHU321B	Transform And Linear Algebra	04
4		No Equivalence		SHU322B	Differential Equation And Transform	04
5	SHU303	Engineering Mathematics- III	03	SHU321C	Transform And Statistical Methods	04
6		No Equivalence		SHU322C	Integral Calculus And Probability	04
7		No Equivalence		SHU323	Introduction To Constitution Of India	00
8		No Equivalence		SHU324	Effective Technical Communication	03
9		No Equivalence		SHU325	Human Values And Ethics	00
10	SHU203	Environmental Studies	03	SHU422	Environmental Studies	00
11		No Equivalence		SHU425	Human Values And Ethics	00
12		No Equivalence		SHU525	Human Values And Ethics	00
13		No Equivalence		SHU725	Human Values And Ethics	00
14	SHU305	General Proficiency- II	2		No Equivalence	
15	SHU401	Engineering Mathematics- IV	3		No Equivalence	
16	SHU402	Engineering Mathematics Lab	2		No Equivalence	
17	SHU403	Engineering Mathematics Lab	2		No Equivalence	

Gulhane

f/ Head, Mathematics

Petle

**Member secretary
BoS Science & Humanities**

S.V. Shinde

**Chairman
BoS Science & Humanities**

ETU331 ANALOG AND DIGITAL INTEGRATED CIRCUIT

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE+ 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. Understand basic analog and digital electronics.
- II. Learn the properties of semiconductor and operational amplifiers.
- III. Understand the concept of combinational and sequential logic and their application.
- IV. Understand the basics of Timer 555 and memories.

Basic concept and application of BJT & MOSFET:

Metal Oxide Semiconductor Field-Effect Transistors (MOSFET) and their Applications: MOSFET as an amplifier, small-signal equivalent circuits, single-stage MOSFET amplifier (common-source mode); MOSFET as a switch.

Operational amplifiers: Properties and characteristics study of typical opamp, Performance limitations, linear application of opamps, IC 741 opamp and its application, Feedback: basic concepts of negative feedback; four ideal feedback topologies;

Oscillators: basic principles of sinusoidal oscillation; Example circuits; Types and characteristics of voltage series feedback, current series feedback, current shunt feedback, and voltage shunt feedback. Barkhausen criteria, RC oscillators - Wein Bridge and phase shift, LC oscillators- Hartley, colpitt's, clapp and crystal oscillators. General features of a time base signal, UJT relaxation oscillator.

Multivibrator: Monostable , Astable and Bistable multivibrator.

Introduction and application of Ic 555:

Pin configuration, Basic of 555 timer, block diagram, working principle of IC555 and data sheet and its application, waveform generator, important features of 555 timer, 555 timer as astable multivibrator and monostable multivibrator, 555 timer as oscillator, 555 timer as RAMP generator,

Combination digital circuits:

Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator,

code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization

Sequential Digital Circuits:

A 1-bit memory, the circuit properties of Bi-stable latch, the SR flip flop, J- K, T and D types flip-flops, applications of flip-flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

Memories:

Introduction and classification of ROM, ROM organization, Static and Dynamic RAM, DRAM Refreshing, Representative circuits for cells using BJT and FET's, Timing diagrams of memories, Memory expansion using IC's, Flash memory, CCD, Magnetic Memories.

Course Outcomes:

After completion of the course students will able to-

ETU331.1 Describe the functioning and selection of OP-AMP as per application.

ETU331.2 Design and testing of OP-AMP based circuits.

ETU331.3 Design and implement Combinational and Sequential logic circuits.

ETU331.4 Describe the functioning of memories and their application

Text Books:

1. Electronic Devices and Circuits (2nd edition, 2008), by J. Millman, C. Halkias and Satyabrata jit, Tata McGraw Hill.
2. Sedra A. S. and Smith K. C., Microelectronic Circuits, Oxford University Press (2006).
3. The art of electronics. by Paul Horowitz and Winfield Hill (1998)
4. Logic and Computer Design Fundamentals. Morris Menno (2007)

CSU321 DATA STRUCTURE AND ALGORITHM

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To impart the knowledge of data structures and algorithms.
- II. To analyse the algorithm with respect to time and space which will prove the efficiency of algorithm.
- III. To assess how the choice of data structures and algorithm design methods impacts the performance of programs
- IV. To convert algorithms into efficient programs

Basic of Data Structure and Algorithm: Understanding the concept of Problem Solving, Design of Algorithms and Data Structures. Basic Terminologies: Elementary Data Organizations, Data Structures Operations and Types, Abstract Data Type (ADT), Writing Algorithms, Mathematical Notations and Functions, Algorithmic Notation, Introduction to Searching Algorithms: Linear and Binary Search, Analysis of an Algorithm: Complexity and Rate of Growth, Asymptotic Notations, Time-Space Trade-Off, Dictionaries, Introduction to Sorting Algorithms: Bubble, Selection, Insertion, Quick, Merge, Radix

Note: In this unit all the algorithms are implemented through a basic data structure called Array

Linked List: Introduction to Linked List, Types of Linked List, Representation of Linked List in Memory, Algorithms of several operation on Linked List and there analysis, String Processing: Storing Strings, String Operations, Word/Text Processing, String Pattern Matching Algorithms.

Stack and Queue: Introduction to Stack, Representation of Stack in Memory using Array and Linked List, Arithmetic Expression, Polish Notation, Application of Stack, Tower of Hanoi Problem, Recursion, Introduction to Queue, Representation of Queue in Memory using Array and Linked List, Types of Queues, Application of Queues.

Tree: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, Red Black Tree, Tree operations on each of the trees and their algorithms with complexity analysis, Applications of Binary Trees, Introduction to B Tree (Disk Based Data Structure), Heap Sort.

Graph: Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis, Minimum Spanning Tree Algorithms (Kruskal and Prim), Single Source Shortest Path (Dijkstra's) and Shortest Path Algorithms (Warshalls), Hashing in Data Structures.

Text Book

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al. 2nd edition Computer Science Press

Course Outcomes

CSU321.1 Understand basic terminology of data organization with the available data structures and their behaviour.

CSU321.2 Analysing and understanding, the implementation of data structures on computer memory so that, one must able to choose appropriate data structure for a given specific problem.

CSU321.3 After implementation a student must be capable of doing quantitative analysis of algorithm.

CSU321.4 Demonstrate ability to devise an efficient algorithm and transform into efficient code.

CSU322 DISCRETE MATHEMATICS

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. Learn basic terminology, formal logic, proofs, sets, relations, functions, recursion
- II. Use formal logic proof and logical reasoning to solve problems
- III. Relate the ideas of mathematical induction to recursion and recursively defined structures
- IV. Learning graphs, trees and related algorithms, Relate, interpret and apply these concepts to various areas of computer science

Sets, Relation and Function: Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cartesian Products, Image of a Set, Operations and Laws of Sets, Binary Relation, Partial Ordering Relation, Equivalence Relation, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Cantor's diagonal argument and the Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic. Basic counting techniques- inclusion and exclusion, pigeon-hole principle, permutation and combination.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.





Text Books :

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference Books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

Course Outcomes

CSU322.1 For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives

CSU322.2 For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference

CSU322.3 Students would be able to classify its algebraic structure for a given a mathematical problem.

CSU322.4 Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. To develop the given problem as graph networks and solve with techniques of graph theory.

SHU321B TRANSFORM AND LINEAR ALGEBRA

Teaching Scheme: 03TH+01TU

Total: 04

Credits: 04

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To study about the mathematical tool like z-transform and its properties.
- II. To introduce the concept of linear algebra which is important in computer software.
- III. To introduce the concept of orthogonally and inner product.
- IV. To familiarize the students with basic concepts of probability and conditional probability, continuous and discrete probability distributions.

Z-transform : Definition, Region of Convergence, Properties of Z-transform, Inverse Z-transform: Partial fraction method, Residue method; Convolution Theorem, Application to solution of difference equations with constant coefficients.

Vector spaces: Vector spaces and subspaces, null spaces, column spaces and linear transformations, Linear dependence and independence, bases, coordinate systems, dimensions of vector space.

Random variables and Probability Distributions:

Basic concepts of probability and its properties; Conditional probability and independent events; Random variables, discrete and continuous random variables, distribution functions, Mean and variance of Binomial, Poisson and Normal distributions.

Basic Statistics: (10 lectures)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression

Text Books:

1. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2010.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th edition, 2020.
3. Engineering Mathematics (for semester III), Veerarajan T., Tata McGraw-Hill, New Delhi, 2010.

Reference Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Introduction to Probability Theory, P. G. Hoel, S. C. Port and C. J. Stone, Universal Book Stall, 2003 (Reprint).
3. A First Course in Probability, S. Ross, 6th Ed., Pearson Education India, 2002.
4. An Introduction to Probability Theory and its Applications, W. Feller, Vol. 1, 3rd Ed., Wiley, 1968.

Course Outcomes

After successful completion of the course the students will be able to

SHU321B.1 use the concept of probability and random variables and various discrete and continuous probability distributions in practical problems.

SHU321B.2 Apply the tool of transform in solving engineering problems.

SHU321B.3 Analyse the problems related to engineering with the knowledge of linear algebra.

SHU322B DIFFERENTIAL EQUATION AND TRANSFORM

Teaching Scheme: 03TH+01TU

Total: 04

Credits: 04

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To study about the mathematical tool like z-transform and its properties.
- II. To introduce the concept of linear algebra which is important in computer software.
- III. To introduce the concept of orthogonally and inner product.
- IV. To familiarize the students with basic concepts of probability and conditional probability.
- V. To study continuous and discrete probability distributions.

Ordinary differential equations of higher orders: (08hours)

Linear differential equation with constant coefficient, complementary function, particular integral, complete solution; method of variation of parameters.

Integral Calculus: (08 hours)

Beta and Gamma functions and their properties; Evaluation of double integrals (Cartesian & polar), change of order of integration.

Z-transform: (08hrs)

Definition, Region of Convergence, Properties of Z-transform, Inverse Z-transform: Partial fraction **method, Residue method; Convolution** Theorem, Application to solution of difference equations with constant coefficients.

Vector spaces: (08hrs)

Vector spaces and subspaces, null spaces, column spaces and linear transformations, Linear dependence and independence, bases, coordinate systems, dimensions of vector Space.

Random variables and Probability Distributions: (08hrs)

Basic concepts of probability and its properties; Conditional probability and independent events; Random variables, discrete and continuous random variables, distribution functions, Binomial, Poisson and Normal distributions.

Course Outcomes

After successful completion of the course the students will be able to
SHU322B.1 Use the concept of probability and random variables and various discrete and continuous probability distributions in practical problems.

SHU322B.2 Apply the tool of transform in solving engineering problems.

SHU322B.3 Analyse the problems related to engineering with the knowledge of linear algebra.

Text Books:

4. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2010.
5. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 44th edition, 2020.
6. Engineering Mathematics (for semester III), Veerarajan T., Tata McGraw-Hill, New Delhi, 2010.

Reference Books:

5. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
6. Introduction to Probability Theory, P. G. Hoel, S. C. Port and C. J. Stone, Universal Book Stall, 2003 (Reprint).
7. A First Course in Probability, S. Ross, 6th Ed., Pearson Education India, 2002.
8. An Introduction to Probability Theory and its Applications. Feller, Vol. 1, 3rd Ed., Wiley, 1968.

SHU323 INTRODUCTION TO CONSTITUTION OF INDIA

Teaching Scheme: 01

Total: 01

Credits: 00

Evaluation Scheme: 20 TA + 30 ESE

Total Marks: 50

ESE Duration: 1Hrs. 30 min.

Course Objectives:

- I. To acquaint students about constitution of India, Fundamental rights, fundamental duties.
- II. To understand electoral process and role of central, state and local government and its administration.
- III. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Introduction to Constitution of India

Salient features of the Constitution of India, Preamble of the Constitution, fundamental rights and fundamental duties, Directive Principles of State Policy and relevance of directive principles. Parliamentary Form of Government in India- President, Vice-President, Prime Minister along with council of Minister, Parliament, Supreme court, Electoral process in India. Amendment Procedure.

State executives Governor, chief minister, state legislature, high courts of state

Role and functions of local self-government- Municipalities in India, with special reference to 73rd amendment. Panchayat Raj in India with special reference to 74th amendment.

Text Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

On the successful completion of this course, Students shall be able to-

SHU322.1 Understand and remember the knowledge of basic information about Indian Constitution.

SHU322.2 Apply the knowledge of fundamental rights and fundamental duties.

SHU324 HUMANITIES (EFFECTIVE TECHNICAL COMMUNICATION)

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To understand the basics of Technical writing and editing
- II. To understand and analyse the self-development

Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

Self-Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.



Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Text Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

Course Outcome

SHU323.1. Students will able to speak and communicate English

ETU332 ANALOG & DIGITAL CIRCUITS LAB

Teaching Scheme: 04P

Total: 04

Credits: 02

Evaluation Scheme: 25 INT+25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. Understand basic analog and digital electronics.
- II. Learn the properties of semiconductor and operational amplifiers.
- III. Understand the concept of combinational and sequential logic and their application.
- IV. Understand the basics of Timer 555 and memories.

Project-1. Oscillator design, & amplifier design,

Project-2. Sequential design & combinational design

Project-3. Memory design

Project-4. Minor project on Design of LED lighting system for household application; street lighting system; soft starting of DC machine.

Course Outcomes:

After completion of the course students will able to-

ETU332.1 Describe the functioning and selection of OP-AMP as per application.

ETU332.2 Design and testing of OP-AMP based circuits.

ETU332.3 Design and implement Combinational and Sequential logic circuits.

ETU332.4 Describe the functioning of memories and their application

CSU323 DATA STRUCTURE & ALGORITHM LAB

Teaching Scheme: 04P

Total: 04



Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I. To impart the knowledge of data structures and algorithms.
 - II. To analyse the algorithm with respect to time and space which will prove the efficiency of algorithm.
 - III. To assess how the choice of data structures and algorithm design methods impacts the performance of programs
 - IV. To convert algorithms into efficient programs
-  

Project 1 will be comprised of static sized array data structure involving sorting, searching, ADT such as dictionaries.

Project 2 will be comprised of linked list different types and string pattern matching algorithms

Project 3 will comprise of applications of stack and queue

Project 4 will comprise of Graph algorithm and its applications

Project 5 will comprise of Tree algorithms and its application

Project 6 will be a major application comprises most of the required contents of syllabus.

Note: Project 1 to 5 can be completed individually or group of two students and Project 6 containing at least 4 different modules which can be completed in the group of 3 to 4 students

Course Outcomes

CSU323.1 Understand basic terminology of data organization with the available data structures and their behaviour.

CSU323.2 Analysing and understanding, the implementation of data structures on computer memory so that, one must able to choose appropriate data structure for a given specific problem.

CSU323.3 After implementation a student must be capable of doing quantitative analysis of algorithm.

CSU323.4 Demonstrate ability to devise an efficient algorithm and transform into efficient code.

CSU324 IT WORKSHOP (Sci Lab/MATLAB)

Teaching Scheme: 01 Tut + 04P

Total: 05

Credits: 03

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objective:

- I.** To understand the basics of matlab
- II.** To Analyse the different functions of Matlab
- III.** To analyse different data visualization in matlab

Any three Based on given guidelines

Project 1- Digital Signal Processing using Matlab

Project 2- Identifying Vehicle Number plates using Matlab

Project 3- Automatic Certificate Generation using Matlab

Project-4 JPEG Compression using Matlab

Project-5 Portable Media Player

Project -6 Design a GUI that show the export of students data such as students passed and failed in all subject, placement of students in various department visualize that using Matlab

Course Outcome

CSU324.1 students will able to understand the basic of matlab and design the project using matlab

CSU 421 OBJECT ORIENTED PROGRAMMING

Teaching Scheme: 03T + 1TU

Total: 04

Credits: 04

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

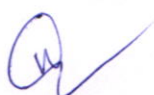
Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To Understand and demonstrate the concepts of object-oriented design, polymorphism, information hiding, and inheritance
- II. Take a problem and develop the structures to represent objects and the algorithms to perform operations.
- III. Use class library to develop projects involving several several C++ files and class libraries.
- IV. To understand the concept of C#

Classes and Abstract data types and their specification. How to implement an ADT. Concrete state space, concrete invariant, abstraction **function**. Implementing operations, Features of object-



oriented programming. Encapsulation, overloading, object identity, polymorphism, Friend Function.

Inheritance: Types of Inheritance

Polymorphism: Run time polymorphism, Compile time polymorphism, virtual function

Memory management. File Processing

Model-view-controller pattern. Commands as methods and as objects. Implementing OO language features.

Generic types and collections: templates, exceptions, container

Design patterns. Introduction and classification. Singleton Pattern.

Introduction to C#

Text-Book :

1. Object-Oriented Programming in C++ by Robert Lafore , 4th Edition, Pearson Education ,2002.
2. C++ Programming Language by Bjarne Stroustrup,3rd Edition, Addison-Wesley, 2002.

References Book:

1. Complete Reference C++ by Herbert Schildt ,4th Edition,Tata McGrawHill,2004.

COURSE OUTCOMES

On completion of the course the student should be able to

- CSU421.1 Understand the relative merits of C++ as an object oriented programming language
- CSU421.2 to produce object-oriented software using C++
- CSU421.3 Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism
- CSU421.4 Understand advanced features of C++ specifically stream I/O, templates and operator overloading

CSU422 COMPUTER ORGANIZATION AND ARCHITECTURE

Teaching Scheme: 03T

Total: 03

Credits: 03


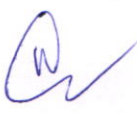
Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective

- I. To understand the basic of computer peripherals which computers work
- II. To impart the knowledge on micro programming.
- III. To analyse how I/O devices are accessed and its principles.
- IV. To understand the concept of pipelining techniques.

Introduction: Computer components and its functions, Processing unit, bus architecture, execution of a complete instruction, sequencing of control signals, Computer peripherals, I/O devices such as video terminals, video displays, graphic input devices, printers, magnetic disk, magnetic tape, CDROM systems, Threading and Multithreading .

Addressing modes, their application in implementation of HLL constructs and data structures, instruction formats, expanding op-code method, Micro programmed control, microinstruction format, microinstruction sequencing, bit slice concept.

Arithmetic, number representations and their operations, design of fast address, signed multiplication, Booth's Algorithm, bit-pair recording, division , floating point numbers and operations, guard bits and rounding.

Main memory organization, various technologies used in memory design, higher order memory design, multi module memories and interleaving, cache memory, concept of cache memory, mapping functions, replacement algorithms.

External devices: I/O modules, Programmed I/O, Interrupt I/O, I/O channels

Input-output organization, I/O mapped I/O and memory mapped I/O, Direct Memory Access (DMA), interrupts and interrupt handling mechanisms, device identification, vectored interrupts, interrupt nesting, I/O interfaces, synchronous vs. asynchronous data transfer, I/O channels.

RISC philosophy, pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations, basic concepts in parallel processing & classification of parallel architectures. Introduction of Superscalar and vector superscalar.

TextBooks:

1. Computer Organization & Architecture By Stalling W, 6th Edition , Pearson Education 2003

References:

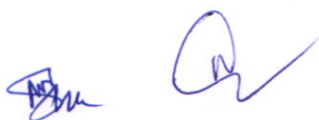
1. Computer Organization & Design, the Hardware/ Software Interface, Patterson D. A, Hennessy J. L.
2. Computer Organization , Hamacher, Carl V. et al, McGraw Hill
3. Structured Computer Organization , Tanenbaum A.S, Prentice Hall of India Ltd

Course Outcomes:

CSU422.1 Students will learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design.

CSU422.2 Students will be able to identify where, when and how enhancements of computer performance can be accomplished.

CSU422.3 Students will learn the sufficient background necessary to read more advance texts as well as journal articles on the field.



CSU422.4 Student will see how to use concepts of computer organization in real-life settings using various PC performance improvements, more recent applications of computer organization in advanced digital systems

CSU423 –OPERATING SYSTEM

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To learn Fundamental, the mechanisms of OS to handle processes, threads and their communication
- II. To learn the mechanisms involved in memory management in contemporary OS
- III. To gain knowledge on operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- IV. To know the aspects of concurrency management control of asynchronous processes, deadlocks, memory management, processor and disk scheduling and file system organization.

Introduction: Concept of Operating Systems, Goals of Operating System, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Overview of Operating system, multiprogramming, time sharing, real time and distributed operating systems, Concept of Virtual Machine.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, **Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling Criteria, Scheduling algorithms. **Inter-process Communication and Process Synchronization:** Critical Section, Race Conditions, Mutual Exclusion, Semaphores, Classical IPC Problems

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation, fragmentation and Paging, **Virtual Memory:** Hardware and control structures, Page fault, Page Replacement algorithms.

File Management: Access methods, File operation, Directory structure, File System structure, Allocation methods, File Protection.

Case study: UNIX Operating System

Text Books:

1. Operating System concepts and principles, A. Silberschatz & P.B. Galvin, 8th Edition Wiley India, 2009.

2. Modern Operating System ,Tanenbaum, 3rd Edition, Prentice Hall India, ,2003.

Reference Books:

1. Operating Systems: Internals and design Principle, W. Stallings, 6th Edition, Pearson Education(LPE) , 2009.
2. Design of Linux Operating system, M.J. Bach, 3rd Edition, Prentice Hall, 2004.
3. www.nptel.iitm.ac.in
4. www.nptel.iitkgp.ac.in

Course Outcome

Students will able to

CSU423.1 learn, Describe, contrast and compare differing structures for operating systems

CSU423.2 Understand the process management policies and scheduling of processes by CPU

CSU423.3 Evaluate the requirement for Process synchronization, deadlock and memory management.

CSU423.4 Interpret various OS functions used in Linux

CSU424 – DESIGN AND ANALYSIS OF ALGORITHMS

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To write rigorous correctness proofs for algorithms designed using different algorithm design techniques and understand there efficiency using different analysis methods.
- II. Synthesize efficient algorithms in common engineering design situations.
- III. To emphasize the relationship between algorithms and programming
- IV. To demonstrate familiarity with NP-Complete problems

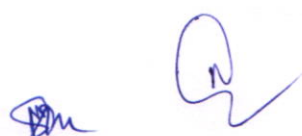
Algorithms: Algorithms as Technology, Algorithm Design Techniques, Asymptotic notations of analysis of algorithms, analysing control structures, complexity, worst case and average case analysis. **Mathematical foundations:** summation of arithmetic and geometric series, bounding summations using integration, recurrence relations.

Sorting Algorithms : Sorting Algorithms and there analysis using incremental approach such as insertion sort, bubble sort, selection sort, sorting in linear time.

Greedy method : basic strategy, application to job sequencing with deadlines problem, Elements of Greedy Methods.

Divide and conquer : Divide and conquer basic strategy, Recurrences, binary search, quick sort, merge sort. Maximum sub array and matrix multiplication problem.

Dynamic programming: basic strategy, Rod Cutting Problem, Elements of Dynamic Programming.



Graph and Tree Algorithms: Elementary Graph Algorithms, DFS, BFS, minimum cost spanning trees, single source shortest path, Network Flow, Topological Sorting
Backtracking basic strategy, 8- Queen's problem, graph colouring, Hamiltonian cycles etc.
Advance Topics: Basic Concepts of NP-hard and NP-complete problems, non-deterministic algorithms, Randomization Algorithms and Approximation Algorithms, RSA Cryptography Algorithm, Compression.

Course Outcomes

- CSU424.1 Students will be Analyze the asymptotic performance of algorithms.
CSU424.2 Students will be understood the rigorous correctness proofs for algorithms.
CSU424.3 Students will be Demonstrate a familiarity with major algorithms and data structures.
CSU424.4 Students will be Apply important algorithmic design paradigms and methods of analysis.

Text Books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al. Computer Science Press

Reference Books

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

CSU425 -MANAGEMENT (ORGANIZATIONAL BEHAVIOUR)

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 30 MSE + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Course Objective

- I. To give a basic perspective of Management theories and Practices.
- II. To study other functional areas of management and to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

Role of Management – Concept – Significance – Functions – principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency

Decision Making & Controlling – Process – Techniques. Planning – Process – Problems — Making It Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective

Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johor window- Transactional Analysis

Group Dynamics & Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler

Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management

TextBook:

1. Organizational Behavior, Stephen P. Robbins, Pearson Education.
2. Management and Organizational behavior, Pierce Gardner, Cengage.

References:

1. Organizational Behavior , Mishra .M.N ,Vikas
2. Management and Organizational Behaviour, Subbarao P, Himalaya Publishing House. Organizational Behaviour, S.S.Khanka, S.Chand

Course Outcome

CSU425.1 Students will learn the principles of Management in management system.

CSU425.2 Students will be able to Organizational Behavior.

CSU425.3 Students will learn the Concept of Motivation.

CSU425.4 Students will learn the Understanding Individual Behavior, Qualities of good Leader, Change Management – Conflict Management

SHU422 ENVIROMENTAL SCIENCES STUDIES

Teaching Scheme: 01

Total: 01

Credits: 01

Evaluation Scheme: 20 TA + 30 ESE

Total Marks: 50

ESE Duration: 1Hrs. 30 min.

Course Objective

- I. To critically evaluate the science and policy ramifications of diverse energy portfolios on air and water quality, climate, weapons proliferation and societal stability;
- II. To apply quantitative reasoning skills to environmental problems including basic calculations related to energy, water, and air issues and the use of statistical methods in data analysis and argumentation.

The Multidisciplinary Nature of Environmental Studies:- Definition, scope and importance, Need for public awareness.

Social issues and Environment:- From Unsustainable to sustainable development, urban problems related to energy, Water conservation, rainwater harvesting, and watershed management Resettlement and rehabilitation of people, problems.

Environmental ethics:- Issues and possible solution, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation. Consumerism and Waste products, Environment protection act, Air (prevention & control) act, Water (prevention and control) act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation.

Human population and environment:- Environment and human health, Human rights, Role of Information Technology in Environment and human health, Public awareness.

Natural Recourses:- Conventional energy resources: definition, classification, composition, energy content types: coal, petroleum, natural gases, hydrogeothermal, nuclear, environmental implication of energy uses. Non conventional energy resources: solar energy, wind energy, tidal energy, geothermal energy, hydropowers and biogas.

Ecosystem and Biodiversity:- Concept of ecosystem, Structure and function of ecosystem, Producer, consumer, decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of following ecosystem: Forest ecosystem, Grass land ecosystem, Desert ecosystem Aquatic ecosystem (Rivers and ocean).

Introduction- definition: genetics, species and ecosystem, diversity. Biogeographically classification of India. Conservation of biodiversity- In-situ and Ex-situ conservation of Biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local level. India as mega diversity nation. Hot spot of biodiversity.

Environmental Pollution:- Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste, Management, Causes effects and control measures, Role of individual in prevention of pollution, Hazardous waste management, Biomedical waste management, Disaster management: floods, earthquake, cyclone and landslides.

Text Book



1. The Biodiversity of India, Bharucha Erach ,Marin Publishing Pvt. Ltd., Ahmedabad
- 2) Brunner R.C., 1989,Hazardous Waste Incineration, McGraw Hill Inc.
- 3) Marine pollution, Clark R.S., Clanderson Press Oxford (TB)
- 4) Environmental Chemistry, De A.K. Wiley Estern Lmt.
- 5) Environmental Chemistry, Sharma B.K., 2001 Goel Publ., House, Meerat.
- 6) Environmental Management, Wagner K.D., 1998, W.B. Saunders Co., Philadel phia, USA
- 7) Environmental Studies, Benny Joseph, 1st edition,2005,Tata Mcgraw-Hill Publ.

Course outcome

After studying the course, the students will be able to:

SHU421.1 Convey the Environmental awareness among peoples.

SHU421.2 Apply Conservation of various natural resources and environmental factors.

SHU421.3 Aware about social and environmental issues.

CSU 426 OBJECT ORIENTED PROGRAMMING LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To Understand and demonstrate the concepts of object-oriented design, polymorphism, information hiding, and inheritance
- II. Take a problem and develop the structures to represent objects and the algorithms to perform operations.
- III. Use class library to develop projects involving several several C++ files and class libraries.
- IV. To understand the concept of C#

Project-1. To developed Student Information System

Project-2. To Developed Employee information system

Project-3. To Developed Banking System

COURSE OUTCOMES

On completion of the course the student should be able to

- CSU426.1** Understand the relative merits of C++ as an object oriented programming language
- CSU426.2** to produce object-oriented software using C++

- CSU426.3 Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism
- CSU426.4 Understand advanced features of C++ specifically stream I/O, templates and operator overloading

CSU 427 COMPUTER ARCHITECTURE LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To understand the basic of computer peripherals which computers work
- II. To impart the knowledge on micro programming.
- III. To analyse how I/O devices are accessed and its principles.
- IV. To understand the concept of pipelining techniques.

Project :1 Designing I/O devices such as video terminals, video displays.

Project :3 Designing and organizing main memory

Project :3 Designing and simulations of simple processors.

Project :4 Design ALU using Logisim.

Course Outcomes :

CSU427.1 Students will learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design.

CSU427.2 Students will be able to identify where, when and how enhancements of computer performance can be accomplished.

CSU427.3 Students will learn the sufficient background necessary to read more advance texts as well as journal articles on the field.

CSU427.4 Student will see how to use concepts of computer organization in real-life settings using various PC performance improvements, more recent applications of computer organization in advanced digital systems

CSU 428 OPERATING SYSTEM LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To learn Fundamental, the mechanisms of OS to handle processes, threads and their communication
- II. To learn the mechanisms involved in memory management in contemporary OS
- III. To gain knowledge on operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- IV. To know the aspects of concurrency management control of asynchronous processes, deadlocks, memory management, processor and disk scheduling and file system organization.

Project -1

Create a simulator for scheduling a given set of processes in user space only. The simulator should read from a configuration file a set of parameters for each process: Length of time for which process will execute, priority of the process and the preferred scheduling policy - FIFO or Round Robin, the time at which the process executes and if it is a CPU intensive process or an I/O intensive process. Apart from this read the quantum of time given to each process and the number of priority levels for scheduling the process. Now simulate a scheduling algorithm which uses FIFO/Round Robin with priority based scheduling. At the end of the run print the following quantities for each process: a. Number of times the process was scheduled. b. A timeline for the process containing the state transitions - Ready, waiting, Running and Terminated and the timestamp for each transition. c. Time taken to complete the process. d. Number of times the process waited for I/O. e. The priority of the process and preferred scheduling algorithm. After printing the above values print the average time of completion for each process. From the calculated parameters determine which scheduling algorithm was better for CPU intensive and I/O intensive processes. Suggest ways in which the scheduling algorithm can be improved and why?

Project -2

Create two processes which communicate using a shared memory segment. The first process finds out the list of all processes running on the system with their name, process id, number of files opened and total time running and creates a linked list containing this data about every process running in the shared memory. The second process reads this linked list and formats it in HTML and saves it in a file. This is done by the processes every half an hour. (Hint: Use jproc file system on Linux to find out process information.)

Project -3

Implement Bankers algorithm for N customer.



Course Outcome

Students will able to

- CSU428.1 learn, Describe, contrast and compare differing structures for operating systems
- CSU428.2 Understand the process management policies and scheduling of processes by CPU
- CSU428.3 Evaluate the requirement for Process synchronization, deadlock and memory management.
- CSU428.4 Interpret various OS functions used in Linux

CSU 429 DESIGN AND ANALYSIS OF ALGORITHMS LAB

Teaching Scheme: 04T

Total: 04

Credits: 02

Evaluation Scheme: 25 INT + 25 EXT

Total Marks: 50

ESE Duration: 2Hrs. 30 min.

Course Objectives

- I. To write rigorous correctness proofs for algorithms designed using different algorithm design techniques and understand their efficiency using different analysis methods.
- II. Synthesize efficient algorithms in common engineering design situations.
- III. To emphasize the relationship between algorithms and programming
- IV. To demonstrate familiarity with NP-Complete problems

Project 1 will be comprised of solving any particular problem with incremental approach and Divide & conquer design technique

Project 2 will be develop application based on Dynamic Programming design technique

Project 3 will be develop application based on Greedy Method design technique

Project 4 will be develop application based on Back Tracking design technique

Project 5 will be a major application comprises most of the required contents of syllabus.

Note: Project 1 to 4 can be completed individually or group of two students and Project 5 containing at least 4 different modules which can be completed in the group of 3 to 4 students

Course Outcomes

- CSU429.1 Students will be Analyze the asymptotic performance of algorithms.
- CSU429.2 Students will be understood the rigorous correctness proofs for algorithms.
- CSU429.3 Students will be Demonstrate a familiarity with major algorithms and data structures.
- BA Q

CSU429.4 Students will be Apply important algorithmic design paradigms and methods of analysis.

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**GOVT. COLLEGE OF
ENGINEERING,
AMRAVATI**



CURRICULUM

**B. TECH. (Computer Science and
Engineering)
VII and VIII Semester**

**Department of Computer Science and
Engineering**

Department of Computer Science & Engineering.
Proposed Scheme for B. Tech. (Computer Science & Engineering)

SEM III

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
SHU304	Engineering Mathematics-III	3	--	---	3	10	15	15	60	---	---	100	3
ETU311	Electronic Devices and Circuits	3	---	---	3	10	15	15	60	---	---	100	3
CSU301	Programming Methodology	3	1	---	4	10	15	15	60	---	---	100	4
CSU302	Computer Organization and Architecture	3	1	---	4	10	15	15	60	---	---	100	4
CSU303	Discrete Mathematics and Graph Theory	3	---	---	3	10	15	15	60	---	---	100	3
SHU305	General Proficiency II	1	---	2	3	---	---	---	---	25	25	50	2
ETU312	Electronic Devices and Circuits Lab	---	---	2	2	---	---	---	---	50	---	50	1
CSU304	Programming Methodology Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU305	Computer Organization and Architecture Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU306	System administration-I Lab	---	---	2	2	---	---	---	---	25	25	50	1
Total		16	2	10	28	---	75	75	300	150	100	750	23

SEM IV

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
CSU401	Numerical Method and Computer Programming	3	--	---	3	10	15	15	60	---	---	100	3
CSU402	Data Structure	3	1	---	4	10	15	15	60	---	---	100	4
CSU403	Object Oriented Technology	3	1	---	4	10	15	15	60	---	---	100	4
ETU411	Analog and Digital IC's	3	---	---	3	10	15	15	60	---	---	100	3
ITU402	Data Communication	3	---	---	3	10	15	15	60	---	---	100	3
CSU404	Data Structure Lab	1	---	2	3	---	---	---	---	50	-	50	2
CSU405	Object Oriented Technology Lab	---	---	2	2	---	---	---	---	25	25	50	1
ETU412	Analog and Digital IC's Lab	---	---	2	2	---	---	---	---	25	25	50	1
ITU403	Data Communication Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU406	System administration-II Lab	---	---	2	2	---	---	---	---	25	25	50	1
Total		16	2	10	28	50	75	75	300	150	100	750	23

TA :Teacher Assessment

CT: Class Tests

ESE: End Semester Examination

ICA : Internal Continuous Assessment

Department of Computer Science & Engineering.
Proposed Scheme for B. Tech. (Computer Science & Engineering)

SEM V

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
ITU501	System Analysis and Design	3		---	3	10	15	15	60	---	---	100	3
ITU502	Database Management System	3	---	---	3	10	15	15	60	---	---	100	3
CSU501	System Programming	3	---	---	3	10	15	15	60	---	---	100	3
CSU502	Theory of Computation	3	---	---	3	10	15	15	60	---	---	100	3
CSU503	Principle of Management	3	---	---	3	10	15	15	60	---	---	100	3
ITU503	System Analysis and Design lab	---	---	2	2	---	---	---	---	25	25	50	1
ITU504	Database Management System lab	---	---	2	2	---	---	---	---	25	---	25	1
CSU504	System Programming Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU505	Hardware Lab	---	---	2	2	---	---	---	---	25	25	50	1
ITU505	System administration-III Lab	1	---	2	3	---	---	---	---	25	25	50	2
CSU506	Self Study I	---	---	---	---	25	---	---	---	---	---	25	2
Total		16		10	26	75	75	75	300	125	100	750	23

Note1: Self study I is based on one class test each on the basis of 20% curriculum of the courses ITU501,ITU502,CSU501,CSU502 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study I and his/her teaching work load shall be considered as one hour per week.

SEM VI

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
ITU601	Design and Analysis of Algorithms	3	--	---	3	10	15	15	60	---	---	100	3
CSU601	Switching Theory and Logic Design	3	---	---	3	10	15	15	60	---	---	100	3
CSU602	Operating System Design	3	---	---	3	10	15	15	60	---	---	100	3
CSU603	Computer Network	3	---	---	3	10	15	15	60	---	---	100	3
CSU604	Software Project Management	3	---	---	3	10	15	15	60	---	---	100	3
ITU604	Design and Analysis of Algorithms Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU605	Switching Theory and Logic Design Lab	---	---	2	2	---	---	---	---	25	---	25	1
CSU606	Operating System Design	---	---	2	2	---	---	---	---	25	25	50	1

	Lab												
CSU607	Computer Network Lab	---	---	2	2					25	25	50	1
CSU608	Minor Project	----	----	2	2	---	----	---	----	25	25	50	2
CSU609	Self Study II	---	---	----	---	25	---	---	---	---	---	25	2
CSU610	Industrial Lecture I*	1	---	----	1	---	---	---	---	---	---	---	---
Total		16	---	10	26	75	75	75	300	125	100	750	23

Note2: Self study II is based on one class test each on the basis of 20% curriculum of the courses ITU601,CSU601,CSU602,CSU603 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study II and his/her teaching work load shall be considered as one hour per week.

TA :Teacher Assessment

CT: Class Tests

ESE: End Semester Examination

ICA : Internal Continuous Assessment

Department of Computer Science & Engineering.
Proposed Scheme for B. Tech. (Computer Science & Engineering)

SEM VII

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
CSU701	System Software	3	---		3	10	15	15	60	---	---	100	3
CSU702	Microprocessor and Interfacing	3	---		3	10	15	15	60	---	---	100	3
CSU703	Elective -I	3	---		3	10	15	15	60	---	---	100	3
CSU704	Interdisciplinary Elective	3	---		3	10	15	15	60	---	---	100	3
CSU705	System Software Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU706	Microprocessor and Interfacing Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU707	Elective -I Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU708	Project Phase I	---	---	4	4	---	---	---	---	50	---	50	2
CSU709	Seminar	---	---	2	2	---	---	---	---	50	---	50	2
CSU710	Industrial Training / Visit	---	---	---	---	---	---	---	---	50	---	50	1
CSU711	Industrial Lecture II*	1	---	---	1	---	---	---	---	25	---	25	1
CSU712	Self Study III	---	---	---	---	25	---	---	---	---	---	25	2
Total		13	---	12	25	65	60	60	240	250	75	750	23

***Note4:** Credit shall be awarded on the basis of combined assessment of Industrial Lecture I & Industrial Lecture II

Note5: Self study III is based on one class test each on the basis of 20% curriculum of the courses CSU701, CSU702, CSU703 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study III and his/her teaching work load shall be considered as one hour per week.

SEM VIII

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
CSU801	Operation Research and Management	3			3	10	15	15	60	---	---	100	3
CSU802	Digital Signal Processing	3	---	---	3	10	15	15	60	---	---	100	3
CSU803	Elective -II	3	---	---	3	10	15	15	60	---	---	100	3
CSU804	Elective-III	3	---	---	3	10	15	15	60	---	---	100	3
CSU805	Operation Research and Management Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU806	Digital Signal Processing Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU807	Elective -II Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU808	Project phase - II	---	---	6	6	---	---	---	---	75	100	175	6

CSU809	Self Study IV	---	---	---	---	25	---	---	---	---	---	25	2
Total		12		12	24	65	60	60	240	150	175	750	23

Note6: Self study IV is based on one class test each on the basis of 20% curriculum of the courses CSU801,CSU802 ,CSU803,CSU804 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study IV and his/her teaching work load shall be considered as one hour per week.

Note7: Students of this department shall select any one Interdisciplinary Elective offered by other department. Interdisciplinary Elective shown below will be offered to students of other department.

TA :Teacher Assessment	CT: Class Tests	ESE: End Semester Examination	ICA : Internal Continuous Assessment
Elective I CSU703	Interdisciplinary Elective CSU704	Elective II CSU803	Elective III CSU804
A) Advanced Computer Architecture	A) Nanotechnology	A) Modeling and Simulation	A) Distributed Operating Systems
B) Embedded System	B) Software Engineering	B) Parallel Computing	B) Natural Language Processing
C) Multimedia Technology	C) Network Security	C) Advanced Database Management System	C) Robotics
D) Internet Technology		D)Artificial Neural Network	D) Advanced Web Technology
E) Artificial Intelligence		E) Bioinformatics	E) Computer Graphics

CSU701 SYSTEM SOFTWARE

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction.

Lexical analysis: interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting, and implementation. Regular definition, Transition diagrams, LEX.

Syntax analysis: context free grammars, ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing. Bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC. Syntax directed definitions: inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions.

Intermediate code generation : intermediate representations, translation of declarations, assignments. Intermediate Code generation for control flow, boolean expressions and procedure calls, implementation issues.

Code generation and instruction selection: issues, basic blocks and flow graphs, register allocation, code generation. DAG representation of programs, code generation from dags, peep hole optimization, code generator generators, specifications of machine.

Code optimization: source of optimizations, optimization of basic blocks, loops, global dataflow analysis, solution to iterative dataflow equations. Code improving transformations, dealing with aliases, data flow analysis of structured flow graphs.

Text Books :

1. Compilers: Principles, Techniques & Tools, V. Aho, R. Sethi, & J. P. Ullman, Second Edition, Addison Wesley.

Reference :

1. NPTEL,IIT, Kanpur.
2. Systems Programming and Operating Systems, Dhamdhare, Second Edition, Tata McGraw Publication,2009.
3. Operating System, A.S. Godbole, A. Kahate, Third edition, Tata McGraw Publication,2010.

CSU702 MICROPROCESSOR AND INTERFACING

Teaching Scheme: 03 L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

8086: Pin configuration, Physical memory organization, general bus organization, I/O addressing, 8086 minimum mode system & timings, Memory interfacing, static RAM Interfacing, dynamic RAM interfacing.

I/O interfacing: methods of I/O interfacing, 8255 PPI: Pin configuration, internal organization, modes of operation, interfacing with 8086. Programmable Interrupt Controller 8259: Pin Configuration, various control & command words and internal organization, modes of operation, interfacing with 8086.

USART 8251: pin configuration, internal organization, control word formats for synchronous & Asynchronous modes of operation, 8251 interfacing with 8086. DMA controller 8237: pin Configuration, internal organization, modes of operation, 8237 interfacing with 8086.

Programmable Timer/counter 8254: pin configuration, Internal organization, all the modes of Operation, 8254 interfacing with 8086. Programmable Keyboard/display Controller 8279: pin Configuration, internal organization, modes of operation, interfacing with 8086.

ADC 0800/0809 : Its working, interfacing with 8086 and programming in polled mode, in interrupt-driven mode. DAC 0800/0808 its working, interfacing with 8086 and programming in polled mode, in interrupt-driven mode. Measurement of temperature, speed and frequency using ADCs/DACs

8086 maximum mode system & timings, bus controller 8288: Its architecture, operation and Interfacing with 8086. 8289 bus arbiter its architecture, operation and interfacing with 8086, Coprocessor configuration. ESC prefix, system bus mode, semaphores & LOCK prefix.

Text Book :

1. 8086/8088 Families: Design, Programming & Interfacing, Uffenbeck John. P., 3rd Edition, Prentice-Hall Publication, 2001.

References Books:

1. Intel Microprocessors, Bray B, 4th Edition, PHI Publication, 1997.
2. Intel Processors: Programming, Interfacing & Applications, Walter A. Triebel, Avtar Singh, 3rd Edition, Prentice-Hall Publication, 2000.
3. Microprocessors Systems: The 8086/8088 Family, Liu & Gibson 2nd Edition.
4. Advanced Microprocessor & Interfacing, Badri Ram Tata McGraw Publication, 2006.
5. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh S. Gaonkar, Prentice Hall, 2002.
6. Microprocessors and Interfacing, Douglas V. Hall, Andrew L. Rood, Eight Reprint, Tata McGraw Publication, 2006.

CSU703 ELECTIVE - I
(A) ADVANCED COMPUTER ARCHITECTURE

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Fundamentals: Technology & Computer usage trends, costs, Performance measurements, Quantitative principles of Computer design, Concepts of memory hierarchy, Instruction set architectures, Memory addressing, Operations in the instruction set, Encoding, Role of compilers, DLX architecture.

Pipelining: Basic principles & DLX. Various hazards: Pipelines, data, control hazards, Implementation issues, Multicycle operations, Crosscutting issues, Instruction set design and pipelining, MIPS R4000 pipeline architecture.

Advanced Pipeline And Instruction-Level Parallelism: Concepts & challenges, Data hazards & dynamic scheduling, Dynamic Hardware prediction, Compiler support for ILP, Hardware support for parallelism, Studies of ILP, Power PC620.

Memory-Hierarchy Design: Basics of caches, reducing cache miss & hit time, Main memory, Virtual memory, Protections Examples of virtual memory, Issues in the design of memory hierarchies, Alpha APX 21064 Memory hierarchy.

Interconnection Networks: Introduction & basic concepts, Computer connection to interconnection network, Interconnection network media, Practical issues, Examples of interconnection networks, Issues for interconnection networks, Internet working, An ATM network of workstation.

Text Book :

1. Advanced Computer Architecture & Parallel Programming, Hwang K, 3rd Edition, McGraw Hill,1998.

Reference Books:

1. Computer Architecture: A Quantitative Approach, Hennessy J.L. & Patterson D, 4th Edition, Harcourt Asia, 2007.
2. Computer Organization & Architecture, Seventh Edition , Stallings Prentice Hall, 2002.

CSU703 ELECTIVE - I (B) EMBEDDED SYSTEM

Teaching Scheme: 03 L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction to embedded systems, Processor in the system, Hardware units required in the exemplary cases, Software embedded into a system, Final Machine implementable software for a product, Software in Processor specific assembly language and high level language, Device drivers, device management using an operating systems, Software design for scheduling multiple tasks and devices using RTOS, Embedded SoC in VLSI circuits.

Structural units of the processor, Allocation of memory to program segment and blocks, memory map of the system, Memory blocks for different data sets and structures, Virtual Devices, Device drivers for parallel port, serial and timing devices, Context and periods for context switching, deadline and interrupt latency.

Embedded programming in assembly language and C: Function pointers, Function queues and ISR queues, Queues for implementing protocol for a network, Queuing of functions on interrupts, Use of FIFO queues, Stacks, Lists and Ordered Lists.

Modeling process: Use of dataflow & control data flow graphs, Programming model for event controlled or response time constraint, Real time programs, Inter process Communication and Synchronization, Multiple processes in an application, Sharing data by multiple tasks, use of finite states machine model & Petri net Model, Use of Semaphores for a task or for Critical section of code, Mutex & P & V, Priority inversion problems & deadlock situations IPC issues, Use of Semaphore flags or Mutex as resource key, use of message queues, mailboxes, pipes, virtual sockets, RPCs.

Introduction to RTOS: RTOS Services, Schedule management for multiple tasks in Real Time, Handling of interrupt source call, RTOS task scheduling models, Cooperative Round Robin Scheduling using a Circular Queue of ready tasks and using ordered list as per precedence constraints, cycling scheduling in Time Sharing, fixed Real Time scheduling, Precedence assignment in Scheduling algorithms, fifteen-point strategy for Synchronization, Embedded Linux Kernel. Advances in Embedded System.

Text Book:

1. Embedded Systems, Architecture, Programming & Design, Rajkamal, 2nd edition, Tata McGraw Hill, 2007

Reference Books:

1. Real Time Systems, Jane W. S. Liu, 1st Edition, Pearson Education, 2004.
2. Embedded System Design: A Unified Hardware/Software Introduction by Frank Vahid, Tony Givargis, 1st Edition, John Wiley & Sons publication, 2002.

CSU703 ELECTIVE - I
(C) MULTIMEDIA TECHNOLOGY

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction : Multimedia basic concepts, Multimedia building blocks, multimedia applications design considerations, goals and objectives, architectural support for multimedia processing. Multimedia Authoring Fundamentals: authoring fundamentals, card/page based, time based, icon based, theatrical-frame based and object based authoring, interactive multimedia software authoring basics.

Multimedia audio : Basic sound concepts, audio capture, sound processor, VOC, WAV file format for sound, MIDI standard, Basic audio compression technique: ADPCM in speech coding, MPEG audio compression Technique MP3 encoder and decoder.

Image and Video technology: Representation of image in digital format, BMP, TIFF file formats, Video technology, Video capture, Video processing, AVI file formats, NTSC, PAL, SECAM, television standards, HDTV, Video streaming.

Image compression techniques: Huffman coding, LZW, DCT, Run Length Coding, JPEG, JPEG 2000, Basic Video Compression Technique.

Video Compensation based on motion compensation: H.261, H.263, MPEG videocoding, MPEG1, MPEG4 and MPEG7.

Multimedia operating system and networking: OS support for continuous media applications, file systems and process management, multimedia database management system, characteristics of multimedia database management system, system support, Distributed multimedia database management, Multimedia networking and multimedia communication systems, networking requirements, key technologies used for multimedia communication, traffic attributes, QoS.

Windows support to multimedia: Function Calls API, Support for WINDOWS.

Case study of audio driver.

Text Book:

1. Multimedia Technologies, Ashok Banerji, Second Edition, Tata McGraw Hill, 2010.

Reference Books:

1. Multimedia technology and applications, Vincent W. S. Chow, Springer, 1997.
2. Multimedia Communication Technology: Representation, Transmission, and Identification of Multimedia Signals, J.R. Ohm, Springer, 2004.

CSU703 ELECTIVE - I
(D) INTERNET TECHNOLOGY

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Servlets in Java: Introduction, Servlet structure & lifecycle, Servlet API basics, various classes & interfaces, Servlet requirements & writing, Running and debugging of Servlets, Servlet Debug Class.

HTTP Redirects & Servlet API: Concepts of cookies, Servlets & cookies, State and session management with Servlet API, Server side includes and request forwarding, Servlet chaining, Jdbc Servlet.

Introduction to XML: Writing XML, creating a DTD, elements & attributes definitions, XML schema, Defining simple & complex types, Namespaces, schemas and validation.

Cascading Style Sheets (CSS) L & XML: Anatomy of a style, creating and calling stylesheets for an XML/HTML document, Layout with CSS, setting up various properties of elements using CSS, Formatting Text with CSS.

Introduction to JSP: Simple JSP & concepts, Request-time expressions, Concept of Beans, Bean instances & serialization. Advanced JSPs: JSP tag library, Scripts, conditionals, loops, Try/Catch.

Beans & Scriptlets: Bean Scopes, Writing Beans, Jdbc & Beans, E-commerce concepts, Using Scopes from Servlets, Using Beans from servlets, JSP classes, JSPs and XML.

Text Books:

1. Professional JAVA Server Programming, Allamaraju & LongShaw, 2nd Edition, Wrox Publication, 2008.
2. Core Servlets & Java Server Pages, Hall & Brown, 2nd Edition, Prentice Hall, 2008.

Reference Books:

1. Web Technologies, Godbole & Kahate, 2nd Edition, Tata Mc-Graw Hill, 2008.
2. Internet & world wide web, Deitel & Nieto, 1st Edition, Pearson Education Publication, 2000.

CSU703 ELECTIVE - I
(E) ARTIFICIAL INTELLIGENCE

Teaching Scheme: 03 L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction to Artificial Intelligence: Introduction, Intelligent Agents.

Problem-Solving: Solving Problems by Searching, Informed Search Methods, Game Playing.

Knowledge and Reasoning: Agents that reason logically, first order logic, building a knowledge base, inference in first order logic, logical reasoning systems.

Planning: Practical Planning, Planning and Acting.

Uncertain Knowledge and Reasoning: Uncertainty, Probabilistic Reasoning Systems, Making Simple Decisions, Making Complex Decisions.

Text Book:

1. Artificial Intelligence: A Modern Approach, S. Russel and P. Norvig, 2nd edition Pearson Education, Asia, 1995.
2. Introduction to Artificial Intelligence & Expert Systems, Dan W. Patterson, 4th Edition, Prentice Hall of India, 1999.
3. Artificial Intelligence, E.Rich, K.K. Knight, 2nd edition, Tata McGraw Hill, New Delhi, 1991

Reference Books :

1. Artificial Intelligence, P.H. Winston, 2nd Edition, Addison-Wesley Publication Company, 1984.
2. Artificial Intelligence: A New Synthesis: Nils J. Nilsson, 1st edition, Morgan Kaufmann Publishers, 1998.

CSU704 INTERDISCIPLINARY ELECTIVE

(A) NANOTECHNOLOGY

Teaching Scheme: 03 L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction : Background and definition of Nanotechnology, Top-down & Bottom -up approaches to nanotechnology, Major fields of nanotechnology.

Properties of Nanoscale structure : Brief idea about Crystal structure and defects, Solid disorder Nanostructure (Failure mechanism of conventional grain sized materials, Its different properties, Metal Nanocluster composite, porous Silicon), Effect of size dependence on electrical properties, Magnetic properties, Mechanical properties (Hall-Petch relation), Chemical properties.

Quantum Well, Wires, Dots : Preparation of Quantum nanostructure, quantum size effect, Conduction Electrons And Dimensionality, Fermi gas and Density of states, Potential well, Partial confinement, Properties Dependent on Density of states, Excitons Single electron tunneling, Applications (Infra red detectors, Quantum dot laser), Spintronics.

Carbon Nanotubes : Introduction, fabrications Structure, Electrical properties, Mechanical properties, Vibrational properties, Applications of CNT.

Technique of Nanomaterials Fabrication & Methods of measuring properties : Mechanical & Chemical approaches, (Inert gas Condensation, high energy ball milling, Sol-gel, Pulse Laser deposition, Chemical vapour deposition), Brief discussion of Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), X-ray Diffraction (XRD).

Nanomachines : Microelectromechanical System (MEMSs) : Introduction to Micro/Nano sensor and actuator, Materials and Fabrication (Oxidation on Si, Lithography, Photoresist, Etching) surface micro/nanomachining.

Introduction to Nanomedicine : Medical Applications of Nanomaterials: drug delivery, Cancer, Surgery, Nano robots, Cell repair etc

Text Books :

1. Introduction to Nanotechnology, C.P. Poole (Jr) & F.J. Owens, John Wiley & Sons, Publication, 2006.
2. Nanotechnology: Principles and Practices, S. K. Kulkarni, Capital Publishing Co., 2007.

Reference Books :

1. Principle of Nanotechnology, Edited by Bharat Bhusan, Springer Verlag, 2003.
2. Introduction to Nanoscience & Nanotechnology, G. L. Hornyak, H. F. Tibbals, J. Dutta, J. J. Moore, CRC Press, New York, 2009.

CSU704 INTERDISCIPLINARY ELECTIVE

(B) SOFTWARE ENGINEERING

Teaching Scheme: 03 L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction: Introduction to Software Engineering.

Software Development Life-cycle : Requirements analysis, software design, coding, testing, maintenance, etc.

Software Requirement Specification: Problem analysis, requirement specification, validation, metrics, monitoring and control.

Software Requirements Specification: Waterfall model, prototyping, interactive enhancement, spiral model. Role of Management in software development, Role of metrics and measurement

System Design : Problem partitioning, abstraction, top-down and bottom-up design, structured approach. Functional versus object-oriented approach, design specification and verification metrics, monitoring and control.

Coding : Top-down and bottom-up, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics, monitoring and control.

Testing : Levels of testing functional testing, structural testing, test plane, test cases specification, and reliability assessment. Implementation & Maintenance.

Software Project Management : Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance, Project Monitoring, Risk management, etc.

Text Books:

1. Pressman R.S, Software Engineering: A Practitioner's Approach, 6th Edition, McGraw Hill, 2005.
2. The Unified modeling Language User Guide, Grady Booch, James Rumbaugh, Jacobson, 2nd Edition, Addison-Wesley, 2005.

Reference Books:

1. Software Engineering, Ian Sommerville, 7th Edition, Pearson Education Asia, 2004.
2. A concise introduction to software engineering, P. Jalote, Springer Verlag, 2008.
3. An integrated approach to software engineering, third edition By P. Jalote Springer Verlag, 2005.

CSU704 INTERDISCIPLINARY ELECTIVE (C) NETWORK SECURITY

Teaching Scheme: 03L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction to Network Security: passive and active attacks, authentication, integrity, access control, The model of internet work security, internet standards: internet society and RFC publications.

Cryptography: Encryption principles and various algorithms, standardization process, key distribution, public key cryptography and message authentication, digital signature.

Network security applications: Kerberos, X.509 directory authentication services, e-mail security PGP (Pretty Good Privacy), operational description. MIME (Multipurpose Internet Mail Extensions), SMIME (Security/Multipurpose internet mail extensions) functionality.

IP Security: Overview, IP security architecture, Authentication header,

Web Security: Web security requirements, secure socket layer, Transport layer security, Secure electronic transactions.

Firewall: Characteristics, types of firewalls, Firewall configuration, Trusted systems, data access control, the concept of the trusted systems.

Network Management Security: Basic concepts of SNMP, Network management architecture and protocol architectures, proxies, services, SNMPv1 authentication service, access policy and proxy service, SNMPv2 architecture, message processing and user security model, view based access control.

System Security: Intruders, Intrusion technologies, password protection, password selection strategies, Intrusion detection.

Viruses and related threats: Nature of viruses, types, micro viruses and various antivirus approaches.

Text Book :

1. Network Security Essentials, William Stallings, 3rd edition, Prentice Hall India, 2006.

Reference Books:

1. Security for Telecommunication and Network management, Moshe Rozenblit, 1st Edition, Prentice Hall India, 2000.
2. Internet Security Protocols - Protecting IP Traffic, Uyles Black, 1st Edition, Pearson.

CSU705 SYSTEM SOFTWARE LAB

Teaching Scheme: 02 P

Total-02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

The course will have project where students will have to develop compiler for a subset of C language using tools like Lex and Yacc.

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU706 MICROPROCESSOR AND INTERFACING LAB

Teaching Scheme: 02 P

Total-02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Eight Experiments to be performed on following topics

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

1. 8086 minimum mode and maximum mode.
2. Methods of I/O interfacing.
3. 8255 interfacing with 8086.
4. 8251 interfacing with 8086.
5. 8237 interfacing with 8086.
6. 8254 interfacing with 8086.
7. ADC 0800/0809.
8. DAC 0800/0808.

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU707 ELECTIVE - I

(A) ADVANCED COMPUTER ARCHITECTURE LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Eight Experiments to be performed on following topics

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

1. Given a set of numbers, count number of zeros, number of positive numbers and number of negative numbers.
2. Transferring contents of an array from one location to another location.
3. To Study Advanced pipeline and instruction - level parallelism
4. Implement Booth's multiplication algorithm.
5. Implement BCD arithmetic using ordinary ADD instruction.
6. A pair of 32-bit numbers is stored in group of four consecutive memory locations, the memory locations with the lowest memory address in each group contains the least significant byte. Write a program to add the numbers. If a carry is generated store it in a specific location.
7. Sort a given set of numbers in ascending order.
8. To Study Interconnection Networks.

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU707 ELECTIVE - I
(B) EMBEDDED SYSTEM LAB

Teaching Scheme: 02 P

Total 02

Credits: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Eight Experiments to be performed on following topics

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. NIOS II System and SDRAM Interface
2. Expanded NIOS II System
3. Study of Development Education Board
4. A Simple Computer Embedded System
5. Program Controlled Input Output
6. Subroutines and Stacks
7. Polling and Interrupts
8. Bus Communication

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU707 ELECTIVE - I
(C) MULTIMEDIA TECHNOLOGY LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Eight Experiments to be performed on following multimedia tools

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

1. To create a Banner using Adobe Photoshop CS5.
2. Link two different pages from the same image using image map in Adobe Dream weaver CS5
3. Apply several transformation at same time on star tool using transform each command in adobe illustrator.
4. Create Animation with Twin Shape using Adobe Flash CS3 Professional.
5. To Move object along a Path using Adobe Flash CS5 Professional.
6. To create Frame by Frame animation in Adobe Flash CS5 Professional.
7. Create Powerful Motion with Simple Expressions in AE using Adobe after Effect.
8. Change one object into another using Adobe Flash CS3 Professional.
9. Perform isolated adjustments to an image using Graduated Filters in Adobe Photoshop Extended CS3.

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU707 ELECTIVE - I
(D) INTERNET TECHNOLOGY LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum eight experiments shall be performed to cover entire curriculum of CSU703 (D) Internet Technology

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

1. Write a simple servlet that will display "Hello World"
2. Write a servlet that uses doGet() and doPost() methods in a single servlet.
3. Write a servlet that receives first name, last name and city name from an html page and puts this data in to cookies provide a hyperlink that can retrieve cookies from the client machine & display.
4. Write a servlet to maintain of state and session with HTTP using rewritten URL's and hidden variables.
5. Introduction to JDBC (Java Database Connectivity).
6. Write a simple servlet to display the information related to students, like student id, student name and his/her age, using JDBC. (Assume student information stored in Microsoft Access database.)
7. Write a servlet that accept banking information like account number, customer name, balance from an html page, and store it into the database, using JDBC (Assume Account table is already created in Microsoft Access database.)
8. Introduction to XML
9. Write an application in XML for representing 'Student Information System'.
10. Write a simple JSP that uses JDBC for accessing information like student name and gender from Microsoft access.
11. Write a bean that receives two numbers and returns result of four basic calculations i.e. addition, subtraction, multiplication and division using JSP beans
12. Write a Servlet with JDBC connectivity for MySQL/Oracle database

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU707 ELECTIVE - I
(E) ARTIFICIAL INTELLIGENCE LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Eight Experiments to be performed on following topics

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

1. Write a simple prolog program to study fact, verification, domain, predicate and clauses section.

2. Write a Prolog program containing facts related to following predicates

1. Location (city, state) 2. Stays (person, city)

Display: (i) list of person, state and city (ii) Give n person staying in which state

3. Create a family tree program(of EXP2) to include following rules

1. M is the mother of P if she is a parent of P and is female

2. F is the father of P if he is a parent of P and is male

3. X is a sibling of Y if they both have the same parent.

4. Then add rules for grandparents, uncle-aunt, sister and brother.

Based on the facts, define goals to answer questions related to family tree.

4. (1) WAP for using Input, Output and fail predicates in Prolog.

Display:

(i) list of married & unmarried employees (ii) List of male & female employees

(iii) List of employees for given job location

(2) Create a small set of facts and rules on who is the ancestor of whom.

Display:

(i) who is ancestor of given person. (ii) Complete list i.e who is ancestor of whom

5. Write programs for studying Usage of arithmetic operators in Prolog.

(1) Accept name of the student, rollno, his /her subject name, maximum marks and obtained marks in the subject. (Take marks of atleast 6 subjects). Compute the percentage of a student. Display his result with other information.

(2) Accept department, designation, name, age, basic salary, house rent allowance(HRA) of an employee. Compute dearness allowance (DA) which is 15% of basic salary. Determine the gross salary(basic salary+HRA+DA) of the employee. Display all information of the employee(Generate Payslip)

6. WAP to study usage of cut, not, fail predicates in Prolog. Write a Prolog program having facts in clauses section for predicate student (studentname,branchname).

Display: (i) list of all students

(ii) list of students for given specific branch.

(iii) list of students excluding specific branch

7. A WAP to study usage of Recursion in Prolog.

(1) Write program which finds and display factorial of a given number.

(2) Write program which display Fibonacci series.

8. WAP to study usage of logical, arithmetic, string operators in Prolog

(1) Write a program which finds and displays maximum number and minimum number from three given numbers.

(2) Write a program which accepts integer number as an input and displays its square .It should also find its positive square root value, if its square root is integer, otherwise display 'NA'.

(3) Write a program to find substring from a given string. The substring should start from 1st location of source string and should contain the entered number of characters from the source string.

Note:-

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU708 PROJECT PHASE - I

Teaching Scheme : 04 P

Total: 04

Credit: 02

Evaluation Scheme: 50 ICA

Total Marks: 50

- 1 In general, a group of 3-6 students should be allowed to complete the project on Approved topic.
- 2 Preferably more than 25 % projects shall be Industry / Research based / oriented.
- 3 Exhaustive survey of literature based on a clear definition of the scope and focus of the topic should be carried out by the students.
- 4 Students should finalize the topic for the project after literature survey in consultation with the Guide.
- 5 The **Synopsis/Abstract** on the selected topic should be submitted to the H.O.D. for approval.
- 6 On approval of the topic, students should initiate the topic based work.
- 7 Approximately more than 30% work(of the total quantum) should be completed by the end of VII semester.
- 8 At the end of semester, each batch should submit the progress report in following format:
 - Title
 - Introduction
 - Concept
 - Work completed
 - Work to be completed
 - References
- 9 For uniform and continuous evaluation, the Evaluation Committee comprising of the Guide, Project Course Coordinator and Expert appointed by the Program Head will award the marks based on the work completed by the end of semester and the presentation based on the project work.

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Oral examination shall be conducted by the panel of examiners.

CSU709 SEMINAR

Teaching Scheme : 02 P
Evaluation Scheme: 50 ICA

Total: 02

Credit: 02
Total Marks: 50

1. Student shall select a topic for seminar which is **not covered in curriculum**.
2. Topics shall be registered within a month after beginning of VII Semester and shall be approved by the concerned guide and Program Head.
3. Students should know the functional and technical details of selected topic after carrying out the conceptual study.
4. Before the end of semester, student shall deliver a seminar and submit the seminar report in following format:
 - Introduction
 - Literature Survey
 - Concept
 - Functional and Technical Details
 - Future scope
 - Applications
 - Comparison with similar topics / methods
 - References
5. Student shall deliver a seminar based on submitted report. The presentation and oral examination on selected seminar topic shall be assessed by panel of examiners

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Seminar Topic and the knowledge acquired. The seminar shall be assessed by the examiner panel consisting of Project Guide, Course Coordinator Seminar and Expert appointed by Program Head.

CSU710 INDUSTRIAL TRAINING / VISIT

Teaching Scheme: 00
Evaluation Scheme: 50 ICA

Total: 00

Credits: 01
Total Marks: 50

Industrial Training shall have an option of Industrial Visit.

Industrial Training: List of renowned industries shall be prepared by the Departmental Coordinator of T & P Cell for the course. After approval from the Principal and with the consultation of Industry personnel, 02 weeks trainings shall be arranged during the vacations (after the VI semester). The students may be permitted to undergo the trainings of 02 weeks as per their choices for which all the official formalities will be completed by the students under the guidance of course coordinator. The students shall submit the report based on the Industrial training to the course coordinator which will be evaluated during the VII semester

Industrial Visit: An Industry Visits to minimum three industries shall be arranged for the students unable to complete the Industrial Training. The visit shall be arranged preferably during the vacation period. However in non-availability of permission for the visit during vacation period, same may be arranged during the regular VII semester. The students will be required to submit the report based on the Industrial Visit which will be evaluated by the course coordinator

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training/visits and knowledge / skill acquired. The technical report submitted by the students shall be assessed, by the panel of examiners consisting of Project Guide, Course Coordinator and Expert appointed by the Program Head.

CSU711 INDUSTRIAL LECTURE-II

Teaching Scheme: 01 L
Evaluation Scheme: 25 ICA

Total: 01

Credits: 01
Total Marks: 25

List of renowned persons from industry shall be prepared by the Departmental Coordinator of T & P Cell for the course. After approval from the Principal, Minimum twelve Industrial lectures shall be arranged, preferably once a week, which shall be delivered by the experts/Officials from Industries/Govt. organizations/ Private Sectors/Public Sectors covering the various aspects.

The assignments based on the Industry Lecture-I and Industry Lecture-II will be evaluated during VII semester

Topics of Industrial Lectures shall be Technical in nature and should not be the specific contents from the curriculum.

Students shall submit the report based on lectures.

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the lectures and knowledge acquired. The technical report submitted by the students shall be assessed, by the panel of examiners consisting of Project Guide, Course Coordinator and Expert appointed by the Program Head.

CSU712 SELF STUDY-III

Teaching Scheme: 00 P

Total: 00

Credit: 02

Evaluation Scheme: 25 TA

Total Marks: 25

1] Self study III is based on one class test each on the basis of 20% curriculum of the courses CSU701, CSU702, CSU703 declared by respective course coordinator at the beginning of semester.

2] One faculty member shall be appointed as course coordinator for Self Study - III and his/her work load shall be considered as 1 hr/week.

CSU 801 OPERATION RESEARCH AND MANAGEMENT

Teaching Scheme : 03 L + 00 T

Total -03

Credits : 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Operation Research (OR) modeling approach: Problem identification, modeling, finding solution, testing etc., scope and limitations of OR.

Linear Programming (LP): Assumption and formulation of LP model, solution by graphical method, simplex and two phase simplex method, use of Excel to solve LP model, dual simplex method and sensitivity analysis, transportation and assignment models.

Project Management: CPM and PERT, finding critical path, time-cost trade off, Resource smoothing and resource leveling.

Dynamic Programming: Introduction and characteristics, recursion in dynamic programming, investment problem, production scheduling problem, stage coach problem, equipment replacement, budget allocation problem, shortest route models and cargo loading.

Non-Linear Programming: Introduction, types, constrained and unconstrained optimization method, one variable and multivariable, steepest descent method, quadratic programming.

Decision Theory and Game Theory: Introduction, minmax decision procedure, Bays decision procedure with and without data, regret function versus loss function, minmax and maxmin strategies, expected payoffs, solution of $m \times n$ games, Brown algorithm.

Machine Sequencing Problems: n jobs through two machines, n jobs through three machines, n jobs through m machines, two jobs through m machines sequencing problem.

Text Books

1. Introduction to Operation Research, B. E. Gillet, 1st Edition, McGraw-Hill, 1996.
2. Introduction to Operation Research, Concepts and Cases, Hillier and Liberman, 8th Edition, McGraw-Hill, 2004.

Reference Books

1. Operation Research, Tiwari and Shandilya, 1st Edition, Prentice Hall of India, 2006.
2. Introduction to Optimization, S. S. Rao, 3rd Edition, Prentice Hall of India, 2005.
3. Computer Aided Project Management, P. B. Mahapatra, 2nd Edition, Prentice Hall of India, 2004.
4. Operation Research, Natrajan, 8th Edition, Balsubramani, Pearson Education, 2008.

CSU802 DIGITAL SIGNAL PROCESSING

Teaching Scheme: 03 L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks :100

Duration of ESE: 2hrs.30min.

Discrete Time Signals: Introduction to DSP, Advantages, basic elements of DSP system, Elementary discrete-time sequences.

Discrete Time Systems: Description, representation, classification (linear versus non linear, time-invariant versus time variant, static versus dynamic, casual versus non causal , stable versus unstable)

LTI systems: The convolution sum, properties of convolution, Analysis of causal LTI systems, stability of LTI systems, step response of LTI systems, difference equation, solution of difference equations, Impulse response of LTI recursive system, Correlation of discrete time signals and types.

Fourier Transforms: Definition & properties of Fourier transform, Finite duration sequences and the discrete Fourier transform (DFT), properties, circular convolution, Fast algorithms for the computation of DFT: radix-2 algorithms, Bit Reversal Algorithm.

Z- Transform: Definition of z- Transform, properties, rational z-Transforms, evaluation of the inverse z- Transforms analysis of linear time invariant systems in z-domain, transient and steady-state responses, causality, stability, pole-zero cancellation, relation with Fourier transform.

Digital Filters: Classification (LP, HP, BP, FIR and IIR filters), filter specifications, Impulse invariant transformation and bilinear transformation, Commonly used Analog filters and IIR Filter design example, Structures for realization of Discrete-Time systems.

Realization of FIR and IIR Systems: Direct Form, Cascade Form, Signal flow graph and Transposed structures, Cascade form, Lattice and Lattice-ladder.

Text Book:

1. Digital Signal Processing: Principles Algorithms and Applications, J G Prokis and D G Manolokis, 4th Edition, Pearson Education Pvt .Ltd, 2006.

Reference Books:

1. Digital Signal Processing: A Computer-Based Approach, S K Mitra, 4th Edition Tata McGraw Hill Publish Co. Ltd., 2007.

2. Digital Signal Processing a Practical Approach, E C Ifeachor and B W Jervis, 1st Edition, Pearson Education, 2002.

3. Discrete Time Signal Processing, A V Oppenheim, R W Schafer with J RBuck, 2nd Edition PHI, 2005.

CSU 803 ELECTIVE - II
(A) MODELING AND SIMULATION

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

System Models and System studies: Basic concepts of systems and system modeling, static and dynamic, physical and mathematical models, principles used in modeling. Corporate models: analysis, design and postulation of system.

Basic Concepts and continuous system: Techniques used, distributed log models and cobweb models, continuous system Model, Analytical equations and methods of obtaining solutions, analog, hybrid computers and simulations, CSSLS examples of different continuous system, System dynamics, probability concepts and basic principles of discrete simulation, Growth and decay models, and system dynamics diagrams, stochastic Process, probability functions and their evaluation, random number generation, rejection method, comparison of Monte-Carlo method and stochastic simulation examples.

Simulation of Queuing System and PERT Network: Simulation of Queuing system, Rudiments of queuing theory, simulation of a single server queue, simulation of a two server queue, simulation of more general queues. Simulation of a PERT Network: Network model of a project, Analysis of an activity network, critical path, Simulation of Inventory Control & Forecasting.

Simulation Experiments Inventory Control and Forecasting: Elements of inventory theory, more Complex inventory models, simulation example-1, Generation of Poisson and Erlanger variates, Simulation example-2, Forecasting and regression Analysis. Design and Evaluation of simulation Experiments: Length of Simulation runs, variance reduction techniques, Experimental layout, Validation, summary and conclusion.

Simulation of Languages and Introduction to GPSS: Different special purpose languages used for continuous and discrete systems and comparison, factors affecting the selection of discrete system, simulation languages-comparison of GPSS and SIMSCRIPT, detailed study of GPSS with examples.

Text Books:

1. System Simulation, Groffrey Gordon, 2nd Edition, PHI Pvt. Ltd., New Delhi-1987.
2. System Simulation with Digital Computers, Narsingh Deo,1st edition PHI Pvt.Ltd., NewDelhi,2005.

Reference Books:

1. System Simulation: The Art of Science, Shannon R.E., 1st edition, Prentice Hall, Englewood Cliffs, NY, 1975.
2. Computer Simulation, Hugh j. Wston, John H. Blackstone, Jr., 2nd Edition, John Wiley & Sons, 2000.

CSU 803 ELECTIVE - II (B) PARALLEL COMPUTING

Teaching Scheme: 03 L + 00 T

Total 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Scalability and Clustering: Evolution of Computer Architecture, Dimensions of Scalability, Parallel Computer Models, Basic Concepts Of Clustering, Scalable Design Principles, Parallel Programming Overview, Processes, Tasks and Threads, Parallelism Issues, Interaction / Communication Issues, Semantic Issues in Parallel Programs.

Enabling Technologies: System Development Trends, Principles of Processor Design, Microprocessor Architecture Families, Hierarchical Memory Technology, Cache Coherence Protocols, Shared Memory Consistency, Distributed Cache Memory Architecture, Latency Tolerance Techniques, Multithreaded Latency Hiding.

System Interconnects: Basics of Interconnection Networks, Network Topologies and Properties, Buses, Crossbar and Multistage Switches, Software Multithreading, Synchronization mechanisms.

Parallel Programming: Paradigms and Programmability, Parallel Programming Models, Shared Memory Programming.

Message Passing Programming: Message Passing Paradigm, Message Passing Interface , Parallel Virtual Machine.

Text Book:

1. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, 2nd Edition, Addison Wesley,2003.

Reference Books:

1. The Sourcebook of Parallel Computing, Jack Dongarra, Geoffrey Fox, Ken Kennedy, Linda Torczon, William Gropp, 1st Edition , Berkeley Publication,2003.
2. Introduction to Parallel Algorithms and Architectures: Arrays, Trees, Hypercubes, F. T. Leighton, 1st Edition, Morgan Kaufmann Publishers, CA 1992.
3. Analysis and Design of Parallel Algorithms, Laxmivarahn and Dahl, 1st Edition, McGraw Hill. 1990

CSU 803 ELECTIVE - II
(C) ADVANCED DATABASE MANAGEMENT SYSTEM

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

SQL: Use Of SQL, DDL Statements, DML Statements, View Definitions, Constraints, Triggers Keys and Foreign Keys, Constraints on Attributes and Tuples, Modification of Constraints Cursors, Dynamic SQL.

Query Execution: Introduction to Physical-Query-Plan Operators, One-Pass and Twopass algorithms, Nested-Loop Joins, Index-Based Algorithms, Buffer Management, Parallel Algorithms for Relational Operations, Using Heuristics in Query Optimization, Basic Algorithms for Executing Query Operations.

Query Compiler: Parsing, Algebraic Laws for Improving Query Plans, From Parse Trees to Logical Query Plans, Estimating the Cost of Operations, Cost-Based Plan Selection, Completing the Physical-Query-Plan, Coping With System Failures, Issues and Models for Resilient Operation, Redo Logging, Undo/Redo Logging, Protecting Against Media Failures.

Concurrency Control: Serializability, Enforcing Serializability by Locks, Locking Systems With Several Lock Modes, Architecture for a Locking Scheduler Managing Hierarchies of Database Elements, Concurrency Control.

Transaction Management: Introduction of Transaction management, Serializability and Recoverability, View Serializability, Resolving Deadlocks, Distributed Databases, Distributed Commit, Distributed Locking.

Database System Architecture: Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Network Types.

Distributed Database: Homogeneous And Heterogeneous Database, Distributed Data Storage, Distributed Transaction, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Heterogeneous.

Text Books:

1. Database Management Systems, Raghu Ramakrishnan/Johannes Gehrke, 3rd edition, Tata Mc Graw Hill, 2007.

Reference Books:

1. Database System Concepts, Silber Schatz. Korth, 5th edition, Tata Mc Graw Hill, 2005.
2. Fundamental of DataBase System, ShamKanth B. Navathe, 5th Edition, Pearson Education, 2006.

CSU 803 ELECTIVE - II

(D) ARTIFICIAL NEURAL NETWORK

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction to Neural Network : History of Neural Networks, Biological Neural Networks, Artificial Neuron, Analysis of Neural networks, Characteristics of Neural Networks ,Limitations of Neural Networks, Neural Network Applications.

Perceptron:-Overview of Perceptron ,Pattern Recognition, Mathematical modeling of Simple Perceptron ,Perceptron Learning Algorithms ,Limitations of Perceptron.

Multi-Layer Perceptron Networks: Delta Learning Rule for the Output Layer, Generalized Delta Learning Rule, Backpropagation learning algorithm, Mathematical modeling of MLP Networks ,Application to Function Approximation.

Radial Basis Function (RBF) Networks: Least Square Estimator, Linear Neuron, Recursive Least Squares Algorithm, Basis Function Networks, Radial Basis Function Networks ,RBF as Interpolation Networks ,Generalized RBF as Approximation Networks, MLP vs. RBF Networks as Function Approximators .

Hopfield Networks: Hopfield Network, Energy Minimizing Networks, Analysis and Mathematical modeling of Hopfield Model, Designing Stable States (Energy Wells), Application to Optimization Problems .

Associative Memory Networks: Linear Feed forward Associative Memory Network, Recurrent Associative Memory Network,Bidirectional Associative Memory Network (BAM) ,Brain-State-in-a-Box (BSB) Network ,Cross-Talk versus Perfect Recall.

Kohonen Networks: Self-Organization in Human Brain,Self-Organizing Neural Networks, Kohonen's Neural Network, Kohonen Learning Rule ,Self-Organizing Feature Maps, Vector Quantization ,Application to Data Compression.

Text Books :

1. Introduction to Artificial Neural Systems, Zurada, Jacek M, 1st Edition West Publishing Company, 1992.
2. Neural Networks, Simon Haykin, 1st Edition, MacMillan College Publishing Company, 1999.

Reference Books:

1. Artificial Neural Networks, Robert J. Schalkoff, 2nd Edition, McGraw-Hill, 1997
2. Neural Networks for Pattern Recognition, Christopher M. Bishop, 1st Edition Oxford University Press, Oxford UK , 1995.

CSU 803 ELECTIVE - II (E) BIOINFORMATICS

Teaching Scheme: 03 T + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Basics: Basics of biology

Sequences : Problem statement, Edit distance and substitution matrices, HMMs and pair wise HMMs, Global and local alignments, Spliced alignment, Space-efficient sequence alignment, Multiple alignment, Database searching tools, Sequence by hybridization, Profile HMMs

Structures : Protein structure alignment, Protein structure prediction

Phylogenetic trees : Large parsimony and small parsimony problems, Probabilistic approaches, Grammar-based approaches

Miscellaneous topics : Pathways and networks, Microarrays, Biomedical images

Text Books

1. An Introduction to Bioinformatics Algorithms, Jones and Pevzner, 1st Edition, MIT Press,2004
2. Biological Sequence Analysis, Durbin, Eddy, Krogh, Mitchison, 3rd Edition, Cambridge University Press, 2008.

Reference Books

1. Algorithms on Strings, Trees and Sequences, Gusfield, 2nd Edition, Cambridge University Press, 2010.
2. Bioinformatics: A Practical Guide to the analysis of Genes and Proteins , Baxevanis, A.D. & Ouellette, B., F. F., 3rd Edition, New York, John Wiley & Sons, Inc.Publications,2002.
3. Bioinformatics: Sequence and Genome Analysis , David Mount, 2nd Edition ,New York, Cold Spring Harbor Laboratory Press, 2004

CSU 804 ELECTIVE - III
(A) DISTRIBUTED OPERATING SYSTEMS

Teaching Scheme: 03L + 00 T	Total-03	Credits: 03
Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE		Total Marks: 100
Duration of ESE: 2hrs.30min.		

Introduction: Characteristics of Distributed Systems, Applications. Challenges, Architecture of Distributed System: Introduction, System Architecture types, Distributed operating systems, Issues in distributed Operating systems.

Programming in Distributed Systems: Sockets and socket programming, LPC, RPC, Distributed Objects, Event Notification.

Distributed File Systems: Design Issues and Case Studies of NFS, AFS, RFS.

Timing Issues: Clock Synchronization, Lamport's Logical Clocks, Vector Clocks, Casual Ordering of messages, Global State Collection, and Termination Detection.

Coordination and Agreement: Leader Election, Distributed Mutual Exclusion, Byzantine Agreement Problem.

Distributed Deadlock Detection: Edge Chasing, Diffusion Computation and Hierarchical Algorithms.

Recovery: Synchronous and Asynchronous Check pointing and Recovery.

Fault Tolerance: Commit protocols, Voting techniques, static and dynamic voting protocols.

Text Book:

1. Advanced Concepts in Operating Systems – M. Singhal and N. Shivaratri, 1st Edition, Tata McGraw Hill Publications, 1994.

Reference Books:

1. Distributed Systems – Concepts and Design, Coulouoris, Dollimore and Kindberg, 4th Edition, Pearson Education Asia, 2004.
2. Distributed Systems – A.S. Tanenbaum, 2nd Edition. Pearson Education Asia, 2002.

CSU 804 ELECTIVE - III
(B) NATURAL LANGUAGE PROCESSING

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction: Brief history of NLP research, current applications, generic NLP system architecture, knowledge-based versus probabilistic approaches.

Finite-state techniques: Inflectional and derivational morphology, finite-state automata in NLP, finite-state transducers.

Prediction and Part-of-Speech Tagging: Corpora, simple N-grams, word prediction, stochastic tagging, evaluating system performance.

Parsing and generation: Generative grammar, context-free grammars, parsing and generation with context-free grammars, weights and probabilities.

Parsing with constraint-based grammars: Constraint-based grammar, unification.

Compositional and lexical semantics: Simple compositional semantics in constraint based grammar, Semantic relations, Word Net, word senses, word sense disambiguation.

Discourse and dialogue: Anaphora resolution, discourse relations.

Applications: Machine translation, email response, spoken dialogue systems.

Text Book:

1. Speech and language processing, Jurafsky, D. & Martin, J., 2nd Edition, Prentice Hall, 2000.

Reference Book:

1. Foundations of Statistical Natural Language Processing, Christopher D. Manning and Hinrich Schutze, 2nd edition, IT Press, 1999

CSU 804 ELECTIVE - III (C) ROBOTICS

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Robot Fundamentals: Definitions, History of robots, present and future trends in robotics, Robot classifications, Robot configurations, Point to Point robots, Continuous Path robots, Work volume, Issues in design and controlling robots Repeatability, Control resolution, spatial resolution, Precision, Accuracy, Robot configurations, Point to Point robots, Continuous Path robots, Work volume, Applications of robots. Drives used in robots: Hydraulic, Pneumatic and Electric drives, Comparison of drive systems and their relative merits and demerits.

Manipulator Kinematics: Matrix Algebra, Inverse of matrices, rotational groups, matrix representations of coordinate transformation, transformation about reference frame and moving frame Forward & Inverse Kinematics examples of 2R, 3R & 3P manipulators, Specifying position and orientation of rigid bodies, Euler's angle and fixed rotation for specifying position and orientation, Homogeneous coordinate transformation and examples, D-H representation of kinematics linkages, Forward kinematics of 6R manipulators using D-H representations, Inverse kinematics of 6R manipulators using DH representations, Inverse Kinematics geometric and algebraic methods.

Robotics Dynamics : Velocity Kinematics, Acceleration of rigid body, mass distribution Newton's equation, Euler's equation, Iterative Newton –Euler's dynamic formulation, closed dynamic, Lagrangian formulation of manipulator dynamics, dynamic simulation, Computational consideration.

Trajectory planning: Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, path generation in runtime, planning path using dynamic model point to point and continuous trajectory , 4-3-4 & trapezoidal velocity strategy for robots.

Robot Sensors: Internal and external sensors, position- potentiometric, optical sensors ,encoders -absolute, incremental ,touch and slip sensors velocity and acceleration sensors, proximity sensors, force & torque sensors, laser range finder, camera, Microcontrollers, DSP, centralized controllers, real time operating systems.

Robot Controllers: Essential components-Drive for Hydraulic and Pneumatic actuators, H-bridge drives for DC motor Overload over current and stall detection methods, example of a micro-controller/ microprocessor based robot Controller.

Robot Programming languages:

Introduction the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

TextBook:

1. Robotics Technology and Flexible Automation, S.R.Deb,1st edition, Tata Mc GrawHill,1994.
2. Industrial Robotics (Technology, Programming and application s) , M.P.Groover, M. Weiss R.N. Nagel, N.G. Odrey,1st edition, McGraw, Hill 1996

Reference Book:

1. Robotics : Control , sensors , vision and intelligence ,K.S.Fu, R.C.Gonzalez and C.S.G. Lee, 1st edition, McGraw-Hill.1987.

CSU 804 ELECTIVE - III
(D) ADVANCED WEB TECHNOLOGY

Teaching Scheme: 03 L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Introduction : Introduction to .Net, Introduction to Microsoft .Net Framework. Building blocks in .Net, Drawback of previous languages. Understand what is .Net VB.Net overview, VB Vs VB.Net, .Net framework: components of .Net framework, Advantages, requirement of .Net.

Introduction and implementation : VB.Net: Features, VB.Net IDE, Data Types, Loops, Control structures, Cases, Operators, Creating forms, Procedures and functions, Form controls, Implementation of OOP: Creation of class and objects, Inheritance, Constructors, Exception handling. Component based programming: Working with Private assembly, shared assembly, Using COM components developed VB or other language.

Introduction to ADO.Net and data manipulation: Introduction to ADO.Net, What is database? Writing XML file.ADO.Net architecture, Creating connection, Dataset and Data reader, Types of Data adapter and ADO controls, reading data into dataset and data adapter, Binding data to controls, Data table and Data row. Migrating from VB 6.0 to VB.Net.

Introduction to ASP.Net :Difference between ASP and ASP.Net, Introduction to IIS, ASP.Net IDE. Creation of web forms & form controls, ASP.Net objects and components: Response, Server, Application, Session, ASP.Net scope, state, view state, post back and configuration, Object creation, Scripting, Drive, folder, file,Server components, Ad rotator, Content linker, Browser capabilities, Use and creation of global .aspx file, Using Application object, Events methods and collection, Using session object, enabling and disabling of session, Event, properties, methods, collection.

ADO.Net in ASP.Net: Connection, Dataset and data reader, Data table and Data row, Web. config introduction, Binding data with data grid, Accessing and manipulating data, Server control templates and Data binding techniques, Understand data access in .Net using ADO.Net, Understand various Server Control Templates available for Data Binding like Repeater, Data List and Data Grid Controls. ASP transactions and e-mail: Transactions, Transaction db design, CDONTS object. Email sending web page creation.

Text Books:

1. Programming in VB.Net, Anita & Bradely, 2nd edition, TATA Mc Grow Hill, 2003.
2. ASP.net, Dave Mercer,2nd Edition, TATA McGraw-Hill, 2002

Reference Books:

1. Net Framework, Anthony Jones, 1st Edition, TATA Mc Grow Hill,2003.
2. .Net Frame Work Essential, Thwan ThAI , Hoang Lan,, 3rd Edition, O'Reilly Media,2003.

CSU 804 ELECTIVE – III
(E) COMPUTER GRAPHICS

Teaching Scheme: 03L + 00 T

Total-03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

An Overview of Computer Graphics and Graphics System: Video display devices, Raster-Scan systems, Random-Scan systems, Graphics monitors and workstations, input devices, hard copy devices, Graphics software.

Output Primitives : Point and Lines, Line drawing algorithms, loading the frame buffer, line function, circle and ellipse generating algorithms, curves, parallel curves algorithms, Pixel addressing, filled-area primitives , functions, Cell array, character generation. Attributes of output primitives: Line and curve attributes, color and grayscale levels, area fill attributes, Character attributes, and bundled attributes, anti aliasing.

2-D Geometric Transformations: Basic and composite transformations, matrix representations, transformations between coordinate systems, affine transformations, transformation functions, Raster methods for transformations. Two-Dimensional viewing: viewing coordinates, Window-to-view port coordinate transformation, viewing functions. Clipping: point, line, polygon, curve, and text, exterior.

Structures And Hierarchical Modeling: Concepts, editing structures, basic modeling concepts, hierarchical modeling. GUI and interactive input methods: the user dialogue, input of graphical data, functions, initial values for input device parameters, interactive picture - construction techniques, virtual reality environments.

Three Dimensional Concepts: Display methods, graphics, Bezier curves and surfaces, B-spline curves and surfaces, Beta-splines. Three dimensional geometric and modeling transformations: translation, rotation, scaling. Three dimensional viewing: viewing pipeline, viewing coordinates, projections, Animation, Illumination and Shading Models.

Text book :

1. Computer Graphics, D. Hearn, M.P. Baker, 2nd edition, Pearson Education,1997.

References Books:

- 1.Computer Graphics Using Open GL, F.S.Hill: 2nd edition ,Pearson Education, 2001.
- 2.Principles of Interactive Computer Graphics, W.M.Newman & R.F.Sproul, 2nd Edition, McGraw Hill, 1979.
- 3.Computer Graphics, Hamington, 2nd edition, (McGraw Hill).2001.
- 4.<http://nptel.iitm.ac.in/syllabus/syllabus.php?subjectId=106102063>

CSU805 OPERATION RESEARCH AND MANAGEMENT LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Eight Experiments to be performed on following topics

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Write a program for implementing Simplex (two phase and dual phase)
2. Write a program to implement Transportation problem
3. Write a program to implement Assignment problem
4. Write a program for Critical path method/ Programme evaluation review technique
5. Write a program to implement Travelling salesman problem
6. Write a program for Investment problem
7. Write a program to study Decision Theory
8. Write a program to implement Three machine sequencing
9. Write a program for Inventory model (deterministic/probabilistic)
10. Write a program to implement Brown's Algorithm

Note: Practical may be performed with any computer programming language, following languages/ packages are suggested MATLAB/C/C++/JAVA.

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU806 DIGITAL SIGNAL PROCESSING LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Ten Experiments to be performed on following topics.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Operation on Sinusoidal Sequence.
2. Operation on DTS.
3. Scaling Operation on DTS.
4. Shifting Operation on DTS.
5. Folding Operation on DTS.
6. Linear Convolution.
7. DFT Computation.
8. Magnitude and Phase Spectrum.
9. Poles and Zero's of Z
10. FFT Computation.

Note:

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU 807 ELECTIVE - II

(A) MODELING AND SIMULATION LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Ten Experiments to be performed on following topics.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

- 1) Simulation of dynamics of continuous systems.
- 2) Simulation of discrete systems.
- 3) Evaluation of random number generation-rejection method.
- 4) Monte Carlo simulation.
- 5) Implementation of stochastic simulation algorithm.
- 6) Simulation of Queuing System and PERT Network.
- 7) Simulation of a two server queue.
- 8) Simulation of Inventory Control & Forecasting.
- 9) Simulation of Languages and Introduction to GPSS.
- 10) Evaluation and improvement of variance reduction in Monte-Carlo production simulation

Note:

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU 807 ELECTIVE - II
(B) PARALLEL COMPUTING LAB

Teaching Scheme: 02 P

Total: 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum 8 experiments should be performed

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes. The following programs should be developed in 'C' language preferably on 'UNIX' platform. Programs (3-7) require usage of Parallel Computing APIs.

1. Implement three POSIX Threads (PThreads) simultaneously for updating a text file.
2. Implement synchronizing POSIX Threads (PThreads) using (a) Semaphore (b)Mutex.
3. Implement the PRAM Algorithm for (a) Parallel Reduction (b) Prefix Sums (c) Preorder Tree Traversal.
4. Implement Parallel Matrix Multiplication using (a) Row-Column oriented Algorithm (b) Block-Oriented Algorithm.
5. Implement Solution of Linear Systems using (a) Gaussian Elimination (b) Jacobi Algorithm.
6. Implement (a) Parallel Quick Sort (b) Hyper Quicksort.
7. Implement Parallel Fast Fourier Transform Algorithm.
8. Implementation of Parallel programming paradigm.
9. Implementation of Message Passing.

Note:

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU 807 ELECTIVE - II

(C) ADVANCED DATABASE MANAGEMENT SYSTEM LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Twelve Experiments to be performed from following List of Experiment.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Login in to your own accounts2. Execute: `select table_name from user_tables;` (to list the tables which are in your account).
2. Execute: `select table_name from all_tables;` (to list the tables to which you have access to).
3. Display the system date. Note the format in which it is displayed.
4. Display the date in Month/Day/YYYY format.
5. Load the above script (downloaded in 5th task) into your account and execute it.
6. Execute: `select table_name from user_tables;`
7. Enter one complete record into the LOCATION table.
8. Enter another record into the LOCATION table, but the value for one of the fields should be null.
9. Enter a record for three columns into FACULTY table, but this entry should be of the primary key, first and last name.
10. Enter one complete record into the COURSE table.
11. List all the entries of the COURSE table.
12. Commit your entries for the COURSE table.
13. Enter another complete record into the COURSE table.
14. List all the entries of the COURSE table.
15. Roll back your entries for the COURSE table.
16. List all the entries of the COURSE table. Check for the difference in this listing than that of the listing done in 11th task.
17. Load the above script (downloaded in 16th task) into your account and execute it.
18. Execute: `select table_name from user_tables;`

19. List all the information of the student called Tammy Jones.
20. List only those students which are not in senior class (SR) but students from every other class.
21. List student id, student's full name (concatenate first and last name and display heading as STUDENT'S NAME) along with the similar details of advisor. Advisor's first and last name should be concatenated and displayed as ADVISOR'S NAME.
22. List those students whose first name begins with 'J'.
23. List those students whose last name ends with 'N' or the second last letter is 'T' in their last name.
24. List those faculty members who have 'L' as the third last letter in their last name.
25. List the students in order of their zip codes.
26. List only those students who are staying beyond zip code 32500.
27. Count the total number of students who are staying within zip code 32500.
28. List only those students whose birthday falls in the months August or November.

Note:

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU 807 ELECTIVE - II
(D)ARTIFICIAL NEURAL NETWORK LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Twelve Experiments to be performed from following List of Experiment.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

1. Regression Analysis
2. The Back Propagation Algorithm
3. Multilayer Perceptions
4. Radial Basis Function Networks
5. Over-learning and Generalization
6. Probabilistic Neural Networks
7. Generalized Regression Neural Networks

Note:

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU 807 ELECTIVE - II
(E) BIOINFORMATICS LAB

Teaching Scheme: 02 P

Total 02

Credit: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE: 3hrs.

Minimum Twelve Experiments to be performed from following List of Experiment.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same.

Aim of the list is to inform about minimum expected outcomes.

1. To view and use the various biological databases available on the World Wide Web.
2. Queries based on Biological databases-To retrieve the gene sequence in FASTA format corresponding to Protein IDP00519
3. To retrieve the sequence of the Human keratin protein from UniProt database and to interpret the results.
4. To retrieve the sequence of the Human keratin protein from GenBank database and to interpret the results.
5. To find the similarity between sequences using BLAST(Basic Local Alignment Search Tool)
6. To perform Sequence analysis by using EMBOSS(European Molecular Biology Open Software Suite)
7. To search for a motif in a DNA sequence
8. To predict secondary structure of the give protein sequences

Note:

ICA - Internal Continuous Assessment shall be based on the practical record and knowledge or skills acquired. The performance shall assess experiment wise by using continuous assessment formats, A and B.

ESE - The End Semester Exam for practical shall be based on performance in one of Experiments and may be followed by sample questions.

CSU808 PROJECT PHASE - II

Teaching Scheme : 06 P Total: 06
Evaluation Scheme: 75 ICA + 100 ESE
Duration of ESE: 3 Hrs.

Credit: 06
Total Marks: 175

1. Project work decided in VII semester shall be continued.
2. Students should complete implementation of ideas given in synopsis, so that project work should be completed before end of semester.
3. Students shall submit the final project report in proper format as per guidelines given on the college website which shall include the work of both semesters.
4. For uniform and continuous evaluation, evaluation committee for each group shall be formed by Program Head in which guide must be a member. Internal marks should be awarded by committee at the end of semester based on continuous evaluation.
5. Final examination of project shall include demonstration, presentation of complete work and oral examination based on the project work.

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Oral examination shall be conducted on the Project report, by the panel of examiners consisting of Project Guide, Course Coordinator and Expert appointed by Program Head.

ESE: The End Semester Examination for Project shall consists of Demonstration if any, presentation and oral examinations based on the project report.

CSU809 SELF STUDY-IV

Teaching Scheme: 00 P Total: 00
Evaluation Scheme: 25 TA

Credit: 02
Total Marks: 25

1] Note6: Self study IV is based on one class test each on the basis of 20% curriculum of the courses CSU801,CSU802 ,CSU803,CSU804 declared by respective course coordinator at the beginning of semester.

2] One faculty member shall be appointed as course coordinator for self study IV and his/her teaching work load shall be considered as one hour per week.

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVTI.

Department of Computer Science & Engineering.

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SEM III

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits	
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total		
						TA	CT1	CT2	ESE	ICA			ESE
SHU304	Engineering Mathematics-III	3	--	---	3	10	15	15	60	---	---	100	3
ETU311	Electronic Devices and Circuits	3	---	---	3	10	15	15	60	---	---	100	3
CSU301	Programming Methodology	3	1	---	4	10	15	15	60	---	---	100	4
CSU302	Computer Organization and Architecture	3	1	---	4	10	15	15	60	---	---	100	4
CSU303	Discrete Mathematics and Graph Theory	3	---	---	3	10	15	15	60	---	---	100	3
SHU305	General Proficiency II	1	---	2	3	---	---	---	---	25	25	50	2
ETU312	Electronic Devices and Circuits Lab	---	---	2	2	---	---	---	---	50	---	50	1
CSU304	Programming Methodology Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU305	Computer Organization and Architecture Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU306	Linux administration-I Lab	---	---	2	2	---	---	---	---	25	25	50	1
Total		16	2	10	28	---	75	75	300	150	100	750	23

SEM IV

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits	
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory			Practical		Total		
						TA	CT1	CT2	ESE	ICA			ESE
CSU401	Numerical Method and Computer Programming	3	--	---	3	10	15	15	60	---	---	100	3
CSU402	Data Structure	3	1	---	4	10	15	15	60	---	---	100	4
CSU403	Object Oriented Technology	3	1	---	4	10	15	15	60	---	---	100	4
ETU411	Analog and Digital IC's	3	---	---	3	10	15	15	60	---	---	100	3
ITU402	Data Communication	3	---	---	3	10	15	15	60	---	---	100	3
CSU404	Data Structure Lab	1	---	2	3					50	-	50	2
CSU405	Object Oriented Technology Lab	---	---	2	2	---	---	---	---	25	25	50	1
ETU412	Analog and Digital IC's Lab	---	---	2	2	---	---	---	---	25	25	50	1
ITU403	Data Communication Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU406	Linux administration-II Lab	---	---	2	2	---	---	---	---	25	25	50	1
Total		16	2	10	28	50	75	75	300	150	100	750	23

TA :Teacher Assessment

CT: Class Tests

ESE: End Semester Examination

ICA : Internal Continuous Assessment

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVTI.

**Department of Computer Science & Engineering.
Proposed Scheme for B. Tech. (Computer Science & Engineering)**

SEM V

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
CSU501	System Analysis and Design	3		---	3	10	15	15	60	---	---	100	3
CSU502	Database Management System	3		---	3	10	15	15	60	---	---	100	3
CSU503	System Software	3		---	3	10	15	15	60	---	---	100	3
CSU504	Theory of Computation	3		---	3	10	15	15	60	---	---	100	3
CSU505	Principle of Management	3		---	3	10	15	15	60	---	---	100	3
CSU506	System Analysis and Design laboratory	---		2	2	---	---	---	---	25	25	50	1
CSU507	Database Management System laboratory	---		2	2	---	---	---	---	25	---	25	1
CSU508	System Software Lab	---		2	2	---	---	---	---	25	25	50	1
CSU509	Hardware Lab	---		2	2	---	---	---	---	25	25	50	1
CSU510	Linux administration-III Lab	1		2	2	---	---	---	---	25	25	50	2
CSU511	Self Study I	---		---	---	---	---	---	---	25	---	25	2
Total		16		10	26	50	75	75	300	150	100	750	23

Note1: Self study I is based on one class test each on the basis of 20% curriculum of the courses CSU501,CSU502,CSU503,CSU504 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study I and his/her teaching work load shall be considered as one hour per week.

SEM VI

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
CSU601	Design and Analysis of Algorithms	3	--	---	3	10	15	15	60	---	---	100	3
CSU602	Switching Theory and Logic Design	3		---	3	10	15	15	60	---	---	100	3
CSU603	Operating System Design	3		---	3	10	15	15	60	---	---	100	3
CSU604	Computer Network	3		---	3	10	15	15	60	---	---	100	3
CSU605	Software Project Management	3		---	3	10	15	15	60	---	---	100	3
CSU606	Design & Analysis of Algorithms Lab	---		2	2	---	---	---	---	25	25	50	1
CSU607	Switching Theory &Logic Design Lab	---		2	2	---	---	---	---	25	---	25	1
CSU608	Operating System Design Lab	---		2	2	---	---	---	---	25	25	50	1
CSU609	Computer Network Lab	---		2	2					25	25	50	1
CSU610	Minor Project	---		2	2	---	---	---	---	25	25	50	2
CSU611	Self Study II	---		---	---	---	---	---	---	25	---	25	2
CSU612	Industrial Lecture I*	1		---	1	---	---	---	---	---	---	---	---
Total		16		10	26	50	75	75	300	150	100	750	23

Note2: Self study II is based on one class test each on the basis of 20% curriculum of the courses CSU601,CSU602,CSU603,CSU604 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study II and his/her teaching work load shall be considered as one hour per week.

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVTI.

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SEM VII

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
CSU701	Computer Graphics	3	---	---	3	10	15	15	60	---	---	100	3
CSU702	Microprocessor and Interfacing	3	---	---	3	10	15	15	60	---	---	100	3
CSU703	Elective –I	3	---	---	3	10	15	15	60	---	---	100	3
CSU704	Interdisciplinary Elective	3	---	---	3	10	15	15	60	---	---	100	3
CSU705	Computer Graphics Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU706	Microprocessor & Interfacing Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU707	Elective –I laboratory	---	---	2	2	---	---	---	---	25	25	50	1
CSU708	Project Phase I	---	---	4	4	---	---	---	---	50	--	50	2
CSU709	Seminar	---	---	2	2	---	---	---	---	25	25	50	2
CSU710	Industrial Visit	---	---	---	---	---	---	---	---	50	---	50	1
CSU711	Industrial Lecture II*	1	---	---	1	---	---	---	---	25	---	25	1
CSU712	Self Study III	---	---	---	---	---	---	---	---	25	---	25	2
Total		13	---	12	25	40	60	60	240	250	100	750	23

***Note4:** Credit shall be awarded on the basis of combined assessment of Industrial Lecture I & Industrial Lecture II

Note5: Self study III is based on one class test each on the basis of 20% curriculum of the courses CSU701, CSU702, CSU703 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study III and his/her teaching work load shall be considered as one hour per week.

SEM VIII

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	ICA	ESE		
CSU801	Operation Research and Planning Management	3	---	---	3	10	15	15	60	---	---	100	3
CSU802	Digital Signal Processing	3	---	---	3	10	15	15	60	---	---	100	3
CSU803	Elective -II	3	---	---	3	10	15	15	60	---	---	100	3
CSU804	Elective-III	3	---	---	3	10	15	15	60	---	---	100	3
CSU805	Operation Research and Planning Management Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU806	Digital Signal Processing laboratory	---	---	2	2	---	---	---	---	25	25	50	1
CSU807	Elective –II Lab	---	---	2	2	---	---	---	---	25	25	50	1
CSU808	Project	---	---	6	6	---	---	---	---	75	100	175	6

CSU809	Self Study IV	---	---	---	---	---	---	---	---	25	----	25	2
Total		12		12	24	40	60	60	240	175	175	750	23

Note6: Self study IV is based on one class test each on the basis of 20% curriculum of the courses CSU801,CSU802 ,CSU803,CSU804 declared by respective course coordinator at the beginning of semester. One faculty member shall be appointed as course coordinator for self study IV and his/her teaching work load shall be considered as one hour per week.

Note7: Students of this department shall select any one Interdisciplinary Elective offered by other department. Interdisciplinary Elective shown below will be offered to students of other department.

TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Contineous Accessment

Interdisciplinary Elective CSU704	Elective I CSU703	Elective II CSU803	Elective III CSU804
A Nanotechnology	A Advanced Computer Architecture	A Modeling and Simulation	A) Distributed Operating Systems
B Computer Oriented Operation Research	B Embedded System	B Parallel Computing	B) Natural Language Processing
C Software Engineering	C Multimedia Technology	C Advanced Database Management System	C) Robotics
	D Internet Technology	D Artificial Neural Network	D) Advanced Web Technology
	E Artificial Intelligence	E Bio-informatics	

SHU304 ENGINEERING MATHEMATICS-III

Teaching Scheme: 03 L Total 03
Marking scheme: 15CT1 + 15CT2 + 10TA + 60 ESE
Duration of ESE : 2Hrs.30min

Credit : 03
Total Marks :100

Linear Differential Equations with constant coefficients:

General solution to L.D.E. of n^{th} order with constant coefficients, rules for finding C.F., General method for finding P.I., P.I. of some standard functions, Method of Variation of Parameters, Cauchy's and Legendre's L.D.E.

Applications of L.D.E. to deflection of beam, vibrations of Springs,

Partial Diff. Equations:

Complete solution of PDE, Linear and non-linear PDE of types (i) $f(p, q) = 0$, (ii) $f(p, q, z) = 0$, (iii) $f(p, q, x, y) = 0$, (iv) $f(p, q, x, y, z) = 0$ ie Lagrange's form $Pp + Qq = R$ and Clairaut's form $z = px + qy + f(p, q)$, (v) Equations reducible to above forms. Complete solution of PDE of first and second order by method of separation of variables.

Laplace Transform:

Definition, standard formulae and properties of LT., Laplace Transform of unit step and periodic functions. Laplace Transform of unit impulse function, Inverse Laplace Transform, Convolution Property, Application of L.T. to solve Linear Differential Equations with constant coefficients.

Vector Calculus:

Scalar and vector point functions, Differentiation of a vector function, Tangent and normal components of velocity and acceleration, orthogonal curves, Operator delta, Gradient of scalar point function & their physical meaning. Divergence and Curl of vector point function & their physical meaning. vector identities, solenoidal and conservative fields. Line integral, work done by force.

Text Books :

- 1) Text book of applied Mathematics by P.N.Wartikar and J.N.Wartikar, Pune vidyarthi griha, Pune 2001.
- 2) Higher Engineering Mathematics by B.S.Grewal, Khanna publication, 6th edition, New Delhi, 1976.

Reference Books:

- 1) Advanced Engineering Mathematics by Kreyzig, John Wiley & sons 9th edition 1995.
- 2) Advanced Engineering Mathematics by John bird 5th edition Elsevier publication 2007.
- 3) Higher Engineering mathematics by C.R.Wiley, 8th edition John Wiley and sons 1999.

ETU311 ELECTRONIC DEVICES AND CIRCUITS

Teaching Scheme: 03T

Total: 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Diodes and applications: Diode as rectifiers (analysis of single phase rectifiers), analysis of C, L, LC and π filter, clipping and clamping circuits. Zener diode as a voltage regulator, opto-coupler.

BJT biasing: Types, overview of construction, working and V-I characteristics of BJT, methods of biasing- analysis and synthesis of voltage divider biasing, d. c. load line, a. c. load line stability and stability factor.

BJT amplifiers: Transistor hybrid model for CE, CB and CC configuration, determination of h-parameters from the characteristics, analysis of CE amplifier circuit using h-parameter.

Concept of darlington emitter follower, bootstrap emitter follower, RC coupled amplifier, transformer coupled amplifier, direct coupled amplifier

FET amplifiers: Advantages and disadvantages of FET, types, overview of construction, working and V-I characteristics of JFET & MOSFET, parameters, method of biasing, common source AC amplifier.

Power & feedback amplifiers: Classification, analysis of class A, B, AB power amplifier – calculation of power gain, efficiency, power dissipation and distortion.

Tuned amplifiers - single tuned, double tuned amplifiers.

The feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers. Types and characteristics of voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

Oscillators & Multivibrators: Barkhausen criteria, RC oscillators - Wein bridge and phase shift, LC oscillators- Hartley, colpitt's, clapp and crystal oscillators.

Self bias bistable multivibrator, commutating capacitor, Schmitt trigger, self bias monostable multivibrator (MMV) - collector coupled. General features of a time base signal, UJT relaxation oscillator, transistor constant current sweep generator, miller and bootstrap sweep generator.

Text Books:

1. Electronic Devices and Circuits (2nd edition, 2008), by J. Millman, C. Halkias and Satyabrata jit, Tata McGraw Hill.
2. Electronic Devices and Circuits (2nd edition, 2008), by D. R. Cheruku and B. T. Krushna, Pearson.

Reference Books:

1. Integrated Electronics, (3rd edition, 2006), by Jacob Millman, Christos C. Halkias, Tata McGraw Hill.
2. Pulse Digital and Switching Waveforms, (2nd edition, 2007), by Jacob Millman, Herbert Taub, Mothiki S Prakash Rao, Tata McGraw Hill.

CSU301 PROGRAMMING METHODOLOGY

Teaching Scheme : 03 L +01T

Total 04

Credits : 04

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE : 2Hrs.30min

Introduction to Java: Object Oriented Programming Concepts, Procedural Vs Object oriented language. Java Basics: Program component, Compilation cycle, class fundamentals, Introduction to Application and Applet, Data types and Variables.

Operators and Control Statements: Arithmetic operators, relational operators, assignment operators. Selection statement: if, nested if, switch statement. Repetition statements: while,do-while, for, nested loops. Arrays: Basics, one dimensional, Multidimensional, array of Objects, Passing array to methods.

Introducing Classes: Class fundamentals, declaring objects, methods, class data and instance Data, constructor, 'this' keyword, access control. Inheritance, Polymorphism, Abstract classes and Interface. Introduction to Math class. Introduction to String and String buffer class.

Applet: Applet class and its methods, Introduction to AWT and classes of AWT: Button, Text field, Label. Working with Graphics, Working with Colors. AWT control fundamentals: adding and removing of controls, responding to controls. Frame class, menus and other GUI objects.

Event handling mechanism: Delegation event model, Event, Event Listeners: ActionListener, MouseListener, MouseMotionListener, WindowListener. Handling mouse event. Adapter classes. Packages.

Java File I/O: File,File Dialog Object, Byte Stream: InputStream, Output Stream, FileInputStream,FileOutputStream,DataInputStream/OutputStream.PrintWriter class. Exception Handling: Exception types, uncaught exception using try catch, throw, throws, finally.

Textbook:

1) Java Complete References by Herbert Schildt, 5th edition, Tata Mc Graw-Hill,2005-06

Reference Book:

1) Java Programming by Liag, 7th edition, Prentice Hall India, 2002.

2) An Introduction to OOP with Java by C.Thomas Wu, Indian Adapted Edition, Tata Mc Graw-Hill, 2006

CSU302 COMPUTER ORGANIZATION & ARCHITECTURE

Teaching Scheme : 03 L + 01T

Total 04

Credits : 04

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE : 2Hrs.30min

Computer components & functions:. Interconnection structures, Bus Interconnection, PCI, Computer memory system overview, semiconductor main memory, chip logic, error correction, cache memory, elements of cache design, Associative mapping, Advanced DRAM organization, magnetic disk, RAID, CD-ROM.

External devices: I/O modules, Programmed I/O, DMA, Interrupt I/O, I/O channels & IOPs, SCSI & firewire interfaces. Operating system overview, Integer representation and arithmetic, Booths's algorithm, Floating point representation and arithmetic, Precision considerations, guard bits, rounding, quiet and signaling NaNs, denormalised numbers, Little, Big and Bi-Endian

ALU: Machine instruction characteristics, operand types, operation types, Addressing modes, Instruction formats, CPU structure, processor organization, register organization, instruction cycle, instruction pipelining, Branch prediction.

RISC machine, Instruction Execution characteristics, Register file concept, Compiler based register optimization, RICS architecture, RISC pipelining, RISC v/s CISC, Case study SPARC, superscalar overview, Design issues in instruction level parallelism and machine parallelism, Case study of PowerPC

Control unit operation: Micro-operations, control of the processor, Hardwired implementation. Micro-programmed control: Concepts, microinstruction sequencing and execution, Applications of microprogramming.

Multiple processor organizations, Symmetric processors, Mainframe SMP, Cache coherence and MESI protocol, clusters, Non-uniform Memory access, vector computation. Computer architecture, Von Neumann, Harvard, Modified Hardwired Architecture

Text Books:

1) Computer Organization & Architecture by Stalling W ,6th Edition, Pearson Education,2003

Reference Books:

1) Computer Organization, by C. Hamacher, R Zaky,2nd Edition, Tata Mc Graw Hill ISE,1984.

2) Computer Architecture & Organization, by J.P.Hayes 4/e, Tata Mc Graw Hill,ISE, 1986.

3) Logic & Computer design fundamentals, by M.Mano & C. Kime (2/e), Prentice Hall,1997.

4) Structured Computer Organization, by A. S. Tanenbaum 4/e, Tata Mc Graw Hill ISE,2004.

CSU303 DISCRETE MATHEMATICS AND GRAPH THEORY

Teaching Scheme : 03 L + 00 T

Total 03

Credits : 03

Evaluation Scheme : 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks : 100

Duration of ESE : 2Hrs.30min

Mathematical Logic: Statements & Notations, Connectives, Normal Forms, Theory of inference for the statement calculus, predicate calculus. The inference theory of the Predicate Calculus

Set theory: Basic Concepts, Operation on sets, Algebra of sets. Relation and Ordering, Functions, Natural Numbers, Recursion.

Algebraic structure: Concepts and properties Semi groups and Monoids, Grammar and Languages, Polish expression and their compilation, Groups.

Lattices and Boolean algebra: Lattices as partially ordered sets, Boolean algebra, Boolean functions, Representation and Minimization of Boolean functions.

Graph theory: Basic concepts, Matrix representation of graphs.

Trees: Basic concepts, tree searching, undirected trees, Minimal spanning tree.

Computability theory: Finite state machines, Finite state acceptors and regular grammars. Turing machines and partial recursive functions.

Text Book:

- 1) Discrete Mathematical Structures with application to Computer science by J.P.Trembley, R.Manohar: 2nd Edition, Tata Mc-Graw Hill Publication, 2004 .

Reference Books:

- 1) Element of Discrete Mathematics by C.L.Lill second edition Mc-Graw Hill, 2002.

SHU305 GENERAL PROFICENCY – II

Teaching Scheme: 01L+02 P

Total : 03

Credit : 02

Evaluation Scheme: ICA 25+ ESE 25

Total Marks: 50

Presentation Skill :

Communication boosters – aura words, pronunciation, body language – voice, posture and gesture, eye contact, dress codes. Function of culture code in presentation – planning, preparing and delivering a presentation, etiquettes, clarity and aliveness of delivery. General communication skill for presentation – content matching and language matching for specific audience, tone, humor, poise- listener/speaker sensitivity. Specific communication skill for presentation – ice breaker, small talk dialogue, debate, turn taking, effective and defensive handling of question. Models of presentation – Public speaking, academic and professional presentation, group discussion, personal interview, technical report writing (IEEE standards).

Managerial skill :

Time management - advantages, time wasters – procrastination, time management tips and strategies. Stress management- stress and its disadvantages, stress coping ability and stress inoculation training, management of various types of fear, depression and anger.

Conflict management -types of conflict, conflict stimulation and conflict resolution technique for conflict for effective conflict management, effective ways of dealing with people, significance of body language in communication and assertiveness training.

Interpersonal skills -concept of team, advantages of team work, promotion of team spirit, team building techniques, nurturing leadership qualities, negotiation skills.

Topics for assignments/practicals :

Minimum eight assignments/practicals based on above topics. The representative list is given below

1. Collection of new words concerning various technical and professional subjects
2. Listening of audio cassette or lecture or watching video cassette (based on the topics of managerial skill) followed by speech/seminar by students.
3. Listening of audio cassette or lecture or watching video cassette (based on the topics of managerial skill) followed by group discussion of students.
4. Collecting the information related to the topics of managerial skill using internet, books, magazines etc. and its power point presentation or seminar/lecture.
5. Power point presentation on topic related to any subject of programme.
6. Preparing a technical paper in IEEE format.
7. Management games.
8. Personal interview.
9. Extempore elocution, debate.

Text Books:

1. Professional Communication Skills, Alok Jain, Pravin S. ,R. Bhatia, A. M. Sheikh, 3rd edition, S. Chand and Company, New Delhi, 2005
2. Personality Development, E. B. Hurlock, 5th edition, Tata MacGraw Hill, New Delhi, 2006

Reference Books :

1. Power of Positive Thinking, D. J. Mile, 1st edition, 28th reprint , Rohan Book Company, Delhi, 2004
2. All About Self motivation, Pravesh Kumar, 3rd edition, Goodwill Publishing House, New Delhi, 2005
3. Body Language: How to Read Others Thoughts by their Gestures, Pease, Allan, 3rd edition, Sudha Publications. New Delhi, 1998.
4. Multiple Intelligences: The Theory in Practice: A Reader, Gardner, Howard, 1st edition, Basic Books. New York, 1993.
5. Six Thinking Hats, De Bono, Edward, 2nd Edition, Penguin Books, New York, 2000.
2. All About Self motivation, Pravesh Kumar, 3rd edition, Goodwill Publishing House, New Delhi, 2005
3. Body Language: How to Read Others Thoughts by their Gestures, Pease, Allan, 3rd edition, Sudha Publications. New Delhi, 1998.
4. Multiple Intelligences: The Theory in Practice: A Reader, Gardner, Howard, 1st edition, Basic Books. New York, 1993.
5. Six Thinking Hats, De Bono, Edward, 2nd Edition, Penguin Books, New York, 2000.

ETU312 ELECTRONIC DEVICES AND CIRCUITS LAB

Teaching Scheme: 02P

Total: 02

Credit: 01

Evaluation Scheme: 50 ICA

Total Marks: 50

Minimum eight experiments shall be performed to cover entire curriculum of ETU311 and the list given is just a guideline.

List:

1. To study V-I characteristics of PN- junction diode and Zener diode. Also compare their characteristics.
2. To Study of diode as clipper and clamper.
3. To study half wave & full wave rectifier without filter and to calculate its ripple factor
4. To study bridge full wave rectifier without filter and to calculate its ripple factor.
5. To study half wave & full wave rectifier with filter and to calculate its ripple factor
6. To study bridge full wave rectifier with filter and to calculate its ripple factor.
7. To study the input and output characteristics of a given transistor in common emitter configuration
8. To Study of CE amplifier- current & power gains and input, output impedances.
9. To study biasing of transistor by following method:

- a. Fixed bias.
 - b. Voltage divider bias.
10. To study the frequency response of RC coupled amplifier.
 11. Measurement and study of output characteristics of JFET.
 12. Measurement and study of output characteristics of MOSFET.
 13. To study Hartley oscillator.
 14. To study the different types of negative feedback in two stage amplifier and to observe its effects upon the amplifier parameters.
 15. To study biasing of transistor by following method:
 - a. Fixed bias.
 - b. Voltage divider bias.

CSU304 PROGRAMMING METHODOLOGY LAB

Teaching Scheme : 02 P Total 02

Credit : 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE : 3Hrs.

Minimum eight experiments shall be performed to cover entire curriculum of CSU301 and the list given is just a guideline.

1. Simple Java applications using any Selection statement.
2. Simple Java applications using any Repetition statement.
3. Java application to Using Math class
4. Applet program using concept working with Graphics and Colors
5. Applet program using GUI components Button, TextField, Label.
6. Applet program for BMI calculation.
7. Java application based on String and String buffer class
8. Java application to implement Frame and Dialog window.
9. Write an application in Java to design “Calculator”
10. Java application program based on Mouse events.
11. Java Application program based on reading and writing of files.
12. Access modifiers(public ,private& protected)

Textbook:

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

CSU305 COMPUTER ORGANIZATION & ARCHITECTURE LAB

Teaching Scheme : 02 P	Total 02	Credit : 01
Evaluation Scheme: 25 ICA + 25 ESE		Total Marks: 50
Duration of ESE : 3Hrs.		

Minimum eight experiments shall be performed to cover entire curriculum of CSU302 and the list given is just a guideline.

1. Intel multicore architecture and processor basics
2. Hyper threading, multithreading, multiprocessing.
3. Multilevel parallel algorithm.
4. Multithreaded application design.
5. Programming for multicore architecture.
6. Application tuning and optimization based on multicore architecture.
7. Program based on Multithreaded and multicore architecture.
8. Operating system support for multithreaded and multicore processor.
9. Simulation of 8080/8086

Reference:

www.Inteleducation.com

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

CSU306 LINUX ADMINISTRATION LAB -I

Teaching Scheme : 02 P

Total 02

Credits: 01

Evaluation Scheme: 25 ICA + 25 ESE

Total Marks: 50

Duration of ESE : 3Hrs.

Minimum eight experiments shall be performed. The sample list of program is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same .Aim of the list is to inform about minimum expected outcomes

1. Introduction & Installation of Linux
2. File and shell Basics
3. Introduction to different editor like vi , vim etc
4. User and Group & File access permissions
5. Standard I/O and Pipes
6. Linux File System
7. X/GNOME/KDE
8. Writing a simple Shell Scripts in Linux
9. Use “cron” to run a program on schedule
10. Printing and mailing

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

CSU401 NUMERICAL METHOD & COMPUTER PROGRAMMING

Teaching Scheme : 03 L

Total 03

Credits : 03

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE : 2Hrs.30min

Problem solving & computers: Numerical methods for roots of equations, polynomial, transcendental, quadratic equations. Bisection, False Position, Newton-Raphson & Direct substitution methods.

Solution of Simultaneous Equations: Gauss Elimination, Gauss Seidel, Gauss-Jordan Methods. Matrix methods & Inversion Interpolation : Linear & polynomial.

Numerical differentiation by polynomial fit: Numerical integration by Trapezoidal Rule, Simpson Rule, Gauss Quadrature.

Sampling frequency distribution: measures of central tendency, dispersion moments. Discrete probability distributions. Probability, Various types of distributions.

Regression : Linear LS fit, Nonlinear fit. Polynomial function. Correlation : Coefficient, Properties of correlation coefficient. Multiple, Partial and Rank correlation.

Test of significance: Introduction, The χ^2 -test. The t-test, the F-test .

Text Books:

1) Computer Oriented Numerical Methods by V Rajaraman, 2nd edition, Prentice Hall India, 1986.

2) Mathematical Statistics by J.N. Kapur, 4th edition, Tata McGrawHill, 1989.

Reference Book:

1) Numerical Computation Methods by Sastry, Prentice Hall India

2) Statistics by M.R. Spiegel, Tata McGraw Hill

CSU402 DATA STRUCTURE

Teaching Scheme : 03 L +01T Total 04

Credits : 04

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE : 2Hrs.30min

Introduction, Data structures, algorithms: complexity, Time-Space, Tradeoff,

Algorithmic notation, complexity of algorithm, sub algorithm, String processing: Basic terminology, storing Strings, character data type, String operations, word processing, pattern matching algorithms.

Arrays, Records and Pointers: Introduction, Linear arrays, , inserting and deleting, sorting; Bubble sort, searching; linear search, Binary search, multidimensional arrays, Pointers; Pointer arrays, Matrices, Sparse matrices.

Linked List: Linked lists, representation of linked lists in memory, traversing a linked list, searching a linked list, memory allocation; garbage collection, insertion into a linked list, Deletion into a linked list, Header Linked list, Two- Way Lists.

Stacks, Queues, Recursion: Introduction, Stacks, Array representation of stacks, Arithmetic expressions; Polish notation, Quick sort, an application of stacks, Recursion, Towers of Hanoi, Implementation of Recursive Procedures by Stacks, Queues, Dequeues, Priority Queues.

Trees: Introduction, Binary Trees, Representing Binary Trees in Memory, Traversing Binary Trees, Traversal Algorithms Using Stacks, Header Nodes; Threads, Binary Search Trees, Deleting in a Binary Search Tree, Heap; Heapsort, Path Lengths; Huffman's Algorithm, General Trees.

Graphs and their applications: Introduction, Graph Theory Terminology, Sequential Representation of Graphs; Adjacency Matrix; Path Matrix, Shortest Paths, Linked Representation of a Graph, Operation on Graphs, Traversing a Graph, Posets; Topological Sorting, Sorting and Searching: Merging, Merge-Sort, Redix- Sort, Hashing.

Text Book :

1.Data structures by Trembley and Sorenson 3rd Edition, Tata McGraw Hill,1986.

Reference Book:

1. Theory and Problems of Data Structures by S. Lipschutz, SCHAUM'S OUTLINE SERIES, 2nd Edition , Tata McGraw Hill,1986.

2. Data Structures by Horowitz and Sahni 2nd Edition,Galgotia Publication,1992.

CSU403 OBJECT ORIENTED TECHNOLOGY

Teaching Scheme : 03 L + 01T Total 04 Credits : 04
Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks: 100
Duration of ESE : 2Hrs.30min

Objects & Classes in C++: Declaring & using classes, Constructors, Objects as functions arguments, Copy Constructor, Static class data. Arrays of objects, C++ String class.

Operator overloading : Overloading unary & binary operators. Data conversion. Pitfalls of operator overloading. Pointers & arrays. Pointers & functions. new & delete operators. Pointers for objects.

Inheritance in C++ : Derived class & base class, Derived class constructors, Function

overloading, class hierarchies, Public and private inheritance, Multiple inheritance.

Containership : classes within classes.

Virtual functions concepts, Abstracts classes & pure virtual functions. Virtual base classes, Friend functions, Static functions, Assignment and copy initialization, the this pointer. Dynamic type information.

Streams & Files in C++ : Stream classes, stream errors, disk file I/O with streams, File pointers, Error handling in file I/O. File I/O with members functions, overloading the extractions & insertion operators, Memory as a stream object, command-line arguments. Multifile programs.

Function Template: Class templates, Exception syntax, Multiple exceptions, exception with arguments. Introduction to the Standard Template Library. Algorithms, Sequential Containers, Iterates, Specialized iterates, Associative containers. Function objects.

Text-Book :

1. Object-Oriented Programming in C++ by Robert Lafore , 4th Edition, Pearson Education 2002.

References Book:

1. C++ Programming Language by Bjarne Stroustrup, 3rd Edition, Addison-Wesley, 2002.
2. Mastering C++ by Venugopal K.R., 1st Edition, Tata McGrawHill, 1997
3. Complete Reference C++ by Herbert Schildt , 4th Edition, Tata McGrawHill, 2004.

ETU411 ANALOG AND DIGITAL IC'S

Teaching Scheme: 03L

Total: 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

ESE Duration: 2Hrs. 30 min.

Introduction to ICs: Operational amplifier- block schematic, internal circuits. Study of op-amp IC 741, measurement of op-amp parameters, balancing networks of op-amp, frequency compensation techniques for op-amp.

Linear and non-linear application op-amp: Inverting amplifier, non-inverting amplifier and voltage follower, differential amplifier, integrator, differentiator, sinusoidal RC phase shift and Wein bridge oscillator, comparator, astable, bistable and monostable multivibrators, Schmitt trigger, clippers, clampers using op-amp.

Other linear ICs: Block schematic of regulator IC 723 and its applications, SMPS, block schematic of timer IC 555 and its applications as a timer, astable, monostable, bistable multivibrator.

Boolean algebra, logic circuits and families: Logic gates – basic, derived and universal gates, theorems and properties of Boolean algebra, DeMorgan's theorem, canonical and standard SOP and POS forms, simplification and synthesis of Boolean functions up to 4 variables using Boolean theorems and K-Map. Characteristics of digital ICs, study of TTL, ECL, I²L, CMOS logic families, tristate logic.

Combinational logic design: Arithmetic circuits as half and full adder and subtractor, 4-bit adder / subtractor, IC 7483, BCD adder, digital comparator, multiplexer, de-multiplexer, encoder, decoder.

Sequential logic design: One-bit memory cell, S-R, clocked S-R, J-K, master slave J-K, T-type, D-type flip-flops, shift registers, synchronous and asynchronous counters, up/down counters, ripple counters, MOD-n counters, RAM bipolar cell.

Text Books:

1. Op-Amps and Linear Integrated Circuits, (4th edition, 2002), by Ramakant A. Gayakwad, Prentice Hall of India Learning.
2. Modern Digital Electronics, (3rd edition, 2005), by R.P. Jain, Tata Mc-Graw Hill

Reference Books:

1. Microelectronics, (2nd edition, 1999), by Jacob Millman and Arvin Grabel, Tata Mc-Graw Hill.
2. Digital Principles and Application, (6th edition, 2006), by A. P. Malvino, D. P. Leach, Tata Mc-Graw Hill.

ITU402 DATA COMMUNICATION

Teaching Scheme: 03 L

Total - 03

Credits: 03

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE : 2Hrs.30min

Introduction: components, networks, protocols & standards, organizations, line configuration, topology transmission mode, categories of networks, internetworks, the model, function of layers, analog & digital signals, periodic & aperiodic signals, time & frequency domains.

Encoding & modulating: Digital-to-Digital conversion, Digital- to- Analog conversion, Analog- to- Digital conversion, Analog -to- Analog conversion, digital data transmission, DTE-DCE interface, modems, 56 K cable modems.

Transmissions media: Guided media, unguided media, transmission impairment performance, wavelength, shannon capacity, Media comparison.

Multiplexing: Many to one/one to many, Freq. division multiplexing, TDM multiplexing

Application: Telephone system, error detection & correction: types of errors, detection, longitudinal redundancy check, cyclic redundancy check, checksum, error correction.

VRC,

Data link control: Line discipline, flow control, error control, data link .

Protocol: Asynchronous protocol, synchronous protocol, character oriented protocol, bit oriented protocols, link access procedures.

Local area networks: Ethernet, Other Ethernet networks, token bus, token ring, FDDI Comparison. MAN: IEEE 802.6(DQDB) SMDS.

Switching: Circuit switching, packet switching, message switching integrated services digital networks (ISDN): Services, history subscriber, access to ISDN, the ISDN layers, broadband ISDN, future of ISDN.

Frame relay: Introduction, frame relay operation, frame relay layers, congestion control, leaky bucket algorithm, traffic control, other futures.

Networking & Internet networking devices: Repeaters, bridges, routers, gateway, routing algorithms, routers tables, other devices, distance vector routing, link state routing.

Text Books:

1. Data communication & networking - Behrouz A. Forouzan (2nd Edition), Tata Mc. Graw Hill, 2000.
2. Data & computer communication - William Stalling (6th Edition), Pearson Education, 2000

Reference Books:

1. Data Communication - William L. Schweber (2nd Edition), McGraw Hill Publication, 1988.
2. Computer communication & networks - J. Frey (3rd Edition), AEW Press, 2005

CSU404 DATA STRUCTURE LAB

Teaching Scheme	: 01T + 02 P	Total 03	Credit	: 02
Evaluation Scheme	: 50 ICA		Total Marks	:50

Minimum eight experiments shall be performed to cover entire curriculum of CSU402 and the list given is just a guideline.

In Theory Syntax to implement the data structure in java & c should be explain.

List of Practical

1. Store and print the nonzero elements of sparse matrix using given format.
2. Transpose the sparse representation using given algorithm.
3. Simulate any algorithm based on recursion
4. Define and Implement functions of Abstract data type
5. Evaluate Postfix/prefix type of expression.
6. Linked representation of data structure Queue
7. Perform the operations such as insert a node at first, insert a node at given location, delete on data structure Singly linked list
8. Perform the operations such as insert a node at first, insert a node at given location, delete data structure Doubly linked list
9. Traverse the binary tree using any one Preorder/ Postorder /Inorder traversal
10. Sort the given array using Selection Sort

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

CSU405 OBJECT ORIENTED TECHNOLOGY LAB

Teaching Scheme : 02 P	Total 02	Credit : 01
Evaluation Scheme : 25 ICA + 25 ESE		Total Marks :50
Duration of ESE : 3Hrs.		

Minimum eight experiments shall be performed to cover entire curriculum of CSU403 and the list given is just a guideline.

- 1 Write a C++ program to implement a stack with its constructor and two member functions PUSH and POP
- 2 Write a C++ program to find product of two same numbers from 0 to 9 stored in an object array of 10 objects and then free the memory space occupied by an object array
- 3 Write a C++ program to overload minus operator as an unary and binary operator
- 4 Write a C++ program using friend operator function to overload plus binary operator
- 5 Write a C++ program to calculate the circumference of an earth (subclass) after getting distance of it measured from sun from planet (super class)
- 6 Write a C++ program for an inventory that stores the name of an item, the number on hand, and its cost. Include an inserter and an extractor for this class
- 7 Write a C++ program that creates an output file, writes information to it, closes the file and open it again as an input file and read the information from the file
- 8 Write a C++ program that counts number of words in a file
- 9 Write a C++ program to create an abstract class area having an abstract function get area, which will find an area of derived classes rectangle and triangle
- 10 Write a C++ program to create a generic function that swaps the values of the two Variables.

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

Teaching Scheme: 02P
Evaluation Scheme: 25 ICA + 25 ESE
Duration of ESE : 3Hrs.

Total: 02

Credit: 01
Total Marks: 50

Minimum eight experiments (minimum four from both the groups) shall be performed to cover entire curriculum of course ETU411. The list given below is just a guideline.

List:

Group A:

1. Measurement of op-amp parameters (IC 741).
2. Design and implement non-inverting amplifier and voltage follower using op-amp.
3. Design and implement inverting amplifier and differential amplifier using op-amp.
4. Design and implement an integrator and differentiator using op-amp.
5. Design and implement MMV / AMV using IC 741
6. Implement Schmitt trigger using IC 741 and calculate LTP and UTP.
7. Design and implement BMV using timer IC 555 and measure voltage and current levels at stable state of BMV
8. Design and implement MMV / AMV using timer IC555.
9. Design and implement voltage regulator using IC723

Group B:

10. Study and verification of truth tables of basic/ derived/ universal logic gates.
11. Design and implementation of adders and subtractors using logic gates.
12. Design and implementation of binary-to-gray / gray-to-binary decoder using logic gates.
13. Design and implementation of 4-bit binary adder/subtractor and BCD adder using IC 7483.
14. Design and implementation of 2-bit magnitude comparator using logic gates, 8-bit magnitude comparator using IC 7485.
15. Design and implementation of 16-bit odd/even parity checker/ generator using IC 74180.
16. Design and implementation of encoder and decoder using logic gates and study of IC 7445 and IC 74147.
17. Study and verification of truth tables of flip-flop ICs.
18. Construction and verification of 4-bit ripple counter and Mod-10/Mod-12 ripple counter.
19. Design and implementation of 3-bit synchronous up/down counter.
20. Implementation of SISO, SIPO, PISO and PIPO shift registers using flip-flops.

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

ITU403 DATA COMMUNICATION LAB

Teaching Scheme : 02 P **Total 02**
Evaluation Scheme: 25 ICA + 25 ESE
Duration of ESE : 3Hrs.

Credit : 01
Total Marks: 50

Minimum eight experiments shall be performed to cover entire curriculum of ITU402 and the list given is just a guideline.

1. Asynchronous protocol

2. Synchronous protocol
3. Character oriented protocol
4. Bit Oriented protocols
5. Link access procedures
6. Packet switching
7. Message switching
8. Integrated services digital networks (ISDN)
9. Routing algorithms

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

CSU406 LINUX ADMINISTRATION LAB-II

Teaching Scheme	: 02 P	Total 02	Credit	: 01
Evaluation Scheme:	25 ICA + 25 ESE		Total Marks:	50
Duration of ESE :	3Hrs.			

Minimum eight experiments shall be performed .The sample list of program is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same .Aim of the list is to inform about minimum expected outcomes

1. Working of UNIX / Linux environment
2. Introduction to process
3. Writing a script with different flow control statement
4. System tool Installation
5. Introduction to different types of shells (sh, ksh, bash, sh, csh, tcsh) .
6. Linux user Quotas
7. Creating a new partition in Linux
8. Creating Logical volume manager in Linux (extend /reduce)

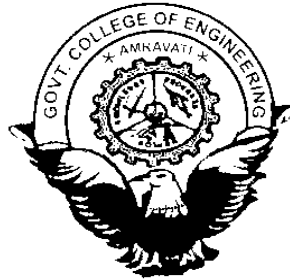
9. Basic networking in Linux

10. Loops Process fundamentals, Pipe (), Read (), Write () system calls, Fork () System call, lseek () System call.

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

GOVT. COLLEGE OF ENGINEERING, AMRAVATI



B. TECH. (Computer Science & Engineering) VII and VIII Semester CURRICULUM

**Department of Computer Science & Engineering
2009-10**

COMPUTER SCIENCE & ENGINEERING DEPARTMENT

SCHEME FOR B.Tech. Computer Science & Engineering

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
						Theory				Practical			
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	Internal	External		
Semester- I													
FE101	Engineering Mathematics-I	4	0	1	5	10	15	15	60	---	---	100	5
FE102	Applied Physics-I	2	-	1	3	4	8	8	30	---	---	50	3
FE103	Applied Chemistry-I	2	-	-	2	4	8	8	30	---	---	50	2
FE104	Computer Science	4	-	1	5	10	15	15	60	---	---	100	5
FE105	Engineering Mechanics	4	-	1	5	10	15	15	60	---	---	100	5
FE106	Workshop Practice-I	-	2	-	2	-	-	-	-	25	25	50	1
FE107	Applied Physics-I Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE108	Applied Chemistry-I Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE109	Computer Science Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE110	Engineering Mechanics Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE111	EVS I	2	-	-	2	-	-	-	-	-	-	-	-
	TOTAL	18	10	4	32	38	61	61	240	105	95	600	25
Semester- II													
FE201	Engineering Mathematics-II	4	0	1	5	10	15	15	60	---	---	100	5
FE202	Applied Physics-II	2	-	1	3	4	8	8	30	---	---	50	3
FE203	Applied Chemistry-II	2	-	-	2	4	8	8	30	---	---	50	2
FE204	Engineering Graphics	4	-	1	5	10	15	15	60	---	---	100	5
FE205	Electrical Engineering	4	-	1	5	10	15	15	60	---	---	100	5
FE206	Workshop Practice-II	-	2	-	2	-	-	-	-	25	25	50	1
FE207	Applied Physics-II Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE208	Applied Chemistry-II Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE209	Engineering Graphics Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE210	Electrical Engineering Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE211	EVS II	2	-	-	2	-	-	-	100	-	-	100	-
	TOTAL	18	10	4	32	38	61	61	340	105	95	700	25

Semester- III

CS301	Engineering Mathematics-III	4	1	---	5	10	15	15	60	---	---	100	5
CS302	Discrete Mathematics and Graph Theory	4	1	---	5	10	15	15	60	---	---	100	5
CS303	Programming Methodology	4	---	---	4	10	15	15	60	---	---	100	4
CS304	Electronic Devices and Circuits	4	---	---	4	10	15	15	60	---	---	100	4
CS305	Computer Organization and Architecture	4	---	---	4	10	15	15	60	---	---	100	4
CS306	Programming Methodology laboratory	---	---	2	2	---	---	---	---	25	25	50	1
CS307	Electronic Devices and Circuits laboratory	---	---	2	2	---	---	---	---	25	25	50	1
CS308	Computer Organization and Architecture laboratory	---	---	2	2	---	---	---	---	25	25	50	1
CS309	Computer laboratory-I	---	---	4	4	---	---	---	---	50	50	100	2
Total		20	2	10	32	50	75	75	300	125	125	750	27

Semester- IV

CS401	Data structure	5	--	--	5	10	15	15	60			100	5
CS402	Object Oriented Technology	4	--	--	4	10	15	15	60			100	4
CS403	Principle Of Management	4	--	--	4	10	15	15	60			100	4
CS404	Numerical Method and Computer Programming	4	1	--	5	10	15	15	60			100	4
CS405	Analog and Digital IC's	4	--	--	4	10	15	15	60			100	4
CS406	Data structure laboratory	--	--	2	2					25	25	50	1
CS407	Object Oriented Technology laboratory	--	--	2	2					25	25	50	1
CS408	Analog and Digital IC's laboratory	--	--	2	2					25	25	50	1
CS409	Computer laboratory-II	--	--	2	2					25	25	50	1
CS410	General Proficiency-I	--	--	2	2					50	--	50	2
Total		21	1	10	32	50	75	75	300	150	100	750	27

Semester- V

CS501	System Analysis and Design	4			4	10	15	15	60			100	4
CS502	Data Communication	4			4	10	15	15	60			100	4
CS503	Theory of Computation	4	1		5	10	15	15	60			100	5
CS504	Database Management System	4			4	10	15	15	60			100	4
CS505	System Software	4			4	10	15	15	60			100	4
CS506	System Analysis and Design laboratory			2	2					25	25	50	1
CS507	Data Communication laboratory			2	2					25	25	50	1
CS508	Database Management System laboratory			2	2					25	25	50	1
CS509	System Software laboratory			2	2					25	25	50	1
CS510	General Proficiency-II			2	2					25	25	50	2
Total		20	1	10	31	50	75	75	300	125	125	750	27

Semester-VI

CS601	Software Project Management	4			4	10	15	15	60	-	-	100	4
CS602	Computer Network	4	1		5	10	15	15	60	-	-	100	5
CS603	Design and Analysis of Algorithms	4			4	10	15	15	60	-	-	100	4
CS604	Switching Theory and Logic Design	4			4	10	15	15	60	-	-	100	4
CS605	Operating System Design	4	1		5	10	15	15	60	-	-	100	5
CS606	Design and Analysis of Algorithms laboratory			2	2					25	25	50	1
CS607	Switching Theory and Logic Design Laboratory			2	2					25	25	50	1
CS608	Operating System Design laboratory			2	2					25	25	50	1
CS609	Minor Project			2	2					50	50	100	2
Total		20	2	8	30	50	75	75	300	125	125	750	27

Semester- VII													
CS701	Computer Graphics	4			4	10	15	15	60			100	4
CS702	Microprocessor and Interfacing	4			4	10	15	15	60			100	4
CS703	Artificial Intelligence	4			4	10	15	15	60			100	4
CS704	Internet Technology	4			4	10	15	15	60			100	4
CS705	Elective –I	4			4	10	15	15	60			100	4
CS706	Computer Graphics laboratory			2	2					25	25	50	1
CS707	Microprocessor and Interfacing laboratory			2	2					25	25	50	1
CS708	Elective –I laboratory			2	2					25	25	50	1
CS709	Project and Seminar			6	6					50	50	100	4
Total		20		12	32	50	75	75	300	125	125	750	27
Semester- VIII													
CS801	Operation Research and Planning Management	4			4	10	15	15	60			100	4
CS802	Digital Signal Processing	4			4	10	15	15	60			100	4
CS803	Elective -II	4			4	10	15	15	60			100	4
CS804	Elective-III	4			4	10	15	15	60			100	4
CS805	Operation Research and Planning Management Laboratory			2	2					25	25	50	1
CS806	Digital Signal Processing laboratory			2	2					25	25	50	1
CS807	Elective –II laboratory			2	2					25	25	50	1
CS808	Project and Seminar			8	8					100	100	200	8
Total		16		14	30	40	60	60	240	175	175	750	27

TA :Teacher Assessment

CT: Class Tests

ESE: End Sem .Examination Duration of ESE: 2hrs.30min

**Elective I
(CS705)**

**Elective II
(CS803)**

**Elective
III(CS804)**

Advanced Computer Architecture
Multimedia Technology
Embedded System

Modeling and Simulation
Parallel Computing
Advanced Database Management System

Distributed Operating System s
Natural Language Processing
Robotics

CS701 COMPUTER GRAPHICS

Teaching Scheme : 04 L Total 04 Credits : 04
Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks :100
Duration of ESE: 2hrs.30min.

An Overview of Computer Graphics and Graphics System: Video display devices, Raster-Scan systems, Random-Scan systems, Graphics monitors and workstations, input devices, hard copy devices, Graphics software.

Output Primitives : Point and Lines, Line drawing algorithms, loading the frame buffer, line function, circle and ellipse generating algorithms, curves, parallel curves algorithms, Pixel addressing, filled-area primitives , functions, Cell array, character generation.

Attributes of output primitives: Line and curve attributes, color and grayscale levels, area fill attributes, Character attributes, and bundled attributes, anti aliasing.

2-D Geometric Transformations: Basic and composite transformations, matrix representations, transformations between coordinate systems, affine transformations, transformation functions, Raster methods for transformations.

Two-Dimensional viewing: viewing coordinates, Window-to-view port coordinate transformation, viewing functions. Clipping: point, line, polygon, curve, and text, exterior.

Structures And Hierarchical Modeling: Concepts, editing structures, basic modeling concepts, hierarchical modeling. GUI and interactive input methods: the user dialogue, input of graphical data, functions, initial values for input device parameters, interactive picture - construction techniques, virtual reality environments.

Three Dimensional Concepts: Display methods, graphics, Bezier curves and surfaces, B-spline curves and surfaces, Beta-splines. Three dimensional geometric and modeling transformations: translation, rotation, scaling. Three dimensional viewing: viewing pipeline, viewing coordinates, projections.

Text book :

1. Computer Graphics, D. Hearn, M.P.Baker, 2nd edition ,Pearson Education,1997.

References:

1. Computer Graphics Using Open GL, F.S.Hill: 2nd edition ,Pearson Education, 2001.
2. Principles of Interactive Computer Graphics, W.M.Newman & R.F.Sproul,2nd Edition, McGraw Hill, 1979.
5. Computer Graphics, Hamington, 2nd edition, (McGraw Hill).2001.

CS702 MICROPROCESSOR AND INTERFACING

Teaching Scheme : 04 L Total 04 Credits : 04
Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks :100
Duration of ESE: 2hrs.30min.

8086: Pin configuration, Physical memory organization, general bus organization, I/O Addressing, 8086 minimum mode system & timings, 8086 maximum mode system & Timings, Memory interfacing, DRAM Controller 8203.

I/O Interfacing: Methods of I/O interfacing. 8255 PPI: Pin configuration, internal organization, Modes of operation, interfacing with 8086.

Programmable Interrupt Controller 8259: Pin Configuration, various control & command words and internal organization, modes of operation, interfacing with 8086.

USART 8251: Pin configuration, internal organization, control word formats for synchronous & Asynchronous modes of operation.

DMA controller 8237: pin configuration, internal organization, modes of operation and 8237 interfacing with 8086.

ADC 0800 /0809: working, interfacing with 8086.

DAC 0800/0808: working, interfacing with 8086.

Programmable Timer/counter 8254: Pin configuration, internal organization, all the modes of Operation, 8254 interfacing with 8086.

Bus controller 8288: Architecture, operation and interfacing with 8086.

8289 bus arbiter: Architecture, operation and interfacing with 8086.

Coprocessor Configuration: Synchronization between 8086,Coprocessor Loosely coupled and closely coupled configuration, ESC prefixes, system bus mode, LOCK prefix, priority resolution, NDP architecture.

Protected mode operation: Introduction to protected mode operation, segmentation, segment descriptors, selectors, Protection, protecting segmented access, page level protection, TSS descriptors task switching, virtual 8086 mode.

Text Book:

1. Advanced Microprocessor and Peripherals, A.K.Ray and K.M.Bhurchandi,2nd edition, Tata McGraw-Hill publishing Company Limited,2000.
2. The Pentium Processor, James Antonokos, 2nd edition, Pearson Education,1995.

References Books:

1. Intel Microprocessors, Bray B, 4th Edition, PHI Publication, 1997.
2. Intel Processors: Programming, Interfacing & Applications, Walter A. Triebel, and Avtar Singh, 3rd Edition, Prentice-Hall Publication, 2000.
3. Microprocessors Systems: The 8086/8088 Family, Liu & Gibson,2nd Edition, Prentice-Hall Publication, 1986
4. 8086/8088 Families: Designing, Programming and Interfacing , John P Uffenbeck, 3rd Edition, Prentice-Hall Publication, 2001.

CS703 ARTIFICIAL INTELLIGENCE

Teaching Scheme : 04 L Total 04 Credits : 04
Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks :100
Duration of ESE: 2hrs.30min.

Introduction to Artificial Intelligence: Introduction, Intelligent Agents.

Problem-Solving: Solving Problems by Searching, Informed Search Methods, Game Playing.



Knowledge and Reasoning: Agents that reason logically, first order logic, building a knowledge base, inference in first order logic, logical reasoning systems.

Planning: Practical Planning, Planning and Acting.

Uncertain Knowledge and Reasoning: Uncertainty, Probabilistic Reasoning Systems, Making Simple Decisions, Making Complex Decisions.

Text Book:

1. Artificial Intelligence: A Modern Approach, S. Russel and P. Norvig, 2nd edition Pearson Education, Asia, 1995.

Reference Books :

1. Artificial Intelligence,P.H.Winston,2nd Edition ,Addison-Wesley Publication Company, 1984.
2. Introduction to Artificial Intelligence & Expert Systems, Dan W. Patterson,4th Edition, Prentice Hall Of India,1999
3. Artificial Intelligence: A New Synthesis: Nils J. Nilsson,1st edition, Morgan Kaufmann Publishers,1998.
4. Artificial Intelligence, E.Rich, K.K.Knight, 2nd edition, Tata McGraw Hill, New Delhi,1991.

CS704 INTERNET TECHNOLOGY

Teaching Scheme	: 04 L	Total	04	Credits	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 +10 TA+ 60 ESE	Total Marks	:100		
Duration of ESE:	2hrs.30min.				

Servlets in Java: Introduction, Servlet structure & lifecycle, Servlet API basics, various classes & interfaces, Servlet requirements & writing, Running and debugging of Servlets, Servlet Debug Class.

HTTP Redirects & Servlet API: Concepts of cookies, Servlets & cookies, State and session management with Servlet API, Server side includes and request forwarding, Servlet chaining, Jdbc Servlet.

Introduction to XML: Writing XML, creating a DTD, elements & attributes definitions, XML schema, Defining simple & complex types, Namespaces, schemas and validation.

Cascading Style Sheets (CSS) L & XML:Anatomy of a style, creating and calling stylesheets for an XML/HTML document, Layout with CSS, setting up various properties of elements using CSS, Formatting Text with CSS.

Introduction to JSP: Simple JSP & concepts, Request-time expressions, Concept of Beans, Bean instances & serialization.

Advanced JSPs: JSP tag library, Scripts, conditionals, loops, Try/Catch.

Beans & Scriptlets: Bean Scopes, Writing Beans, Jdbc & Beans, E-commerce concepts, Using Scopes from Servlets, Using Beans from servlets,JSP classes, JSPs and XML.

Text Book:

1. Professional JAVA Server Programming, Allamaraju & LongShaw, 2nd Edition, Wrox Publication, 2008.
2. Core Servlets & Java Server Pages, Hall & Brown, 2nd Edition, Prentice Hall, 2008.

Reference Books:

1. Web Technologies, Godbole & Kahate, 2nd Edition, Tata Mc-Graw Hill, 2008
2. Internet & world wide web, Deitel & Nieto, 1st Edition, Pearson Education Publication, 2000.

CS705 ELECTIVE - I

A) ADVANCED COMPUTER ARCHITECTURE

Teaching Scheme	: 04 L	Total 04	Credits : 04
Evaluation Scheme	: 15 CT1 + 15 CT2 +10 TA+ 60 ESE		Total Marks :100
Duration of ESE:	2hrs.30min.		

Fundamentals: Technology & Computer usage trends, costs, Performance measurements, Quantitative principles of Computer design, Concepts of memory hierarchy, Instruction set architectures, Memory addressing, Operations in the instruction set, Encoding, Role of compilers, DLX architecture.

Pipelining: Basic principles & DLX. Various hazards: Pipelines, data, control hazards, Implementation issues, Multicycle operations, Crosscutting issues, Instruction set design and pipelining, MIPS R4000 pipeline architecture.

Advanced Pipeline And Instruction-Level Parallelism: Concepts & challenges, Data hazards & dynamic scheduling, Dynamic Hardware prediction, Compiler support for ILP, Hardware support for parallelism, Studies of ILP, Power PC620.

Memory-Hierarchy Design: Basics of caches, reducing cache miss & hit time, Main memory, Virtual memory, Protections Examples of virtual memory, Issues in the design of memory hierarchies, Alpha APX 21064 Memory hierarchy.

Interconnection Networks: Introduction & basic concepts, Computer connection to interconnection network, Interconnection network media, Practical issues, Examples of interconnection networks, Issues for interconnection networks, Internet working, An ATM network of workstation.

Text Book :

1. Computer Architecture : A Quantitative Approach, Hennessy J.L. & Patterson D, 4th Edition, Harcourt Asia, 2007.

Reference Book:

1. Advanced Computer Architecture & Parallel Programming, Hwang K, 3rd Edition, McGraw Hill, 1998.

2.Computer Organization,Hamacher V.C,5th Edition,McGraw Hill,2001.

CS705 ELECTIVE - I

B) MULTIMEDIA TECHNOLOGY

Teaching Scheme : 04 L Total 04 Credits : 04
Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks: 100
Duration of ESE: 2hrs.30min.

Introduction: Multimedia basic concepts, Multimedia building blocks, multimedia applications design considerations, goals and objectives, architectural support for multimedia processing. Multimedia Authoring Fundamentals: authoring fundamentals, card/page based, time based, icon based, theatrical-frame based and object based authoring, interactive multimedia software authoring basics.

Multimedia audio: Basic sound concepts, audio capture, sound processor, VOC, WAV file format for sound, MIDI standard. Basic audio compression technique: ADPCM in speech coding, MPEG audio compression Technique MP3 encoder and decoder.

Image and Video technology: Representation of image in digital format, BMP, TIFF file formats, Video technology, Video capture, Video processing, AVI file formats, NTSC, PAL, SECAM,television standards, HDTV, Video streaming.

Image compression techniques: Huffman coding, LZW, DCT, Run Length Coding, JPEG, JPEG 2000, Basic Video Compression Technique.

Video Compensation based on motion compensation: H.261, H.263, MPEG video coding, MPEG1,MPEG4 and MPEG7,Augmented and virtual reality Concept,VR devices: Hand gloves, head mounted tracking system, VR chair, CCD, VCR, 3D sound system, Head mounted displays and rendering software setup, Virtual objects, VRML.

Multimedia devices: Mass storage system for multimedia- requirements, Magnetic devices, Optical devices, CDROM.DVD Scanners: Types and classification.

Multimedia operating system and networking,OS support for continuous media applications, file systems and process management, multi media database management system, characteristics of multimedia database management system, system support, Distributed multimedia database management, Multimedia networking and multimedia communication systems, networking requirements, key technologies used for multimedia communication, traffic attributes, QoS.

Windows support to multimedia: Function Calls API, Support for WINDOWS.

Text books:

1. Multimedia: Computing, Communication and Applications, Ralf Steinmetz, Klara Nahrstedt, 2nd Edition, Prentice Hall,1995.
- 2.Fundamentals of Multimedia, Ze nian Li, Marks S. Drew, 1st Edition, Pearson Education,2004.

Reference Books:

1. Virtual Reality and Multimedia, Durano R. Begault, 1st Edition,AP Professionals, 2002.

2. VRML Programmer's Library, Kris Jama, Phil Schmauder, Nelson Yee,
1st Edition, Galgotia Publication, 1997.

CS705 ELECTIVE - I
C) EMBEDDED SYSTEMS

Teaching Scheme : 04 L Total 04 Credits : 04
Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks :100
Duration of ESE: 2hrs.30min.

Introduction to embedded systems, Processor in the system, Hardware units required in the exemplary cases, Software embedded into a system, Final Machine implementable software for a product, Software in Processor specific assembly language and high level language, Device drivers, device management using an operating systems, Software design for scheduling multiple tasks and devices using RTOS, Embedded SoC and in VLSI circuits.

Structural units of the processor, Allocation of memory to program segment and blocks, memory map of the system, Memory blocks for different data sets and structures, Virtual Devices, Device drivers for parallel port, serial and timing devices, Context and periods for context switching, deadline and interrupt latency.

Embedded programming in assembly language and C: Function pointers, Function queues and ISR queues, Queues for implementing protocol for a network, Queuing of functions on interrupts, Use of FIFO queues, Stacks, Lists and Ordered Lists.

Modeling process: Use of dataflow & control data flow graphs, Programming model for event controlled or response time constraint, Real time programs, Inter process Communication and Synchronization, Multiple processes in an application, Sharing data by multiple tasks, use of finite states machine model & Petri net Model,

Use of Semaphores for a task or for Critical section of code, Mutex and P & V, Priority inversion problems & deadlock situations IPC issues, Use of Semaphore flags or Mutex as resource key, use of message queues, mailboxes, pipes, virtual sockets, RPCs.

Introduction to RTOS: RTOS Services, Schedule management for multiple tasks in Real Time, Handling of interrupt source call, RTOS task scheduling models, Cooperative Round Robin Scheduling using a Circular Queue of ready tasks and using ordered list as per precedence constraints, cycling scheduling in Time Sharing, fixed Real Time scheduling, Precedence assignment in Scheduling algorithms, fifteen-point strategy for Synchronization, Embedded Linux Kernel.

Text Book:

1. Embedded Systems, Architecture, Programming & Design ,Rajkamal, 1st edition, Tata McGraw Hill, 2003

Reference Books:

1. Real Time Systems, Jane W. S. Liu, 3rd Pearson Education, 2004
2. Embedded System Design: A Unified Hardware/Software Introduction, Frank Vahid, Tony Givargis, 1st Edition, John Wiley & Sons publication, 2002.

CS 706 COMPUTER GRAPHICS LABORATORY

Teaching Scheme : 02 P Total 02 Credit : 01
Evaluation Scheme : 25 Internal + 25 External Total Marks : 50

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Program to draw line using DDA algorithm for all quadrants.
2. Program to draw line using Bresenham's algorithm for all quadrants..
3. Program to draw a Circle drawing using DDA and Bresenham algorithms.
4. Program for Polygon Filling using Flood and Boundary fill algorithm.
5. Procedure to rotate a wheel.
6. Implement 2D transformations with translation, rotation, reflection, shearing and scaling.
7. Program for Line clipping using Cohen-Sutherland algorithm.
8. Program for Polygon clipping.
9. Construct Bezier curves and Spline curves with 6 or more control points entered through mouse.
10. Animation using Segmentation.

CS707 MICROPROCESSOR AND INTERFACING LABORATORY

Teaching Scheme : 02 P Total 02 Credit : 01
Evaluation Scheme : 25 Internal + 25 External Total Marks : 50

Minimum Eight Experiments On Following Topics:

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. 8086 minimum mode and maximum mode.
2. Methods of I/O interfacing.
3. 8255 interfacing with 8086.
4. 8251 interfacing with 8086.
5. 8237 interfacing with 8086.
6. 8254 interfacing with 8086.

6. Create dynamic layers with interactive image rollovers using Adobe Dream weaver CS3.
7. Link two different pages from the same image using image maps in Adobe Dream Weaver CS3.
8. Create Powerful Motion with Simple Expressions in AE using Adobe after Effect.
9. Change one object into another using Adobe Flash CS3 Professional.
10. Move objects along a Path using Adobe Flash CS3 Professional.

CS708 ELECTIVE - I

C) EMBEDDED SYSTEM LABORATORY

Teaching Scheme : 02 P Total 02 Credit : 01
Evaluation Scheme : 25 Internal + 25 External Total Marks : 50

Minimum Eight Experiments to be performed on following topics.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. NIOS II System and SDRAM Interface
2. Instantiation of the expanded NIOS II System
3. Study of Development Education Board
4. A Simple Computer System
5. Program Controlled Input Output
6. Subroutines and Stacks
7. Polling and Interrupts
8. Bus Communication

CS709 PROJECT AND SEMINAR

Teaching Scheme : 06 P Total 06 Credit : 04
Evaluation Scheme : 50 Internal + 50 External Total Marks : 100

100 marks divided in two parts, 50 marks for Seminar and 50 marks for project work

A. Seminar :

1. Student shall select a topic for seminar which is not covered in curriculum. Student shall complete the conceptual study of the selected topic and expected to know functional and technical details of selected topic
2. Before end of semester students shall deliver a seminar and submit seminar report in proper format consisting of
 - Literature survey
 - Concept
 - Functional and Technical detail
 - Present status
 - Future scope

- Application
 - Comparison with similar technique
 - References
3. Student shall deliver a seminar on report submitted which shall be assessed by two examiner (one should be guide) appointed by HOD

B. Project :

1. Students have to complete project work in VIIth and VIIIth semester. In general a group of 4 -5 student should be allowed to complete one project
2. In VIIth semester student shall complete literature survey and finalized the topic for project. They shall submit synopsis on the selected topic to HOD. On approval of project topic , they shall complete the design work and procure the required components.
3. Before the end of the semester student shall submit one copy of progress report in proper format covering the total work completed by the group
4. There shall be oral exam based on report submitted by student. The oral examination shall be conducted by two examiner (one should be guide) appointed by HOD

CS801 OPERATION RESEARCH AND PLANNING MANAGEMENT

Teaching Scheme : 04 L Total 04 Credits : 04
Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks :100
Duration of ESE: 2hrs.30min.

Operation Research (OR) modeling approach: Problem identification, modeling, finding solution, testing etc., scope and limitations of OR.

Linear Programming (LP): Assumption and formulation of LP model, solution by graphical method, simplex and two phase simplex method, use of Excel to solve LP model, dual simplex method and sensitivity analysis, transportation and assignment models.

Project Management: CPM and PERT, finding critical path, time-cost trade off, Resource smoothing and resource leveling.

Dynamic Programming: Introduction and characteristics, recursion in dynamic programming, investment problem, production scheduling problem, stage coach problem, equipment replacement, budget allocation problem, shortest route models and cargo loading.

Non-Linear Programming: Introduction, types, constrained and unconstrained optimization method, one variable and multivariable, steepest descent method, quadratic programming.

Decision Theory and Game Theory: Introduction, minmax decision procedure, Bays decision procedure with and without data, regret function versus loss function, minmax and maxmin strategies, expected payoffs, solution of $m \times n$ games, Brown algorithm.



Machine Sequencing Problems: n jobs through two machines, n jobs through three machines, n jobs through m machines, two jobs through m machines sequencing problem.

Text Books

1. Introduction to Operation Research, B. E. Gillet, 1st Edition, McGraw-Hill, 1996.
2. Introduction to Operation Research, Concepts and Cases, Hillier and Liberman, 8th Edition, McGraw-Hill, 2004.

Reference Books

1. Operation Research, Tiwari and Shandilya, 1st Edition, Prentice Hall of India, 2006.
2. Introduction to Optimization, S. S. Rao, 3rd Edition, Prentice Hall of India, 2005.
3. Computer Aided Project Management, P. B. Mahapatra, 2nd Edition, Prentice Hall of India, 2004.
4. Operation Research, Natrajan, 8th Edition, Balsubramani, Pearson Education, 2008.

CS802 DIGITAL SIGNAL PROCESSING

Teaching Scheme	: 04 L	Total 04	Credits	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE			Total Marks : 100
Duration of ESE: 2hrs.30min.				

Discrete Time Signals: Introduction to DSP, Advantages, basic elements of DSP system, Elementary discrete-time sequences.

Discrete Time Systems: Description, representation, classification (linear versus non linear, time-invariant versus time variant, static versus dynamic, casual versus non casual , stable versus unstable)

LTI systems: The convolution sum, properties of convolution, Analysis of causal LTI systems, stability of LTI systems, step response of LTI systems, difference equation, solution of difference equations, Impulse response of LTI recursive system, Correlation of discrete time signals and types.

Fourier Transforms: Definition & properties of Fourier transform, Finite duration sequences and the discrete Fourier transform (DFT), properties, circular convolution, Fast algorithms for the computation of DFT: radix-2 algorithms, Bit Reversal Algorithm.

Z- Transform: Definition of Z- Transform, properties, rational Z-Transforms, evaluation of the inverse Z- Transforms, analysis of linear time invariant systems in Z-domain, transient and steady-state responses, causality, stability, pole-zero cancellation, relation with Fourier transform.

Digital Filters: Classification (LP, HP, BP, FIR and IIR filters), filter specifications, Impulse invariant transformation and bilinear transformation, Commonly used Analog filters and IIR Filter design example, Structures for realization of Discrete-Time systems.

Realization of FIR and IIR Systems: Direct Form, Cascade Form, Signal flow graph and Transposed structures, Cascade form, Lattice and Lattice-ladder.

Text Book:

1. Digital Signal Processing: Principles Algorithms and Applications ,J G Prokis and D G Manolokis, 3rd Edition, Pearson Education Pvt .Ltd, 1996

Reference Books:

1. Digital Signal Processing: A Computer-Based Approach by S K Mitra, 3rd Edition Tata McGraw Hill Publish Co. Ltd., 2001.
2. Digital Signal Processing a Practical Approach, E C Ifeachor and B W Jervis ,1st Edition, Pearson Education, 2002.
3. Discrete Time Signal Processing, A V Oppenheim, R W Schafer with J RBuck, 2nd Edition (PHI), 2005.

CS 803 ELECTIVE - II

A) MODELING AND SIMULATION

Teaching Scheme: 04 L

Total 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

System Models and System studies: Basic concepts of systems and system modeling, static and dynamic, physical and mathematical models, principles used in modeling. Corporate models: analysis, design and postulation of system.

Basic Concepts and continuous system: Techniques used, distributed log models and cobweb models, continuous system Model, Analytical equations and methods of obtaining solutions, analog, hybrid computers and simulations, CSSLS examples of different continuous system, System dynamics, probability concepts and basic principles of discrete simulation, Growth and decay models, and system dynamics diagrams, stochastic Process, probability functions and their evaluation, random number generation, rejection method, comparison of Monte-Carlo method and stochastic simulation-examples.

Simulation of Queuing System and PERT Network: Simulation of Queuing system, Rudiments of queuing theory, simulation of a single server queue, simulation of a two server queue, simulation of more general queues.

Simulation of a PERT Network: Network model of a project, Analysis of an activity network, critical path, Simulation of Inventory Control & Forecasting.

Simulation Experiments Inventory Control and Forecasting: Elements of inventory theory, more Complex inventory models, simulation example-1, Generation of Poison and Erlanger variates, Simulation example-2, Forecasting and regression Analysis. Design and Evaluation of simulation Experiments: Length of Simulation runs, variance reduction techniques, Experimental layout, Validation, summary and conclusion.

Simulation of Languages and Introduction to GPSS: Different special purpose languages used for continuous and discrete systems and comparison, factors affecting the selection of discrete system, simulation languages-comparison of GPSS and SIMSCRIPT, detailed study of GPSS with examples.

Text Books:

1. System Simulation, Groffrey Gordon,2nd Edition, PHI Pvt.Ltd., New Delhi- 1987.

2. System Simulation with Digital Computers, Narsingh Deo, 1st edition PHI Pvt.Ltd., New Delhi, 2005.

Reference Books:

1. System Simulation: The Art of Science, Shannon R.E., 1st edition, Prentice Hall, Englewood Cliffs, NY, 1975.
2. Computer Simulation, Hugh J. Weston, John H. Blackstone, Jr., 2nd Edition, John Wiley & Sons, 2000.

CS803 ELECTIVE - II

B) PARALLEL COMPUTING

Teaching Scheme : 04 L Total 04 Credits : 04
Evaluation Scheme : 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks : 100
Duration of ESE: 2hrs.30min.

Scalability and Clustering: Evolution of Computer Architecture, Dimensions of Scalability, Parallel Computer Models, Basic Concepts Of Clustering, Scalable Design Principles, Parallel Programming Overview, Processes, Tasks and Threads, Parallelism Issues, Interaction / Communication Issues, Semantic Issues in Parallel Programs.

Enabling Technologies: System Development Trends, Principles of Processor Design, Microprocessor Architecture Families, Hierarchical Memory Technology, Cache Coherence Protocols, Shared Memory Consistency, Distributed Cache Memory Architecture, Latency Tolerance Techniques, Multithreaded Latency Hiding.

System Interconnects: Basics of Interconnection Networks, Network Topologies and Properties, Buses, Crossbar and Multistage Switches, Software Multithreading, Synchronization mechanisms.

Parallel Programming: Paradigms and Programmability, Parallel Programming Models, Shared Memory Programming.

Message Passing Programming: Message Passing Paradigm, Message Passing Interface, Parallel Virtual Machine.

Text Book:

1. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, 2nd Edition, Addison Wesley, 2003.

Reference Books:

1. The Sourcebook of Parallel Computing, Jack Dongarra, Geoffrey Fox, Ken Kennedy, Linda Torczon, William Gropp, 1st Edition, Berkeley Publication, 2003.
2. Introduction to Parallel Algorithms and Architectures: Arrays, Trees, Hypercubes, F. T. Leighton, 1st Edition, Morgan Kaufmann Publishers, CA 1992.
3. Analysis and Design of Parallel Algorithms, Laxmivarahn and Dahl, 1st Edition, McGraw Hill. 1990

CS 803 ELECTIVE - II

C) ADVANCED DATABASE MANAGEMENT SYSTEM

Teaching Scheme: 04 L **Total 04** **Credits: 04**
Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**
Duration of ESE: 2hrs.30min.

SQL: Use Of SQL, DDL Statements, DML Statements, View Definitions, Constraints, Triggers Keys and Foreign Keys, Constraints on Attributes and Tuples, Modification of Constraints Cursors, Dynamic SQL.

Query Execution: Introduction to Physical-Query-Plan Operators, One-Pass and Two-pass algorithms, Nested-Loop Joins, Index-Based Algorithms, Buffer Management, Parallel Algorithms for Relational Operations, Using Heuristics in Query Optimization, Basic Algorithms for Executing Query Operations.

Query Compiler: Parsing, Algebraic Laws for Improving Query Plans, From Parse Trees to Logical Query Plans, Estimating the Cost of Operations, Cost-Based Plan Selection, Completing the Physical-Query-Plan, Coping With System Failures, Issues and Models for Resilient Operation, Redo Logging, Undo/Redo Logging, Protecting Against Media Failures.

Concurrency Control: Serializability, Enforcing Serializability by Locks, Locking Systems With Several Lock Modes, Architecture for a Locking Scheduler Managing Hierarchies of Database Elements, Concurrency Control.

Transaction Management: Introduction of Transaction management, Serializability and Recoverability, View Serializability, Resolving Deadlocks, Distributed Databases, Distributed Commit, Distributed Locking.

Database System Architecture: Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Network Types.

Distributed Database: Homogeneous And Heterogeneous Database, Distributed Data Storage, Distributed Transaction, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Heterogeneous.

Text Books:

- 1) Database Management Systems, Raghu Ramakrishnan/Johannes Gehrke, 3rd edition, Tata Mc Graw Hill, 2007.

Reference Books:

- 2) Database System Concepts, Silber Schatz. Korth, 3rd edition, Tata Mc Graw Hill, 1997.
- 3) Fundamental of DataBase System, ShamKanth B. Navathe, 5th Edition, Pearson Education, 2006.

CS 804 ELECTIVE - III

A) DISTRIBUTED OPERATING SYSTEM

Teaching Scheme: 04 L **Total 04** **Credits: 04**
Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**
Duration of ESE: 2hrs.30min.

Introduction: Characteristics of Distributed Systems, Applications. Challenges Models: Architectural Models, Fundamental Models, Interaction Model, Failure Model and Security Model.

Programming in Distributed Systems: Sockets and socket programming, RPC, Distributed Objects, Event Notification.

Distributed File Systems: Design Issues and Case Studies of NFS, AFS, RFS.

Timing Issues: Clock Synchronization, Lamport's Logical Clocks, Vector Clocks, Ordered Broadcast, Global State Collection, and Termination Detection.

Coordination and Agreement: Leader Election, Distributed Mutual Exclusion, Byzantine Agreement Problem.

Distributed Deadlock Detection: Edge Chasing, Diffusion Computation and Hierarchical Algorithms.

Recovery: Synchronous and Asynchronous Check pointing and Recovery.

Fault Tolerance: Commit protocols, Voting techniques, static and dynamic voting protocols.

Text Book:

1. Advanced Concepts in Operating Systems – M. Singhal and N. Shivaratri, 1st Edition, Tata McGraw Hill Publications, 1994.

Reference Books:

1. Distributed Systems – Concepts and Design, Coulouoris, Dollimore and Kindberg, 4th Edition, Pearson Education Asia, 2004.
2. Distributed Systems – A.S. Tanenbaum, 2nd Edition. Pearson Education Asia, 2002.

CS 804 ELECTIVE - III

B) NATURAL LANGUAGE PROCESSING

Teaching Scheme: 04 L **Total 04** **Credits: 04**
Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**
Duration of ESE: 2hrs.30min.



Introduction: Brief history of NLP research, current applications, generic NLP system architecture, knowledge-based versus probabilistic approaches.

Finite-state techniques: Inflectional and derivational morphology, finite-state automata in NLP, finite-state transducers.

Prediction And Part-Of-Speech Tagging: Corpora, simple N-grams, word prediction, stochastic tagging, evaluating system performance.

Parsing and generation: Generative grammar, context-free grammars, parsing and generation with context-free grammars, weights and probabilities.

Parsing with constraint-based grammars: Constraint-based grammar, unification.

Compositional and lexical semantics: Simple compositional semantics in constraint-based grammar, Semantic relations, Word Net, word senses, word sense disambiguation.

Discourse and dialogue: Anaphora resolution, discourse relations.

Applications: Machine translation, email response, spoken dialogue systems.

Text Book:

- 1) *Speech and language processing*, Jurafsky, D. & Martin, J. , 2nd Edition, Prentice Hall, 2000.

Reference Book:

- 1) *Foundations of Statistical Natural Language Processing*, Christopher D. Manning and Hinrich Schutze, 2nd edition, IT Press, 1999.

CS 804 ELECTIVE - III C) ROBOTICS

Teaching Scheme: 04 L

Total 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Robot Fundamentals: Definitions, History of robots, present and future trends in robotics, Robot classifications, Robot configurations, Point to Point robots, Continuous Path robots, Work volume, Issues in design and controlling robots Repeatability, Control resolution, spatial resolution, Precision, Accuracy, Robot configurations, Point to Point robots, Continuous Path robots, Work volume, Applications of robots. Drives used in robots: Hydraulic, Pneumatic and Electric drives, Comparison of drive systems and their relative merits and demerits.

Manipulator Kinematics: Matrix Algebra, Inverse of matrices, rotational groups, matrix representations of coordinate transformation, transformation about reference frame and moving frame Forward & Inverse Kinematics examples of 2R, 3R & 3P manipulators, Specifying position and orientation of rigid bodies, Euler's angle and fixed rotation for specifying position and orientation, Homogeneous coordinate transformation and examples, D-H representation of kinematics linkages, Forward kinematics of 6R manipulators using D-H representations, Inverse kinematics of 6R manipulators using D-H representations, Inverse Kinematics geometric and algebraic methods.

Robotics Dynamics : Velocity Kinematics, Acceleration of rigid body, mass distribution Newton's equation, Euler's equation, Iterative Newton –Euler's dynamic formulation,

closed dynamic, Lagrangian formulation of manipulator dynamics, dynamic simulation, computational consideration.

Trajectory planning: Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, path generation in runtime, planning path using dynamic model point to point and continuous trajectory, 4-3-4 & trapezoidal velocity strategy for robots.

Robot Sensors: Internal and external sensors, position- potentiometric, optical sensors, encoders - absolute, incremental, touch and slip sensors velocity and acceleration sensors, proximity sensors, force & torque sensors, laser range finder, camera, Micro-controllers, DSP, centralized controllers, real time operating systems.

Robot Controllers: Essential components-Drive for Hydraulic and Pneumatic actuators, H-bridge drives for DC motor Overload over current and stall detection methods, example of a micro-controller/ microprocessor based robot Controller.

Robot Programming languages: Introduction the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

TextBook:

- 1) Robotics Technology and Flexible Automation, S.R.Deb, 1st edition, Tata Mc Graw Hill, 1994.
- 2) Industrial Robotics (Technology, Programming and applications), M.P.Groover, M. Weiss R.N. Nagel, N.G. Odrey, 1st edition, McGraw, Hill 1996

Reference Book:

- 1) Robotics : Control, sensors, vision and intelligence, K.S.Fu, R.C.Gonzalez and C.S.G.Lee, 1st edition, McGraw-Hill, 1987.
- 2) Introduction to Robotics, J.J.Craig, 2nd edition, Addison-wesely 1989.

CS805 OPERATION RESEARCH AND PLANNING MANAGEMENT LABORATORY

Teaching Scheme : 02 P	Total 02	Credit : 01
Evaluation Scheme : 25 Internal + 25 External		Total Marks : 50

Minimum eight programs shall be performed from the list given below.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Two Machine sequencing.
2. Three machine sequencing.
3. Travelling salesman problem.
4. Investment problem.
5. Linear programming.
6. Dual simplex.
7. Two phase simplex.



8. Transportation problem.
9. Critical path method/ programme evaluation review technique.
10. Inventory model (deterministic/probabilistic).

Note: Practical may be performed with any computer programming language, following languages/ packages are suggested MATLAB/C/C++.

CS806 DIGITAL SIGNAL PROCESSING LABORATORY

Teaching Scheme	: 02 P	Total 02	Credit	: 01
Evaluation Scheme	: 25 Internal + 25 External		Total Marks	: 50

Minimum Ten Experiments to be performed on following topics.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Operation on Sinusoidal Sequence.
2. Operation on DTS.
3. Scaling Operation on DTS.
4. Shifting Operation on DTS.
5. Folding Operation on DTS.
6. Linear Convolution.
7. DFT Computation.
8. Magnitude and Phase Spectrum.
9. Poles and Zero's of Z Transform.
10. FFT Computation.

CS 807 ELECTIVE - II

A) MODELING AND SIMULATION LABORATORY

Teaching Scheme	: 02 P	Total 02	Credit	: 01
Evaluation Scheme	: 25 Internal + 25 External		Total Marks	: 50

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

- 1) simulation of dynamics of continuous systems.
- 2) Simulation of discrete systems.
- 3) Evaluation of random number generation-rejection method.
- 4) Monte Carlo simulation.
- 5) Implementation of stochastic simulation algorithm.

- 6) Simulation of Queuing System and PERT Network.
- 7) Simulation of a two server queue.
- 8) Simulation of Inventory Control & Forecasting.
- 9) Simulation of Languages and Introduction to GPSS.
- 10) Evaluation and improvement of variance reduction in Monte-Carlo production simulation.

CS807 ELECTIVE - II

B) PARALLEL COMPUTING LABORATORY

Teaching Scheme : 02 P Total 02 Credit : 01
Evaluation Scheme : 25 Internal + 25 External Total Marks : 50

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

The following programs should be developed in 'C' language preferably on 'UNIX' platform.

Programs (3-7) require usage of Parallel Computing APIs.

1. Implement three POSIX Threads (PThreads) simultaneously for updating a text file.
2. Implement synchronizing POSIX Threads (PThreads) using (a) Semaphore (b)Mutex.
3. Implement the PRAM Algorithm for (a) Parallel Reduction (b) Prefix Sums (c) Preorder Tree Traversal.
4. Implement Parallel Matrix Multiplication using (a) Row-Column oriented Algorithm (b) Block-Oriented Algorithm.
5. Implement Solution of Linear Systems using (a) Gaussian Elimination (b) Jacobi Algorithm.
6. Implement (a) Parallel Quick Sort (b) Hyper Quicksort.
7. Implement Parallel Fast Fourier Transform Algorithm.

CS807 ELECTIVE - II

C) ADVANCED DATABASE MANAGEMENT SYSTEM LABORATORY

Teaching Scheme : 02 P Total 02 Credit : 01
Evaluation Scheme: 25 Internal + 25 External Total Marks : 50

Minimum Twelve Experiments to be performed from following List of Experiment.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Login in to your own accounts



2. Execute: `select table_name from user_tables;` (to list the tables which are in your account).
3. Execute: `select table_name from all_tables;` (to list the tables to which you have access to).
4. Display the system date. Note the format in which it is displayed.
5. Display the date in Month/Day/YYYY format.
6. Load the above script (downloaded in 5th task) into your account and execute it.
7. Execute: `select table_name from user_tables;`
8. Enter one complete record into the LOCATION table.
9. Enter another record into the LOCATION table, but the value for one of the fields should be null.
10. Enter a record for three columns into FACULTY table, but this entry should be of the primary key, first and last name.
11. Enter one complete record into the COURSE table.
12. List all the entries of the COURSE table.
13. Commit your entries for the COURSE table.
14. Enter another complete record into the COURSE table.
15. List all the entries of the COURSE table.
16. Roll back your entries for the COURSE table.
17. List all the entries of the COURSE table. Check for the difference in this listing than that of the listing done in 11th task.
18. Load the above script (downloaded in 16th task) into your account and execute it.
19. Execute: `select table_name from user_tables;`
20. List all the information of the student called Tammy Jones.
21. List only those students which are not in senior class (SR) but students from every other class.
22. List student id, student's full name (concatenate first and last name and display heading as STUDENT'S NAME) along with the similar details of advisor. Advisor's first and last name should be concatenated and displayed as ADVISOR'S NAME.
23. List those students whose first name begins with 'J'.
24. List those students whose last name ends with 'N' or the second last letter is 'T' in their last name.
25. List those faculty members who have 'L' as the third last letter in their last name.
26. List the students in order of their zip codes.
27. List only those students who are staying beyond zip code 32500.
28. Count the total number of students who are staying within zip code 32500.
29. List only those students whose birthday falls in the months August or November.

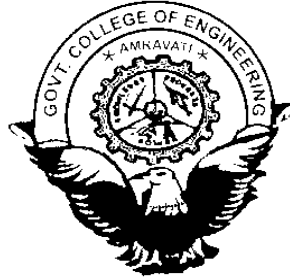
CS808 PROJECT AND SEMINAR

Teaching Scheme	: 08 P	Total 08	Credit	: 08
Evaluation Scheme:	100 Internal	+ 100 External	Total Marks	: 200



1. In continuation with the work completed in VIIth semester, student shall complete the implementation of ideas given in synopsis, so that working model of project shall be complete before the end of semester.
2. Students shall submit final project report in proper format which shall include the work completed in VIIth semester also.
3. HOD shall design an evaluation system to evaluate the progress of project work.
4. Final examination of project shall include demonstration of working model, presentation by student and oral examination based on total project work. Project work shall be accessed by guide and one external examiner.

GOVT. COLLEGE OF ENGINEERING, AMRAVATI



B. TECH. (Computer Science & Engineering) III and IV Semester CURRICULUM

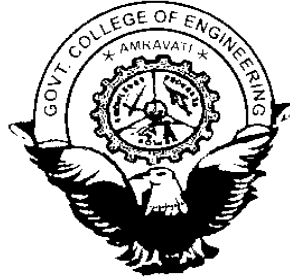
**Department of Computer Science & Engineering
2009-10**

COMPUTER SCIENCE & ENGINEERING DEPARTMENT

SCHEME FOR B.Tech. Computer Science & Engineering

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
						Theory				Practical			
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	Internal	External		
Semester- I													
FE101	Engineering Mathematics-I	4	0	1	5	10	15	15	60	---	---	100	5
FE102	Applied Physics-I	2	-	1	3	4	8	8	30	---	---	50	3
FE103	Applied Chemistry-I	2	-	-	2	4	8	8	30	---	---	50	2
FE104	Computer Science	4	-	1	5	10	15	15	60	---	---	100	5
FE105	Engineering Mechanics	4	-	1	5	10	15	15	60	---	---	100	5
FE106	Workshop Practice-I	-	2	-	2	-	-	-	-	25	25	50	1
FE107	Applied Physics-I Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE108	Applied Chemistry-I Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE109	Computer Science Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE110	Engineering Mechanics Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE111	EVS I	2	-	-	2	-	-	-	-	-	-	-	-
	TOTAL	18	10	4	32	38	61	61	240	105	95	600	25
Semester- II													
FE201	Engineering Mathematics-II	4	0	1	5	10	15	15	60	---	---	100	5
FE202	Applied Physics-II	2	-	1	3	4	8	8	30	---	---	50	3
FE203	Applied Chemistry-II	2	-	-	2	4	8	8	30	---	---	50	2
FE204	Engineering Graphics	4	-	1	5	10	15	15	60	---	---	100	5
FE205	Electrical Engineering	4	-	1	5	10	15	15	60	---	---	100	5
FE206	Workshop Practice-II	-	2	-	2	-	-	-	-	25	25	50	1
FE207	Applied Physics-II Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE208	Applied Chemistry-II Lab	-	2	-	2	-	-	-	-	15	10	25	1
FE209	Engineering Graphics Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE210	Electrical Engineering Lab	-	2	-	2	-	-	-	-	25	25	50	1
FE211	EVS II	2	-	-	2	-	-	-	100	-	-	100	-
	TOTAL	18	10	4	32	38	61	61	340	105	95	700	25

GOVT. COLLEGE OF ENGINEERING, AMRAVATI



B. TECH. (Computer Science & Engineering) V and VI Semester CURRICULUM

**Department of Computer Science & Engineering
2009-10**

COMPUTER SCIENCE& ENGINEERING DEPARTMENT

SCHEME FOR B.Tech. Computer Science & Engineering

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
						Theory				Practical			
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	Internal	External		
Semester- I													
FE101	Engineering Mathematics-I	4	0	1	5	10	15	15	60	---	---	100	5
FE102	Applied Physics-I	2	---	1	3	4	8	8	30	---	---	50	3
FE103	Applied Chemistry-I	2	--	--	2	4	8	8	30	---	---	50	2
FE104	Computer Science	4	--	1	5	10	15	15	60	---	---	100	5
FE105	Engineering Mechanics	4	--	1	5	10	15	15	60	---	---	100	5
FE106	Workshop Practice-I	---	2	---	2	---	---	---	---	25	25	50	1
FE107	Applied Physics-I Lab	--	2	--	2	--	--	--	--	15	10	25	1
FE108	Applied Chemistry-I Lab	--	2	--	2	--	--	--	--	15	10	25	1
FE109	Computer Science Lab	--	2	--	2	--	--	--	--	25	25	50	1
FE110	Engineering Mechanics Lab	---	2	---	2	---	---	---	---	25	25	50	1
FE111	EVS I	2	-	--	2	--	--	--	--	-	-	-	-
	TOTAL	18	10	4	32	38	61	61	240	105	95	600	25
Semester- II													
FE201	Engineering Mathematics-II	4	0	1	5	10	15	15	60	---	---	100	5
FE202	Applied Physics-II	2	---	1	3	4	8	8	30	---	---	50	3
FE203	Applied Chemistry-II	2	--	-	2	4	8	8	30	---	---	50	2
FE204	Engineering Graphics	4	--	1	5	10	15	15	60	---	---	100	5
FE205	Electrical Engineering	4	--	1	5	10	15	15	60	---	---	100	5
FE206	Workshop Practice-II	---	2	---	2	---	---	---	---	25	25	50	1
FE207	Applied Physics-II Lab	--	2	--	2	--	--	--	--	15	10	25	1
FE208	Applied Chemistry-II Lab	--	2	--	2	--	--	--	--	15	10	25	1
FE209	Engineering Graphics Lab	--	2	--	2	--	--	--	--	25	25	50	1
FE210	Electrical Engineering Lab	---	2	---	2	---	---	---	---	25	25	50	1
FE211	EVS II	2	-	--	2	--	--	--	100	-	-	100	-
	TOTAL	18	10	4	32	38	61	61	340	105	95	700	25

Department of Computer Science & Engineering

Equivalence Scheme

**Programme Name:-B.Tech. Computer Science & Engineering
(III & IV Semester)**

Sr.no.	Course code with Name of course(old)		Course code with Name of course (new)	
1.	CS301	Engineering Mathematics-III	SHU304	Engineering Mathematics-III
2.	CS302	Discrete Mathematics and Graph Theory	CSU303	Discrete Mathematics and Graph Theory
3.	CS303	Programming Methodology	CSU301	Programming Methodology
4.	CS304	Electronic Devices and Circuits	ETU311	Electronic Devices and Circuits
5.	CS305	Computer Organization and Architecture	CSU302	Computer Organization and Architecture
6.	CS306	Programming Methodology Laboratory	CSU304	Programming Methodology Lab
7.	CS307	Electronic Devices and Circuits laboratory	ETU312	Electronic Devices and Circuits Lab
8.	CS308	Computer Organization and Architecture Laboratory	CSU305	Computer Organization and Architecture Lab
9.	CS309	Computer Laboratory-I	CSU306	Linux administration Lab-I
10.	CS401	Data Structures	CSU402	Data Structure
11.	CS402	Object Oriented Technology	CSU403	Object Oriented Technology
12.	CS403	Principle Of Management		No Equivalence
13.	CS404	Numerical Method and Computer Programming	CSU401	Numerical Method and Computer Programming
14.	CS405	Analog and Digital IC's	ETU411	Analog and Digital IC's
15.	CS406	Data Structures Laboratory	CSU404	Data Structure Lab
16.	CS407	Object Oriented Technology Laboratory	CSU405	Object Oriented Technology Lab
17.	CS408	Analog and Digital IC's laboratory	ETU412	Analog and Digital IC's Lab
18.	CS409	Computer Laboratory-II	CSU406	Linux administration Lab-II
19.	CS410	General Proficiency-I	SHU205	General Proficiency-I
20.		No Equivalence	SHU305	General Proficiency II
21.		No Equivalence	ITU402	Data Communication
22.		No Equivalence	ITU403	Data Communication Lab

Note:

- 1) All students promoted to third year with some backlog courses shall remain in old scheme (212 credits).
- 2) All students who failed in second year (DC students) shall be transferred to new scheme (184 credits).