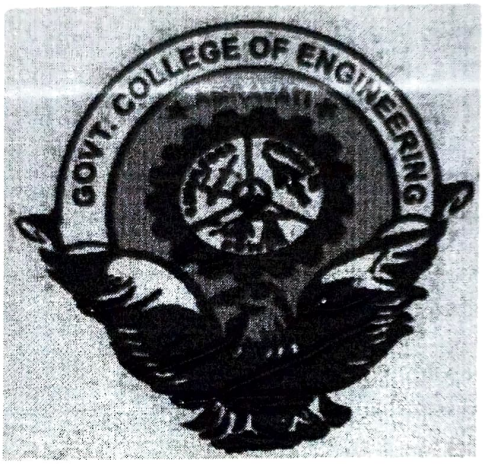
Curriculum for First Year B. Tech.

(In light of NEP 2020)

(For students admitted in 2023-24 onwards)



Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Near Kathora Naka, Amravati, Maharashtra

PIN 444604

www.gcoea.ac.in

Curriculum Structure for B. Tech. First Year Science and Humanities Engineering Programme

(In light of NEP 2020)

NCrF Level 6

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Near Kathora Naka, Amravati, Maharashtra

PIN 444604

www.gcoea.ac.in

Structure for B. Tech. ProgrammeIn light of NEP 2020

For students admitted in 2023-24 onwards

Key Features of Curriculum

1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc courses
9. Provision for B.Tech. Honours with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.

12. Flexibility for all types of learners i. e Excellent, Good, Normal and Exit

Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Credit Distribution for each year and Exit Option

NCrF Level	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational/B.Sc. Engg.	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honors and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188

SEMESTER –I													
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		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphic	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Introduction to Artificial Intelligence & Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2				50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2
IKS	SH1106	Indian Knowledge System 1 from Basket (Introduction to Constitution of India, Political Science, Economics etc)	2			2	30	20				50	2
Total			**15**		**10**	**25**	**210**	**90**	**300**	**150**		**750**	**20**

SEMESTER –II												
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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	CE1201	Engineering Mechanics	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	XX1215	Department Specific Core 1	2			2	30	10	60			100	2
PC2	XX1216	Department Specific Core Lab			2	2				25		25	1
AE2	SH1203	Modern Indian Language		4		4	30	20				50	2
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
AE3	SH1207	Language Laboratory			2	2				25		25	1
ES9	CE1202	Engineering Mechanics Laboratory			2	2				25		25	1
ES10	EE1201	Basic Electrical & Electronics Engineering Laboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
Total			**14**	**4**	**12**	**29**	**210**	**90**	**300**	**125**		**725**	**20**

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programmes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in

secondsemester vice-versa exceptfor courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201.These courses will be offered in respective semesters only.

EXIT CRITERIA FOR U. G. CERTIFICATE
(Duration 8 Weeks)

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		
EX1	XX1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)								50		50	3
EX2	XX1212	Department Specific Core	03			03	30	20				50	3
EX3	XX1213	Department Specific Lab			04	04				50		50	2
	Total		03	--	04	07	30	20		**100**		**150**	8

Course Code	SH1101	Course Category	BS1
Course Name	MATHEMATICS-I		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	-	-	03	30	10	60	2 hrs 30 min	-	-	100	03

Course Objectives:

To make the students aware

1. To study Fourier series with various expansions
2. To Learn and understand the matrix Algebra to solve Engineering problems
3. To equip students with the foundations of complex numbers mostly used in varied applications in engineering and science.
4. To study special functions for solving different Engineering problems
5. To understand Partial derivatives used to solve engineering problems.

Course Contents:

Fourier Series:
Fourier series, Dirichlet's conditions, Fourier series for discontinuous functions, Fourier series for odd and even functions, Half range Fourier series

Matrix Algebra:
Rank of Matrix: Echelon and normal form, Consistency for System of linear equations, Eigen values and Eigen vectors, Cayley Hamilton theorem (without proof)

Complex Number:
Demoivre's theorem, roots of complex number, circular and hyperbolic functions, Separation of real and imaginary parts, Logarithm of Complex number.

Special Functions:
Gamma and beta functions, properties, relation between beta and gamma functions, Differentiation under integral sign.

Partial Differentiation:
Partial derivatives, Euler's function on homogeneous function, total derivative, Jacobian and its properties, Maxima and minima for the function of two variables.

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers,2020,44th edition.
2. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint,2010.
3. A text book of Applied Mathematics, P. N. Wartikar and J. N. Wartikar (Vol I and ll), Pune VidyarthiGrihaPrakashan, Pune, 7'h Edition, 2003

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Advanced Engineering Mathematics, H.K.Das, S.Chand& Company Pvt.Ltd,2014.
3. Higher Engineering Mathematics, B.V,Ramana, Tata McGraw Hill Publishing company Ltd.,New Delhi,2008,6th edition.

Course Outcomes:

After successful completion of this course student will be able to

SH1101.1. use matrix Algebra to solve Engineering problems.
SH1101.2. Obtain Fourier series with various expansions.
SH1101.3. Apply complex numbers mostly used in varied applications in engineering and science.
SH1101.4. Analyze and apply special functions for solving different Engineering problems.
SH1101.5. Apply Partial derivatives applications used to solve engineering problems.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1101.1	3	3	3	3	3	0	0	0	0	0	0	0	3	0	0
SH1101.2	3	3	3	3	3	0	0	0	0	0	0	0	3	0	0
SH1101.3	3	3	3	3	3	0	0	0	0	0	0	0	3	0	0
SH1101.4	3	3	3	3	3	0	0	0	0	0	0	0	3	0	0
SH1101.5	3	3	3	3	3	0	0	0	0	0	0	0	3	0	0

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

Course Code	SH1102	Course Category	BS2
Course Name	PHYSICS		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	-	-	02	30	10	60	2 hrs 30 min	-	-	100	02

Course Objectives:

To make the students aware and understand:

1. To provide exposure about the basic principles of Physics along with the possible applications.
2. Understand the depth knowledge of various topics of Physics.
3. To develop an insight that provides a necessary foundation for scientific thinking and innovation.
4. To create awareness about the vital role played by science & recent advancements in technology.
5. To provide a good learning environment for Physics.

Course Contents:

SemiconductorPhysics:

Band theory of solid, Band structure of Si, C and Na, Fermi Energy and F-D distribution, Fermi level inintrinsic and extrinsic semiconductors, semiconductor conductivity, pn-junction, and its working based on energy band diagrams, Hall effect (Hall voltage and coefficient), Solar cell: working, types, and characteristic.

Quantum Physics:

Introduction to quantum mechanics, wave nature of particles, wave function and wave packet, Heisenberg's uncertainty principle (its experimental illustration), application (nonexistence of electron in nucleus), motion of a free particle,time-dependent and time-independent Schrödinger wave equations, solution of stationary-state Schrödinger equation for one dimensional problem–particle in a box.

Superconductor: Introduction, types I and II, Meissner effects, applications of superconductor in engineering.

Nanotechnology: Introduction, nanomaterials, method of synthesis (Physical, Chemical & Green), characterization techniques (UV, SEM XRD) applications of nanomaterials in engineering.

Text Books:

1. Concept of Physics by Arthur Beiser
2. Engineering Physics by Dr. K. C. Nandi

3.Textbook of Optics, N. Subrahmanyam, Brij Lal, S. Chand, 2006

Reference Books:

1. Optics, A. Ghatak, McGraw Hill Education, 2012.
2. Engineering Physics, Dattu R. Joshi, Mc Graw Hill Education, 2010.
3. Fundamentals of Physics, D. Halliday, R. Resnick, J. Walker, John Wiley & Sons, 2011
4. Materials Characterization Techniques, Sam Zhang, Lin Li, Ashok Kumar
5.Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, Y. Leng.
6. Superconducting Materials and Their Applications, Jatinder Vir Yakhmi

Course Outcomes:

At the end of this course, students will demonstrate the ability to
SH1102.1Understand origin of energy bands in solids with focus on semiconductors.
SH1102.2Understand the concepts in modern physics and will be able to apply them.
SH1102.3Understand the use of basic quantum concepts.
SH1102.4 Discuss the basics of superconductors.
SH1102.5 To help them gain knowledge of Nanotechnology, and their application.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1102.1	3	0	3	0	0	0	0	0	0	2	2	3	2	2	1
SH1102.2	3	2	3	0	2	0	2	0	0	3	2	3	2	2	1
SH1102.3	3	2	3	2	0	0	3	3	0	3	3	3	2	2	1
SH1102.4	3	2	3	2	2	0	2	0	0	3	3	3	2	2	1
SH1102.5	3	2	3	2	2	0	3	1	0	3	3	3	2	2	1

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

Course Code	**SH1104**	**Course Category**	**BS3**
Course Name	**PHYSICS LABORATORY**		
Teaching Scheme	**Examination Scheme**		**Credits**

Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	02	02	-	-	-	---	25	-	25	01

Course Objectives:

To make the students will be able to:

1. The practical aspect of physics explores the relationships between physical parameters, cultivates the habit of inquiry and acquires skills of observation.
2. Identification of possible errors, analysis, and interpretation of data into results.
3. Introduction to modern scientific and technical tools necessary for professional practice.

Course Contents:

This is a representative list of practical's. The student is required to perform a minimum of eight experiments as per his choice to cover the entire contents of this course.

Representative list of experiments related to the course contents of SH1104 (Physics):

1. Determination of energy gap in semiconductors.
2. Determination of surface resistivity of given semiconductor by four probes method and study its temperature variation.
3. To determine type of semiconductor and Hall coefficient. To determine the carrier concentration and conductivity of a semiconductor using Hall effect.
4. To determine the divergence of LASER beam.
5. Determination of wavelength of LASER beam using diffraction of grating element.
6. To determine the Curie temp and relative permittivity of given ferro-electric material.
7. Study measurement of voltage and frequency using Cathode Ray Oscilloscope.
8. Study of Meissner effect in high TC superconductors and determination of its transition temperature.
9. Study characteristics of solar cells at different intensities and determination of maximum workable power.
10. Study of optical fiber characteristics.
11. UV characterization of metal oxide nanoparticles.
12. UV characterization of green synthesis nanoparticles

Course Outcomes:

At the end of this course, students will demonstrate the ability to

SH1104.1 Identify probable errors and their rectification.

SH1104.2Demonstrate skills and competencies to conduct wide range of scientific experiments.

SH1104.3 To learn synthesis, characterization, and application advance materials.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1104.1	3	3	2	3	2	3	1	0	0	0	2	3	3	2	1
SH1104.2	3	3	2	3	2	3	1	0	1	0	2	3	3	2	1
SH1104.3	3	3	2	3	2	3	1	0	1	0	2	3	3	2	1

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

ICA –InternalContinuous Assessmentshall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	**SH1103**			**Course Category**		**AE1**
Course Name	**COMMUNICATION SKILL**					
Teaching Scheme				**Examination Scheme**		**Credits**
Th	Tu	Pr	Total	Theory	Practical	Total	

				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	02	02	-	-	-	-	50	-	50	01

Course Objectives:

The objectives of offering this course are to-

1. Foster collaborative communication skills: Cultivate teamwork and collaboration by equipping engineering students with the skills to effectively communicate and collaborate.
2. Enhance presentation and public speaking abilities: Equip engineering students with the necessary skills to deliver compelling and engaging presentations, enabling them to effectively communicate their ideas.
3. Develop professional communication skills: Prepare engineering students for professional settings by honing their interpersonal skills.
4. Strengthen cross-cultural communication skills: Enable engineering students to communicate effectively and respectfully across cultural boundaries.

Course Contents:

This is a representative list of practical's. The student is required to perform a minimum of eight experiments as per his choice to cover the entire contents of this course.

Representative list of experiments related to the course contents of SH1103 (Communication Skill):

1. Understanding the importance of communication skills in professional settings.
2. Developing self-awareness and active listening skills.
3. Overcoming communication barriers and fostering empathy.
4 Enhancing clarity and coherence in spoken communication.
5. Using appropriate tone, voice modulation, and body language.
6. Effective questioning and active engagement in conversations.
7. Writing clear and concise emails, memos, and reports
8. Structuring written documents effectively
9. Grammar, punctuation, and proofreading technique
10. Building and maintaining positive relationships.

13. Conflict resolution and negotiation skills.
14. Assertive communication and active listening in interpersonal interactions.

Course Outcomes:

After studying the course, the students will be able to: -

SH1103.1 Develop effective communication and collaboration skills. Students will be able to demonstrate effective teamwork and collaboration by employing various communication strategies and techniques.

SH1103.2 Deliver compelling and engaging presentations. Students will possess the necessary skills to deliver impactful presentations, allowing them to effectively communicate their ideas in a clear and engaging manner.

SH1103.3 Demonstrate professional communication skills. Students will be prepared for professional settings and possess strong interpersonal skills that enable them to communicate effectively, professionally, and respectfully.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1103.1	1	0	2	3	1	2	1	2	1	1	1	3	1	1	1
SH1103.2	1	0	2	3	1	2	1	2	1	1	1	2	1	1	1
SH1103.3	1	0	2	3	1	2	1	2	1	1	1	2	1	1	1

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

ICA –InternalContinuous Assessmentshall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	**SH1105**				**Course Category**		**VE1**
Course Name	**ENVIORNMENTAL SCIENCE**						
Teaching Scheme				**Examination Scheme**			**Credits**
Th	Tu	Pr	Total	Theory	Practical	Total	

				MSE	TA	ESE	ESE Duration	ICA	ESE		
02		-	02	30	20	-	-	-	-	50	02

Course Objectives:

The objectives of offering this course are to-

1. Creating the awareness about environmental problems among people
2. Imparting basic knowledge about the environment and its allied problems.
3. Be aware of various environmental factors and their preservation.
4. Teach them how to protect Environment and natural resources.
5. How to make equitable use of energy resources.

Course Contents:

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, hydro geothermal, nuclear, environmental implication of energy uses. Non-conventional energy resources: solar energy, wind energy, tidal energy, geothermal energy, hydropower's and biogas.

Ecosystem and Biodiversity:
Concept of ecosystem, Structure and function of ecosystem, Producer, consumer, decomposers. Energy flows 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 Books:

1. Perspectives in environmental studies, Anubha Kaushik, C. P. Kaushik, New Age international Publisher, 2014.
2. A text book of environmental studies, A. Dhinakaran, B. Sankaran, Himalaya Publishing House.
3. A text book of environmental studies, Dr. D. K. Asthana, Dr. M. Asthana, S. Chand Publication.

Reference Books:

1. The Biodiversity of India, Bharucha Erach ,Marin Publishing Pvt. Ltd., Ahmedabad
2. Hazardous Waste Incineration, Brunner R.C.,McGraw Hill Inc.,1989.
3. Marine pollution, Clark R.S., Clanderson Press Oxford (TB)
4. Environmental Chemistry, De A.K. Wiley EsternLmt.
5. Environmental Chemistry, Sharma B.K., 2001 Goel Publ., House, Meerat.
6. Environmental Management, Wagner K.D., 1998, W.B. Saunders Co., Philadelphia, USA
7. Environmental Studies, Benny Joseph, 1st edition, 2005,TataMcgraw-Hill Publ.

Course Outcomes:

After studying the course, the students will be able to: -
SH1105.1 Knowing about importance of public participation in preserving and protecting the environment.
SH1105.2 Protect wild life and promotes biodiversity and ecosystems.
SH1105.3 Convey the Environmental awareness among peoples.

SH1105.4 Apply Conservation of various natural resources and environmental factors.
SH1105.5 Aware about social and environmental issues.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1105.1	3	1	3	0	3	2	3	3	2	0	0	2	3	3	2
SH1105.2	2	3	0	0	2	3	3	3	1	1	0	3	3	1	2
SH1105.3	3	3	3	2	3	3	3	2	3	1	0	3	3	2	1
SH1105.4	3	2	3	2	3	3	3	2	2	0	2	3	2	3	2
SH1105.5	2	2	1	1	2	3	3	3	1	1	1	3	3	2	2

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

Course Code	**SH1106**					**Course Category**		**IKS**
Course Name	**INTRODUCTION TO CONSTITUTION OF INDIA**							
Teaching Scheme				**Examination Scheme**				**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		

02	-	-	02	30	20	-	-	-	-	50	02

Course Objectives:

The objectives of offering this course are to-

1. The basis of Law, the concept 'Constitution' and the fact that our Constitution is a blend of the positive aspects of other Constitutions.
2. The interpretation of the Preamble and statues.
3. The basis of governance of the nation.
4. The aspects covered under the different important Articles.
5. To gain confidence in our Constitution by knowing it better.

Course Contents:

Introduction:
Introduction to The Constitution of India, its aim's and objects. Preamble to the constitution of India.Fundamental rights under Part – III, exercise of the Rights, limitations, and important case laws**.**

The concept of Rule of Law:
Understanding the concept 'Rule of Law' Meaning and history of Constitution. Understanding the concept of Human Rights and Fundamental Rights.

State Policies:
Relevance of State Policy: Directive Principles, Fundamental Duties & itssignificance.

Distributions of Power:
Legislative, Executive & Judiciary (Union and State Level), Prerogative Writs.

Special Provisions:
Constitutional Provisions with respect to Scheduled Castes, Scheduled Tribes, & Backward classes. Constitutional Provisions for Women & Children.

Emergency Provisions:
Electoral procedure in India, Amendment procedure and important Constitutional Amendments.

Text Books:

1. Constitution of India, Dr. B. R. Ambedkar, Government of India Publication.
2. Introduction to the Constitution of India by Durga Das Basu (Students Edn.) Prentice – Hall EEE, 19th/20th Edn..
3. Engineering Ethics by Charles E.Haries, Michael. S.Pritchard and Michael J.Robins Thompson Asia.

Reference Books:

1.Constitutional law of India, H. M. Seervai.
2. An Introduction to Constitution of India, M.V. Pylee, Vikas Publishing, 2002
3. Latest Publications of Indian Institute of Human Rights, New Delhi

Course Outcomes:

After studying the course, the students will be able to: -

SH1106.1 Understand and remember the knowledge of basic information about Indian Constitution.
SH1106.2Interpretation of the Preamble
SH1106.3Apply the knowledge of fundamental rights and fundamental duties.
SH1106.4 Understand thebasis of governance of the nation.
SH1106.5Understand the basis of Law, the concept 'Constitution' and the fact that our Constitution is a blend of the positive aspects of other Constitutions.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1106.1	0	2	3	0	0	3	0	3	2	0	0	3	3	0	3
SH1106.2	0	2	3	0	0	3	0	3	2	0	0	3	3	0	3
SH1106.3	0	2	3	0	0	3	0	3	2	0	0	3	3	0	3
SH1106.4	0	2	3	0	0	3	0	3	2	0	0	3	3	0	3
SH1106.5	0	2	3	0	0	3	0	3	2	0	0	3	3	0	3

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

Course Code	**SH1201**			**Course Category**			**BS4**
Course Name	**MATHEMATICS-II**						
Teaching Scheme				**Examination Scheme**			**Credits**
Th	Tu	Pr	Total	Theory			Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	-	-	03	30	10	60	2 hrs 30 min	-	-	100	03

Course Objectives:

1. To Learn and understand the First order differential equations.
2. To learn Higher order Linear differential equations
3. To equip students with Numerical solutions of ordinary differential equations mostly used in varied applications in engineering and science.
4. To study Multiple integrals for solving different Engineering problems
5. To learn and understand Probability.

Course Contents:

Differential Equations of the First Order:
Linear differential equation, Nonlinear, Exact, non-exact differential equations, orthogonal trajectories,simple Electric circuits,

Linear Differential Equations with Constant Coefficients:
Higher order linear differential equation: complementary functions, Rules to find particular integrals, Cauchy's homogeneous equation, Method of variation of parameters.

Numerical Solutions of Ordinary Differential Equations:
Picard's method of approximations, Taylor's series method, Euler's method, Modified Euler's method, Runge- Kutta method of fourth order,

Multiple integrals:
Double integrals: Cartesian and polar coordinates, change of order of integrations, Evaluation of integral by changing to polar coordinates, Triple integration, Applications of multiple integrals: Area and volume.

Probability:
Definition, Laws of Probability (addition law of probability and multiplication law of probability), conditional probability, Baye's theorem.

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers,2020,44th edition.

2. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint,2010.

3. A text book of Applied Mathematics, P. N. Wartikar and J. N. Wartikar (Vol I and ll), Pune VidyarthiGrihaPrakashan, Pune, 7'h Edition, 2003

References:

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. Advanced Engineering Mathematics, H.K.Das, S.Chand& Company Pvt.Ltd,2014.

5. Higher Engineering Mathematics, B.V,Ramana, Tata McGraw Hill Publishing company Ltd.,New Delhi,2008,6th edition.

Course Outcomes:

After successful completion of this course student will be able to

SH1201.1.Solve the First order differential equations
SH1201.2. Solve higher order linear differential equations
SH1201.3.Apply Numerical solutions of ordinary differential equations mostly used in varied applications in engineering and science.
SH1201.4. Analyse and apply multiple integrals techniques for solving different Engineering problems
SH1201.5. Solve problems related to Probabilistic models.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1201.1	3	3	3	3	3	0	0	0	0	0	0	0	2	0	0
SH1201.2	3	3	3	3	3	0	0	0	0	0	0	0	2	0	0
SH1201.3	3	3	3	3	3	0	0	0	0	0	0	0	2	0	0
SH11201.4	3	3	3	3	3	0	0	0	0	0	0	0	2	0	0
SH11201.5	3	3	3	3	3	0	0	0	0	0	0	0	2	0	0

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

Course Code	**SH1202**			**Course Category**			**BS5**
Course Name	**CHEMISTRY**						
Teaching Scheme				**Examination Scheme**			**Credits**
Th	Tu	Pr	Total	Theory			Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	-	-	02	30	10	60	2 hrs 30min	-	-	100	02

Course Objectives:

1. Have knowledge of engineering materials e.g., Refractories, Composite etc.
2. Be aware of Spectroscopic Techniques and Applications.
3 Identify and apply the principles of green chemistry in improving the existing technology.

Course Contents:

Water treatment:
Definition of hardness of water, Types of hardness and softening methods like Lime-Soda, Zeolite and Ion exchange. Units of hardness, Methods of treatment of water for domestic & Industrial purpose, Numerical problems on Lime-soda and Zeolite process. Boiler troubles: Boiler corrosion, Caustic embrittlement, Priming and Foaming, Scale and Sludge formation and internal treatment for Boiler feed water.

Engineering Chemistry:
Corrosion of metals- definition, types and mechanism ofDry and wet corrosion. Design and Material selection, Anodic & cathodic protection, hot dipping: - galvanizing and tinning. Composite Material- definition, classification and applications. Refractories- Definition, types, properties Requisites of good refractory and manufacturing process of refractory.

Fuel:
Classification, Calorific value-gross & net Determination of calorific value by Bomb calorimeter & Boy's calorimeter, Proximate & Ultimate Analysis of coal & its significance, Cracking of petroleum fractions, use of gasoline & diesel in internal combustion engines. Working of IC engine, Knocking, Antiknocking agents, there properties with chemical constitution, Octane number and Cetane number.

Green Chemistry:
Overview, Set of Principles of Green chemistry, Importance and application of Green Synthesis.

Lubricants:
Introduction, Classification and functions of lubricants, Mechanisms of Lubrications, Properties-Lubricating oil and Greases, Selection of lubricants.

Engineering Materials:
High Temperature Polymers, Conduction Polymers, Foamed Plastics, Polymer Composites, Organic Electronic Materials, Explosives: - introduction, Classification, Characteristics, Disarmanment, Weapon of Mass Destruction (WMD), Peaceful uses of explosives, Fuel Cell and Batteries.

Textbooks:
1. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane.
2. Fundamentals of Molecular Spectroscopy, by C. N. Banwell

Reference Books:
1. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
2. Physical Chemistry, by P. W. Atkins
3. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore.

Course outcomes: After studying the course, the students will be able to:
SH1202.1 Understand the types of hardness of water and softening methods.
SH1202.2 Illustrates the basic fundamental and define their application in various fields of engineering.
SH1202.3 Understand the Determination of calorific value.
SH1202.4 Identify and apply the principles of green chemistry in improving the existing technology.
SH1202.5 Select the appropriate experimental method of analysis and interpret its result.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1202.1	2	0	0	1	0	0	0	1	2	0	0	0	2	1	1
SH1202.2	2	0	0	1	0	0	0	1	2	0	0	0	2	1	1
SH1202.3	2	0	0	1	0	0	0	1	2	0	0	0	2	1	1
SH1202.4	2	0	0	1	0	0	0	1	2	0	0	0	2	1	1
SH1202.5	2	0	0	1	0	0	0	1	2	0	0	0	2	1	1

0 - Not correlated 1 - Weakly Correlated2 - Moderately Correlated 3 - Strongly Correlated

Course Code	**SH1204**			**Course Category**			**BS6**
Course Name	**CHEMISTRY LABORATORY**						
Teaching Scheme				**Examination Scheme**			**Credits**
Th	Tu	Pr	Total	Theory			Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	02	02	-	-	-	---	25	-	25	01

Course Objectives:

To make the students will be able to:

1. The practical aspect of chemistry explores the relationships between chemical parameters, cultivates the habit of inquiry and acquires skills of observation.
2. Identification of possible errors, analysis and interpretation of data into results.
3. Introduction to modern scientific and technical tools necessary for professional practice.

The following is the representative list of experiments. A minimum of eight experiments are to be performed.

List of experiments:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Determination of cell constant and conductance of solution.
6. Synthesis of a polymer/drug
7. Saponification/acid value of an oil
8. Chemical analysis of a salt
9. Determination of the partition coefficient of a substance between two immiscible Liquids.
10. Absorption of acetic acid by charcoal.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

SH1204.1 Identify basic parameters and their rectification.

SH1204.2Demonstrate skills and competencies to conduct wide range of scientific experiments.

SH1204.3 To learn analysis of materials.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1204.1	2	0	0	0	0	0	0	1	2	0	0	0	2	1	1
SH1204.2	2	0	0	0	0	0	0	1	2	0	0	0	2	1	1
SH1204.3	2	0	0	0	0	0	0	1	2	0	0	0	2	1	1

0 - Not correlated 1 - Weakly Correlated2 - Moderately Correlated 3 - Strongly Correlated

ICA – Internal Continuous Assessmentshall be based on the practical record and knowledge/ skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	SH1203	Course Category	AE2
Course Name	MODERN INDIAN LANGUAGE		

Teaching Scheme				Examination Scheme							Credits
				Theory				Practical		Total	
Th	Tu	Pr	Total	MSE	TA	ESE	ESE Duration	ICA	ESE		
-	04	-	04	30	20	-	--	-	-	50	02

Course Objectives:

1. To developed skill and competence in modern Indian language
2. How the developments in languages accompanied new polarizations which were occurring in the Indian society.

3. The ways in which the developments in languages were affected by the coming of the Western influence.
4. Consequences the developments in the modern lndian language had on modern Indian history.
5. To develop social and culture aspect.

Course Contents:

Introduction to Marathi/Hindi/Urdu Language:
- Overview of the Marathi/Hindi/Urdu language, its history, and its regional significance
- Introduction to the script and phonetics of Marathi/Hindi/Urdu
- Basic vocabulary, grammar, and sentence structure
- Greetings and conversational phrases in Marathi/Hindi/Urdu

Language Proficiency and Communication Skills:
- Building vocabulary and improving language proficiency in Marathi/Hindi/Urdu
- Practice in speaking, listening, reading, and writing skills
- Conversation practice and language exercises
- Enhancing comprehension through audio and visual resources
- Introduction to commonly used idioms, proverbs, and expressions in Marathi/Hindi/Urdu

Literary Traditions and Texts:
- Study of prominent Marathi/Hindi/Urdu authors, poets, and literary figures
- Analysis of significant literary works and genres (poetry, novels, short stories, plays)
- Understanding the themes, motifs, and cultural contexts in Marathi/Hindi/Urdu literature
- Exploration of regional literary movements and their impact on the language
- Appreciation of the cultural and historical significance of Marathi/Hindi/Urdu literature

Cultural and Social Contexts:
- Exploration of the cultural and social contexts of Marathi/Hindi/Urdu-speaking communities
- Understanding regional customs, traditions, and festivals
- Examination of cultural and social issues depicted in Marathi/Hindi/Urdu literature.
- Study of important historical events and their impact on the language and culture
- Comparisons between Marathi/Hindi/Urdu and other Indian languages and their unique characteristics

Translation and Interpretation:
- Techniques and principles of translation between English and Marathi/Hindi/Urdu
- Practice in translating texts from different genres (literary, technical, journalistic)
- Interpretation skills for oral communication and cross-cultural understanding
- Introduction to professional translation and interpretation services
- Ethical considerations in translation and interpretation work specific to Marathi/Hindi/Urdu

Textbooks:
1. Language and the Making of Modern India, Pritipuspa Mishra

References:

1. Kabeer, Hariprasad Drivedi
2. Marathi Vishvakosh
3. Hindi Sahitya Ka Abhayas, Rachandra Shukla
4. Hamesha Saath Saath A Book In Urdu Language.
5.Linguistic history and language diversity in India: Views and counterviews, Sonal Kulkarni-Joshi

Course Outcomes:

After successful completion of this course student will be able to

SH1203.1.Understand and remember the knowledge of basic information about Modern Indian language.

SH1203.2. Understand thelanguage Proficiency and Communication Skills

SH1203.3. UnderstandLiterary work done in India.

SH1203.4.Understand and remember the knowledge of regional literary movements.

SH1203.5. Develop the ability as a translator.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1203.1	3	1	0	1	0	0	0	0	0	1	0	2	0	2	2
SH1203.2	3	0	0	0	0	0	0	0	0	1	0	2	0	1	2
SH1203.3	3	0	0	1	0	0	0	0	0	1	0	2	0	1	1
SH1203.4	3	0	0	1	0	0	0	0	0	1	0	2	0	1	2
SH1203.5	3	1	0	1	0	0	0	0	0	1	0	0	0	1	2

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

Course Code	**SH1207**					**Course Category**			**AE3**
Course Name	**LANGUAGE LABORATORY**								
Teaching Scheme				**Examination Scheme**					**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	02	02	-	-	-	---	25	-	25	01

Course Objectives:

To make the students will be able to:

1.Understand and apply communication theory

2. Critically think about communication processes and messages

3. Write effectively for a variety of contexts and audiences

4. Interact skilfully and ethically

Experiment List:

Representative list of experiments related to the course contents.A minimum of eight experiments are to be performed.

1. Comprehension for analysing documents, cultural, emotional intelligence
2. Grammar with Parts of Speech, Figure of Speech, Direct & Indirect Speech, and Models
3. General Vocabulary for Idioms, Phrases,Prefix and Suffix
4. Group Discussion & Interview techniques effectively
5. Soft Skills & Writing Skills with Personality Development Skills, Presentation Skills, Pronunciation, Business Email writing,Reading & Writing Technical Papers, Resume writing
6. Communication Skills &Barriers of communication techniques
7. Pronunciation Exercise – Basic like Pronunciation Practice Listen & Repeat practice for Global Accent
8. Phonetics to Learn Phonetics Lip Movements, Lip Movements with Phonetics for Diphthongs
9. Words frequently confused, avoiding slangs, Avoiding inappropriate use of words in official/educational purposes, difference between words, Grammar Words

Course Outcomes:

At the end of this course, students will demonstrate the ability to
SH1207.1.Develop Intelligible Pronunciation & Writing Skills
SH1207.2. Apply Verbal and Non-Verbal Communication Techniques in Professional Environment
SH1207.3 Handling the group discussion & interview process confidently

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1207.1	2	3	0	0	0	0	0	1	2	0	0	0	3	1	2
SH1207.2	2	0	0	0	0	0	0	1	2	0	0	0	2	1	1
SH1207.3	2	2	0	0	0	0	0	1	2	0	0	0	2	1	1

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

ICA –InternalContinuous Assessmentshall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	**SH1206**						**Course Category**			**MNC1**
Course Name	**YOGA AND FITNESS**									
Teaching Scheme				**Examination Scheme**						**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	02	02	-	-	-	--	-	-	00	00

Course Objectives:

1. To impart the students with basic concepts of Yoga for health and wellness.

2. To familiarize the students with health-related Exercise, Yoga for Overall growth & development

3. To create a foundation for the professionals in Yoga.

4. To impart the basic knowledge and skills to teach Yoga activities.

5. To developyoga professionals at various levels of education.

Course Contents:

Introduction:

Meaning and definition of Yoga. Aims, Objectives and Importance of Yoga. History of Yoga. Modern trend of Yoga Brief concept of Yoga.

Yoga & Fitness Training:

Importance of Yoga & Fitness. Fundamentals Principles of Yoga & Fitness Training. Components of Fitness and Fitness Equipment's. Types of Yoga Practices - Asanas, Pranayama and Meditation. Introduction to Balanced Diet for Fitness.

Career Opportunities in Yoga and Fitness:

Yoga professionals at various levels of educational institutions. Yoga Instructors, Coach, Managers, Researcher, Event Organizers, Technical Officials, Entrepreneurs and others. Yoga Trainer for Police and Paramilitary forces at State and Central organizations and others. Health Clubs and Fitness Centers, Aerobics, Dance & Recreation Clubs in Corporate Sectors, and others. Sports Journalists, Commentators, Photo and Video Analyst, Sports Marketing and Equipment/Props manufactures.

Textbooks:

1. Textbook of Yoga, Yogeshwar

References:

1. The Yoga Meditation, Swami Krishnananda.
2. A Handbook of Basic Asanas, IIITDM Kancheepuram.
3. Yoga & Meditation for Health and Well-Being, William & Mary.
4. Yoga as Therapy, Christopher M Norris.
5. How to Meditate: A Primer for Beginners (Article)Joel M. Evans.
6. Meditation: Techniques and Benefits (Article)Dr. Abdul Wahab Pathath.
7. link: 20+ Yoga Books for Free! [PDF] | InfoBooks.org

Course Outcomes:

After successful completion of this course student will be able to

SH1206.1. Students will be able to understand the basic principles and practices Yoga

SH1206.2. Students will be able to instruct Yoga practices for Healthy Living.

SH1206.3. To develop professionalism among students to conduct, organize & officiate Yoga events at schools and community level.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1206.1	1	0	0	0	0	1	2	2	3	0	0	0	1	0	2
SH1206.2	1	0	0	0	0	1	2	2	3	0	0	0	1	0	2
SH1206.3	1	0	0	0	0	1	2	2	3	0	0	0	1	0	2

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

Course Code	**SH1205**			**Course Category**			**VE2**
Course Name	**UNIVERSAL HUMAN VALUES**						
Teaching Scheme				**Examination Scheme**			**Credits**
Th	Tu	Pr	Total	Theory			Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	-	-	02	30	20	-	-	-	-	50	02

Course Objectives:

Students will able to:

1. Distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession.
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

Course Contents:

Introduction to Value Education:
Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – CurrentScenario, Method to Fulfil the Basic Human Aspirations

Understanding Harmony in The Human Being:

The understanding human being as a co-existence of the sentient 'T' and the material 'Body,Understanding the needs of Self ('T') and 'Body' – Sukh and Suvidha, Understanding the Body as an instrument of 'T' (I being the doer, seer, and enjoyer), Understanding the characteristics and activities of 'T' and harmony in T, Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam & Swasthya.

Understanding Harmony in The Family & Society:
Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay tripti; Trust (Vishwas) and Respect (Samman) as the foundational vales of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship., Understanding the harmony in the society (society being an extension of family): Samadhan,Samridhi,Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society, Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) – from family to world

Understanding Harmony in The Nature & Existence:
Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature – recyclability and self-regulation in nature, Understanding Existence as Co existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Understanding of Harmony on Professional Ethics Competence in professional ethics:
a) Ability to utilize the professional competence for augmenting universalhuman order
b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c) Ability to identify and develop appropriate technologies and managementpatterns for above production systems.
Case studies of typical holistic technologies, management models and productionsystems
Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineers,technologists and managers

b) At the level of society: as mutually enriching institutions and organizations

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Books and Websites:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Course Outcomes:

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

SH1205.1 Understand the significance of value inputs in a classroom and start applying them in their life
and profession
SH1205.2Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
SH1205.3 Understand the value of harmonious relationship based on trust and respect in their life and profession
SH1205.4 Understand the role of a human being in ensuring harmony in society and nature.
SH1205.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SH1205.1	0	0	0	0	0	2	0	2	2	0	0	0	1	0	2
SH1205.2	0	0	0	0	0	0	0	2	0	0	1	0	2	0	1

SH1205.3	0	0	0	0	1	3	0	2	0	0	0	1	2	0	0
SH1205.4	0	0	0	0	0	2	3	2	0	0	1	1	1	0	3
SH1205.5	0	0	0	0	0	1	2	3	2	0	2	2	1	0	2

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

Curriculum Structure for B. Tech. Civil Engineering Programme

(In light of NEP 2020)

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)
Near Kathora Naka, Amravati, Maharashtra
PIN 444604
www.gcoea.ac.in

Key Features of Curriculum

1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc courses
9. Provision for B.Tech. Honors with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.
12. Flexibility for all types of learners i. e Excellent, Good, Normal and Exit

Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Credit Distribution for each year and Exit Option

NCrF Level	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honors and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188

B. TECH. CIVIL ENGINEERING SEMESTER –I

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Cred
							Theory			Practical		Total	
			Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphics	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Introduction to Artificial Intelligence & Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2				50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2
IKS1	SH1106	Indian Knowledge System-I from Basket (Introduction to Constitution of India, Political Science, Economics etc.)	2			2	30	20				50	2
Total			**15**		**10**	**25**	**210**	**90**	**300**	**150**		**750**	**2(**

B. TECH. CIVIL ENGINEERING SEMESTER – II

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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	**CE1201**	**Engineering Mechanics**	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	**CE1215**	**Basic Civil Engineering**	3			3	30	10	60			100	3
AE2	SH1203	Modern Indian Language		4		4	30	20	---			50	2
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
ES10	**CE1202**	**Engineering Mechanics Laboratory**			2	2				25		25	1
ES8	EE1201	Basic Electrical &Electronics EngineeringLaboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
AE3	SH1207	Language Laboratory			2	2				25		25	1
Total			**14**	**4**	**10**	**28**	**210**	**90**	**300**	**100**		**700**	**20**

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in secondsemester vice-versa except for courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201. These courses will be offered in respective semesters only

Member Secretary | BoS Chairperson | Dean (Academics) | Principal

B. TECH. CIVIL ENGINEERING
EXIT CRITERIA FOR U. G. CERTIFICATE
(Duration 8 Weeks)

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		
EX1	**CE1211**	**Apprenticeship / Internship of minimum eight weeks (with three reviews)**	-	-	-	-	-	-	-	50	-	50	3
EX2	**CE1212**	**Building Construction**	03	-	-	03	30	20	-	-	-	50	3
EX3	**CE1213**	**Basic Civil Engineering Lab**	-	-	04	04	-	-	-	50	-	50	2
	Total					07	**30**	**20**		**100**		**150**	8

Equivalence Scheme

Programme Name:-B. Tech. Civil Engineering

Sr.	Course code with Name of course(old)		Credit	Course code with Name of course (new)		Credit
1	CEU121	Engineering Mechanics	03	CE1201	Engineering Mechanics	02
2	-	-		CE1202	Basic Civil Engineering	03
3	CEU122	Engineering Mechanics Lab		CE1203	Engineering Mechanics Lab	01

Course Code	CE1201							Course category			ES
Course Name	ENGINEERING MECHANICS										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	-	-	02	30	10	60	2 hrs 30 min	-	-	-	02

Course Objectives:

1. To make the students understand applications of principles of mechanics for solutions of various engineering problems
2. To inculcate in the students, problem solving abilities and to enhance their analytical abilities
3. To clear the student's fundamental concepts before going for higher level courses

Course Contents

Force System

Introduction to the principles of mechanics, general force system, moment of a force about a point and about an axis, couple and couple moment, couple moment as free vector, moment of couple about a line, resolution and composition of coplanar force system, Reduction of system of forces into a force couple system, Simple resultant, Resultant and equilibrium of two dimensional force system

Friction

Concept of friction, impending motion, angle of friction, angle of repose, cone of friction, Coulombs laws of dry fiction, wedge blocks, belt friction, Concept of dynamic friction

Centroid and Moment of Inertia

Centroid of plane areas, second moment of area, and product of inertia, perpendicular and parallel axis theorem, polar moment of inertia,Principal moment of inertia

Kinematics

Rectilinear motion under constant and variable acceleration, motion curves, simple relative motion between two particles, kinematics of rigid bodies

Kinetics

Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newton's second law. D'Alembert's principle, Impulse momentum principle, Work energy equation for rigid bodies, concept of dynamic equilibrium

Text Books

1. Dr. K. L. Kumar, Engineering Mechanics, Tata McGraw Hill Publications, 2011
2. V. S. Mokoshi, Engineering Mechanics, Vol. 1 – Statics and Vol. 2 – Dynamics,Tata McGraw Hill Books, 1996
3. Shames, I. H. and Rao,G. K., "Engineering Mechanics: Statics and Dynamics, Pearson 4thEd, 2006,

Reference Books and Websites

1. Meriam, J. L. and Kraige, L. G., Engineering Mechanics, Volume 1: Statics, Volume 2: Dynamics, 8th Ed , Wiley, 2017,
2. Beer and Johnston Vector Mechanics for Engineers: Statics and Dynamics, , Tata McGraw Hill Books, 10th Ed , 2012,
3. Nelson A., Engineering Mechanics: Statics and Dynamics, Tata McGraw Hill Books, 2017
4. R. C. Hibbeler, Engineering Mechanics, Pearson Publishers, 2010
5. SCHAUM Series, Intermediate Engineering Mechanics, McLean, 3rd Edition, 1995
6. http://www.nptelvideos.com/mobilevideo.php?id=1514

Course Outcomes

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

CE1201.1 Determine resultant forces, moments and resolvethem
CE1201.2 Calculateeffects of friction for solving problems
CE1201.3 Evaluate centroid, moment of inertia and Principal moment of inertia
CE1201.4 Apply principles of kinematicsfor rectilinear motion problems
CE1201.5 Apply principles of kinetics for rectilinear motionproblems

CO – PO – PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CE1201.1	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CE1201.2	2	3	-	2	--	-	-	-	-	-	-	-	3	-	-
CE1201.3	1	3	-	-	--	-	-	-	-	-	-	-	2	-	-
CE1201.4	1	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CE1201.5	1	3	-	-	-	-	-	-	-	-	-	-	2	-	-

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

Course Code	CE1215							Course category			PC2
Course Name	BASIC CIVIL ENGINEERING										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	-	-	03	30	10	60	2 hrs 30 min	-	-	100	03

Course Objectives:

To make the students aware and understand:

1. Importance of Civil Engineering and role in Civil Engineer in infrastructure development
2. Various activities in a Civil Engineering Project
3. Various construction materials and their applications in construction
4. various branches / systems of Civil Engineering

Course Contents:

Introduction

Introduction to Civil Engineering, Civil Engineering Projects, Role of Civil Engineer in construction activities, , Importance of Civil engineering in infrastructure development of the country

Investigations

Data collection for planning and design, Topographical investigations – surveying and leveling, Geological Investigations, Geotechnical Investigations, Hydrological Investigations,

Construction materials

Construction materials- Building stones, sand, aggregates, bricks –types and dimensions, Qualities of good bricks, Classification of bricks, cement-types and grades, mortar, P.C.C R.C.C- Grades, Solid and concrete blocks, ACC blocks, Reinforcement- Types and grades, M.S. Rolled steel sections, Aluminium sections, Roof coverings sheets, Flooring Tiles-types, Glass, Aluminium sections, Bitumen, Industrial timber products-veneer, Ply wood, particle board, fibre board, batten board, block board, pre-laminatedboards, laminates

BuildingPlanning, drawingsand Estimates

Elements of a building, Basic requirements, Principles of planning, orientation, Introduction to building rules and bye laws, Building area terms-f plinth area and carpet area
Scales, Plan, Elevation, sections, dimensioning, construction notes, symbols for construction materials, Concept of Line plans, site plan and location plan

Units of measurements, Types of estimate- approximate and detailed

Branches of Civil Engineering

Basics of water resources engineering **:**Types of irrigation schemes, Types of Dams – Gravity dams and earth dams and their suitability, Bandhara

Basics of environmental engineering**:** Sources of water, Demand of water, Quality of water, waste water, Need of water treatment and waste water treatment

Basics of transportation engineering **: Modes of** Transportation - Roads, railways, bridges, tunnels and airports, docks and harbours , Typical cross sections of roads

Mega structures in Civil Engineering

Text Books:

1. Ramamrutham, Basic Civil Engineering, Dhanapatrai Publications, New Delhi, 2013
2. Bhavikatti S. S., Basic Civil Engineering, New Age Publication, 2010
3. Gopi S., Basic Civil Engineering, Pearson Education India, 2009
4. B. C. Punmia & Ashok Kumar Jain, Basic of Civil Engineering, Firewall Media, 2003

Reference Books and website links:

1. S.C. Rangwala, Engineering Materials, Charotar Publications, 2008
2. S.C. Rangwala, Engineering Materials, Charotar Publications
3. C. P. Kaushik, Basic of Civil and Environmental Engineering, , New Age Publication
4. M.S.Palanichamy, Basic Civil Engineering, McGraw Hill

Course Outcomes:

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

CE1201.1 Describe importance of Civil Engineering and role of Civil Engineer in infrastructure development
CE1201.2 Explain various types of investigations required for Civil Engineering projects
CE1201.3 Describe various building materials and their use/ application in Civil Engineering Constructions
CE1201.4 Explain basics of Civil engineering Planning, drawings and Estimates
CE1201.5 Describe various details related to branches of Civil Engineering

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CE1201.1	-	-	-	-	-	-	-	-	-	2	-	-	2	3	1
CE1201.2	-	-	-	-	-	-	-	-	-	2	-	-	2	3	1
CE1201.3	-	-	-	-	-	-	-	-	-	2	-	-	2	3	1
CE1201.4	-	-	-	-	-	-	-	-	-	2	-	-	2	3	1
CE1201.5	-	-	-	-	-	-	-	-	-	2	-	-	2	3	1

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

Course Code	CEU1203							Course category			ES10
Course Name	ENGINEERING MECHANICS LAB										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	---	02	02	---	--	---	---	25	-	25	01

Course Objectives:

To make the students will be able to:

1. Verify the principles of mechanics experimentally.
2. Develop the skill of using graphical methods /machines for thesolution of mechanics problems.
3. Describe the motion of a particle/ rigid bodies in terms of its position, velocity and accelerationin different frames of reference.

Course Contents:

It is a representative list of practical with minimum of **eight** experiments with graphical solutions& use of machines. The instructor may choose experiments as per his requirements (so as to cover the entire contents of the course) from the list or otherwise.

1. Determination of resultant of coplanar concurrent force system by law of polygon of forces.
2. Determination of reactions at the supports of simple supported beam.
3. Determination of forces in the members of Jib crane.
4. Determination of coefficient of friction between inclined glass planes and different blocks.
5. Determination of coefficient of friction between belt and fixed drum.
6. Determination of mechanical advantage, velocity ratio and efficiency of simple screw jack machine.
7. Determination of mechanical advantage, velocity ratio and efficiency of machine. (such as differential wheel axle machine, single purchase crabs machine, double purchase crabs machine, worm and worm wheel machine etc)
8. Determination of moment of inertia of flywheel.
9. Verification of Newton's second law of motion by Fletcher's trolley.
10. Motion curves for particles / rigid bodies.
11. Inversions of four bar and Slider Crank Mechanism:
12. Gears and Gear Trains: Spur gear (single and Multi-Stage), Helical Gear, Bevel gear, Herringbone gear, Worm gear, Rack and pinion arrangement;
13. Determine the mass moment of inertia of a given object using triflerPendulum
14. Determination of forces in the members of trusses by graphical method.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

CE1203.1 conduct laboratory experiments to determine MI, forces, reactions, moments and friction coefficient.

CE1203.2 conduct laboratory experiments on simple machine to determine their efficiency.

CE1203.3 conduct laboratory experiment to verify laws of mechanics

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CE1203.1	2	-	-	-	-	-	-	-	-	1	-	-	2	1	-
CE1203.2	2	-	-	-	-	-	-	-	-	1	-	-	2	1	-
CE1203.3	2	-	-	-	-	-	-	-	-	1	-	-	2	1	-

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

ICA –InternalContinuous Assessmentshall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	CE1212							Course category		EX2
Course Name	BUILDING CONSTRUCTION									
Teaching Scheme				Examination Scheme						Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	-	-	30	20	-	-	-	-	50	03

Course Objectives:

To make the students aware and understand:

1. Various types of buildings according to NationalBuildingCode
2. Various components of building, their functions, types and suitability
3. Various construction processes
4. Joints in construction and temporary support required during construction

Course Contents:

Introduction

Types of building as per National Building Code, Types of structures-load bearing, framed and composite structures, their suitability, relative advantages and disadvantages

BUILDING COMPONENTS:

Foundations: Definition, purpose, Types of shallow foundation for buildings-spread footings for walls and columns, combined footing for columns, Raft foundation,

Floors: Floors- Definition & purpose, Ground and upper Floors- R.C.C slab, R.C.C. Beam & slab

Doors &Windows: Doors-Purpose, Sizes, Types of door frames, Types of door shutters- fully panelled, flush, louvered, glazed, sliding, revolving, rolling shutter, collapsible door, grilled door, suitability of different types of doors, Windows-Purpose, Types of windows-wooden, steel and Aluminium windows, Ventilators

Lintels: Lintels-purpose, Types of lintel, details of R.C.C. lintel and chajja

Stairs: Function, Technical terms, Requirements of good stair, Types of stairs and their suitability

Roofs: Flat & pitched roofs-suitability, Types of steel roof trusses and their suitability, Fixing of roofing sheets to trusses

CONSTRUCTION PROCESSES:

Brick Masonry: Proportion of mortars used for different works, Technical terms in brick masonry, Principles to be observed during construction, Types of bonds - Header bond, Stretcher bond, English Bond, (I and ½ brick thick walls), Construction procedure, defects in brick masonry, Reinforced Brick masonry

Concrete block masonry: Types-solid and hollow, common dimensions, Construction procedure

Plastering and pointing: Purpose, Types and their suitability, Procedure of plastering and pointing, Defects in plastering work

Damp proofing: Causes and effects, Methods of damp proofing, materials required, Water proofing compounds- suitability and uses. Details of cavity wall construction

Joints in structure: Construction joints-necessity, provision of construction joint in slab, beam and columns, Expansion joints -necessity, location, materials used, details of expansion joints at foundation and roof level for a load bearing and framed structure

Formwork &scaffolding: Construction joints-necessity, provision of construction joint in slab, beam and columns, Expansion joints -necessity, location

Text Books:

1. SushilKumar, BuildingConstruction, 19th edition,Standard Publishers Distributors, New Delhi.2008
2. B. C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, BuildingConstruction, Laxmi Publications (P) Ltd
3. S. P. Arora , S. P. Bindra, The text Book of Building Construction, Dhanpat Rai Publications, New Delhi
4. BuildingConstruction,GurucharanSingh,11thEdition,StandardBook House,NewDelhi 2010.

Reference Books and Websites:

1. P.C. Varghese, Building Construction, PHI Learning
2. NationalBuildingCodeofIndia2005,B.I.S.,2nd revision,TechnizBooksInternational,NewDelhi,2005
3. Building Materials &Components for Developing Countries, C.B.R.I., Tata Mc- Graw Hill Publishing Co. New Delhi, 1990
4. S.C. Rangwala, Engineering Materials, Charotar Publications, 2008

Course Outcomes:

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

CE1212.1	Describe different types of Buildingsas per National Building Code
CE1212.2	Describe different components of building and their functions, types and suitability
CE1212.3	Draw sketches of different building components
CE1212.4	Describe basic construction processes
CE1212.5	Describe Joints in structure, their types, necessity and temporary supports required during construction

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CE1212.1	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1212.2	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1212.3	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1212.4	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1212.5	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-

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

Course Code	CE1213							Course category			EX3
Course Name	BASIC CIVIL ENGINEERING LAB										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	-	02	-	-	-	---	50	-	50	02

Course Objectives:

To make the students competent to:

1. Draw free hand sketches of Civil Engineering components
2. Carry out Planning, drawing and estimate and setting out for a small residential building.
3. se surveying instruments for measurement of lengths, angles and areas

Course Contents:

Representative list of experiments related to the course contents of CE1201 (Basic Civil Engineering) and CE1212 (Building Construction):

A. FREE HAND SKETCHES:

(i) Bonds in Brick masonry (plans of alternative courses and elevations)
(ii) Types of stairs (Plan and elevation)
(iii) Section of wall from foundation to parapet for load bearing structure and framed structure
(iv) Any one type of door and window

B. PLANNING AND DRAWING :

(i) Planning of a small residential building (3 rooms with toilet block)
(ii) Drawings of building (Plan, elevation and section) for building in (i)

C. FIELD PRACTICALS

(i) Determination of RL of various points by Autolevel and entering readings in field book
(ii) Measurement horizontal and vertical angles by digital theodolite
(iii) Measurement of horizontal and vertical distances by Tachometer
(iv) Layout out of a small residential building (2 to 3 rooms)
(v) Use of software / apps for measurement of lengths and areas

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CE1213.1 Draw free hand sketches of Civil Engineering components.
CE1213.2 Carry out Planning, and drawing for a small residential building
CE1213.3 Use surveying instruments for measurement of lengths, angles and areas

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CE1213.1	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1213.2	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1213.3	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-

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

ICA –InternalContinuous Assessmentshall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	CE1211	Course category	EX1
Course Name	APPRENTICESHIP / INTERNSHIP OF MINIMUM EIGHT WEEKS (WITH THREE REVIEWS)		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	-	-	-	-	-	---	50	-	50	03

Course Objectives:

To make the students competent to:

1. Carry out industry internship / apprenticeship
2. Prepare report of industry internship / apprenticeship

Course Contents:

Industry internship / apprenticeship

Students must complete Internship/ / apprenticeship for a duration of minimum eight weeks, after completion of second semester of first year. The company/organization for Internship/ / apprenticeship must be approved by the DFB. All the official formalities to be completed by the student. The students should undergo related trainings and perform tasks assigned to him in the Industry, under the guidance of Industry personnel. The students shall submit the report based on the Industry Internship / apprenticeship along with the Completion Certificate given by Industry.

Industry internship / apprenticeship may be carried out in any one of the following construction industry:

i) Central Government Department related to construction of Civil Engg. Structures e.g. Central P.W.D.

ii) State Government Department related to construction of Civil Engg. Structures e.g. P.W.D., Irrigation Dept

iii) Public Sector Department related to construction of Civil Engg. Structures e.g Jeevan Pradhikaran, Municipal Corporations

iv) Private Limited Company related to construction of Civil Engg. Structures

At the end of internship / apprenticeship, sstudent should submit the report based on training received during internship / apprenticeship and also give presentation for the same to the panel of examiners / Evaluation Committee comprising of Experts appointed by the Program Head.

Course Outcome:

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

CE1211.1: prepare report based on Industry internship / apprenticeship,
CE1211.2 Give presentation based on Industry internship / apprenticeship
CE1211.3 Give presentation based on Industry internship / apprenticeship

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CE1211.1	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1211.2	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-
CE1211.3	2	-	-	-	-	-	1	-	-	1	1	1	2	3	-

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

Curriculum Structure for

B. Tech. Mechanical Engineering

Programme

(In light of NEP 2020)

NCrF Level 6

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)
Near Kathora Naka, Amravati, Maharashtra
PIN 444604
www.gcoea.ac.in

Structure for B. Tech. ProgrammeIn light of NEP 2020

For students admitted in 2023-24 onwards

Key Features of Curriculum

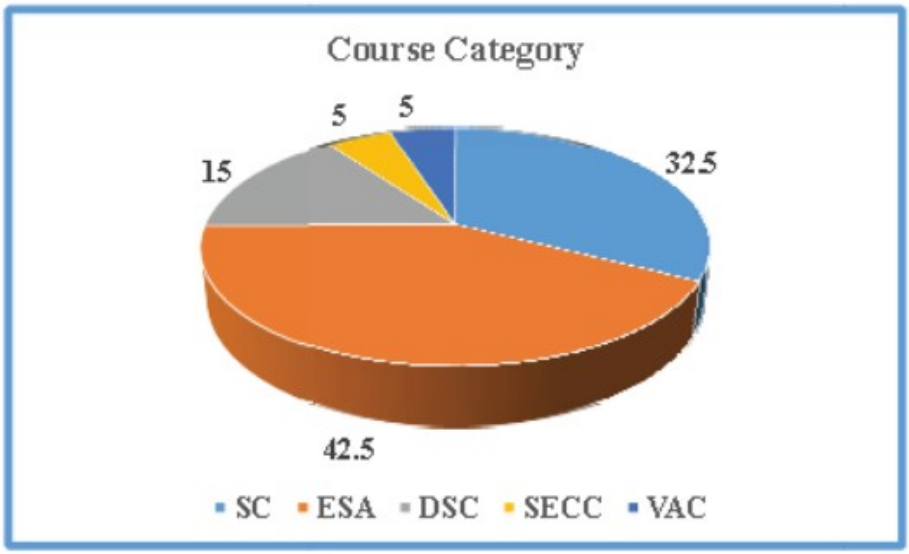
1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / NPTEL etc. courses
9. Provision for B.Tech. Honours with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.
12. Flexibility for all types of learners i.e Excellent, Good, Normal and Exit

Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Subject category wise credit distribution of first year

Course Category	Credits Semester I	Credits Semester II
Science Core (SC)	07	06
Engineering Science and Art (ESA)	07	10
Department Specific Core (DSC)	03	03
Department Specific Elective (DSE)	00	00
Open Elective (OE)	00	00
Ability Enhancement Compulsory Core (AECC)	00	00
Skill Enhancement Compulsory Core (SECC)	02	00
Value Added Courses /Project (VAC)	01	01
Total Credits	**20**	**20**

Subject category wise percentage credit distribution of first year



Sign
Member Secretary

Sign
BoS Chairperson

Sign
Dean, Academics

Sign
Principal

Credit Distribution for each year and Exit Option

NCrF Level	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational/B.Sc. Engg.	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honors and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188

SEMESTER – I													
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		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphics	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Introduction to Artificial Intelligence & Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2	30	20		50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2
IKS	SH1106	Indian Knowledge System I from Basket (Introduction to Constitution of India, Political Science, Economics etc)	2			2	30	20				50	2
Total			**15**		**10**	**25**	**210**	**90**	**300**	**150**		**750**	**20**

Sign
Member Secretary

Sign
BoS Chairperson

Sign
Dean, Academics

Sign
Principal

SEMESTER –II													
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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	CE1201	Engineering Mechanics	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	ME1215	Basic Mechanical Engineering	3			3	30	10	60			100	3
AE2	SH1203	Modern Indian Language		4		4	30	20				50	2
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
AE3	SH1207	Language Laboratory			2	2				25		25	1
ES9	CE1202	Engineering Mechanics Laboratory			2	2				25		25	1
ES10	EE1201	Basic Electrical & Electronics Engineering Laboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
Total			**14**	**4**	**10**	**28**	**210**	**90**	**300**	**100**		**700**	**20**

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programmes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in second semester vice-versa except for courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201.These courses will be offered in respective semesters only.

EXIT CRITERIA FOR U. G. CERTIFICATE (Duration 8 Weeks)														
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**		
EX1	ME1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)								50		50	3
EX2	ME1212	Workshop Technology	03			03	30	20				50	3
EX3	ME1213	3 D Modelling Laboratory			04	04				50		50	2
	Total		03		04	07	30	20		**100**		**150**	8

Government College of Engineering, Amravati
Equivalence of Courses in Old Scheme with New Scheme
B. Tech: Mechanical Engineering
Year: First Year (Semester – I & II)

Course in old scheme				Course in new Scheme		
Sr. No	**Course Code**	**Course name**	**No. of Credits**	**Course Code**	**Course name**	**No. of Credits**
1	MEU 121	Workshop Practice-I	1	ME1102	Workshop Practice	1
2	MEU 221	Engineering Graphics	2	ME1101	Engineering Graphics	2
3	MEU 222	Basic Mechanical Engineering	2	---	----No Equivalence---	---
4	MEU 223	Engineering Graphics Lab	2	ME1103	Engineering Graphics Laboratory	1
5	MEU 224	Workshop Practice- II	1	---	----No Equivalence--	---

SEMESTER – I

Course Code	**ME1101**	**Course category**	ESA
Course Name	**ENGINEERING GRAPHICS**		

Teaching Scheme				Examination Scheme							
				Theory				Practical		Total	Credits
Th	Tu	Pr	Total	MSE	TA	ESE	ESE Duration	ICA	ESE		
02	00	00	02	30	10	60	3hr 00 min	00	00	100	02

Course Objectives:

To make the students aware and understand:

1. To inculcate imagination and mental visualization capabilities for interpreting the geometrical details of common engineering objects.
2. To impart knowledge about principles/methods related to projections of one, two and three dimensional objects.
3. To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.
4. To be able to read, understand and apply the knowledge of orthographic projections (production related features and instructions) in manufacturing industry, process industry and other allied engineering application.
5. To create the image of three dimensional figures with the help of isometric projections.

Course Contents:

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Different types of lines used in drawing practices, dimensioning, Introduction to scale i.e. full size, Reducing scale and enlarging scale.

Conic sections (No focus and directrix method); Cycloid (Epicycloid, Hypocycloid), and Involute; Principles of Orthographic Projections, concepts of four quadrants and conventions used to represent methods of orthographic projection. Projections of Points and lines inclined to both planes (excluding applications of straight lines.)

Projections of Planes: Projection of planes when it is parallel to one & perpendicular to other reference plane, lying in reference plane, inclined to one & perpendicular to other reference plane, inclined to both reference planes. Auxiliary planes - Auxiliary Inclined Plane (AIP) and Auxiliary Vertical Plane (AVP), Use of Auxiliary Plane method for solving the problems.

Projections of Solids: cube, tetrahedron, prism, pyramid, cylinder and cone, projections of above solids when axis perpendicular to one of the reference planes, axis inclined to one & parallel to other reference plane

Orthographic Projections: Conversion of Pictorial views into Orthographic Projections.

Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of Planes, Simple Solids; Conversion of Orthographic projections into Isometric Projections.

Overview of Computer Graphics: Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects; consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles; applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command;

(**Note:** All projections in this course are restricted to First Quadrant only.)

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., Engineering Drawing, Charotar Publishing House (2014),
2. Shah, M.B. &Rana B.C. Engineering Drawing and Computer Graphics, Pearson Education (2008),
3. D.N. Johle, Engineering Drawing, Tata Megraw-hill publishing Co. Ltd
4. Narayana, K.L. & P Kannaiah, Text book on Engineering Drawing, Scitech Publishers (2008)
5. Corresponding set of) CAD Software Theory and User Manuals.

Reference Books :

1. Cencil Jenson, Jay D. Helsel, D. R. Short, Engineering Drawing & Design, TMH Pub
2. M. L. Dabhade, Engineering Graphics, Vision Publication
3. Kristie Plantenberg, Engineering Graphics Essentials, University of Detroit Mercy, SDC Publication
4. AutoCAD 2016 for 2016

Useful Links:

1. https://nptel.ac.in/courses/112103019/
2. https://www.standardsmedia.com/IS-SP-46--Engineering-Drawing-Practice-for-Schools-and-Colleges-4915-book.html
3. http://www.engineering108.com/

Course Outcomes:

ME1101.1 Get acquainted with principles of engineering drawing

ME1101.2 Practice standard conventions to prepare engineering drawings

ME1101.3 Visualize the geometry and shape of the products

ME1101.4 Translate the geometrical information of engineering objects into engineering drawings

ME1101.5 Use computer aided drafting/solid modelling software

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1101.1	0	3	3	2	2	2	0	2	3	3	3	1	1	2	3
ME1101.2	1	2	2	1	3	1	2	1	0	1	2	2	1	1	3
ME1101.3	2	1	3	1	0	2	2		2	1	0	2	2	0	0
ME1101.4	3	2	3	1	2	0	1	2	1	3	1	2	0	3	2
ME1101.5	2	3	1	3	1	3	1	0	2	3	3	3	2	0	0

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

Course Code	ME1102							Course category			ESA
Course Name	WORKSHOP PRACTICE										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
00	00	02	02	0	0	0	00	25	00	25	01

Course Objectives:

1. To develop skills to prepare job in gas & arc welding
2. To develop skills to prepare sheet metal and plumbing and blacksmith job
3. To develop skills of wood working
4. To understand the casting and moulding
5. To understand the fitting and different tools

Course contents:

Carpentry: Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning, Pattern making, types of patterns, Pattern making tools. One job on wood working joint and demonstration of pattern making on wood working lathe.

Welding: Introduction to various welding equipment and welding joints, Demonstration on Gas welding, Electric arc welding, Spot welding, Resistance welding and TIG/MIG welding One job on Arc welding

Sheet metal: Introduction to primary technology processes involving bending, punching and drawing, sheet metal tools and equipment, their uses, various sheet metal joints, surface development. One job on sheet metal joint. Pipe fitting & joints: Introduction to different types of pipefitting and joints Demonstration of pipe threading and pipe fitting.

Smithy: Introduction to various smithy tools and equipment, Introduction to forging operation, One job on upsetting, drawing down, flattening

Fitting: Introduction to types of Fits, concepts of interchangeability, different fitting tools & their use, different measuring tools, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals**,** drilling and tapping. One job involving fitting to size, male-female fitting with drilling and tapping.

Moulding & Casting: Introduction to moulding tools and equipment's, One job on preparation of mould, Demonstration of casting process

Course Outcomes:

After completion of course students will be able to

ME1102.1 Prepare a job on wood working, welding, sheet metal Black smithy, fitting and moulding

ME1102.2 Perform repairs & maintenance of metal Joints using welding

MEU1102.3 Perform Preparation of mould and casting

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1102.1	2	1	-	1	-	1	-	1	2	-	-	-	2	1	1
ME1102.2	2	-	2	-	1	-	2	1	2	-	-	-	2	1	1
ME1102.3	2	-	1	-	-	1	-	1	2	-	-	-	2	1	1

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

Course Code	**ME1103**	**Course category**	ESA
Course Name	**ENGINEERING GRAPHICS LABORATORY**		

Teaching Scheme				Examination Scheme							Credits
				Theory				Practical		Total	
Th	Tu	Pr	Total	MSE	TA	ESE	ESE Duration	ICA	ESE		
00	00	**02**	**02**	00	00	00	--	**25**	00	**25**	**01**

Course Objectives:

1. To inculcate imagination and mental visualization capabilities to read, interpret and construct basic geometrical details of common engineering objects using geometrical instruments as well as graphics software
2. To develop graphical skills related to projections of one, two and three dimensional objects/engineering products
3. To apply the knowledge of orthographic projections (production related features and instructions) in manufacturing industry, process industry and other allied engineering application
4. To create the image of three dimensional figures with the help of isometric projections
5. To develop capability of computer-aided drawing in engineering area using Solid Modelling software

Practical Work:

Half imperial (A2-594 mm X 420mm) sheets are to be drawn from the list shown below.

1) Various Engineering Curves (Four Problems)

2) Projections of Lines (Four Problems)

3) Projections of Planes (Four Problems)

4) Projections of Solids (Four Problems)

5) Orthographic Projections (Two problems on sheet and two problems using CAD software)

6) Isometric drawing and Isometric projections (Two problems on sheet and two problems using CAD software)

Course Outcomes:

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

ME1103.1 Apply the standard conventions and practices of engineering drawing

ME1103.2 Construct representative drawings of one, two and three dimensional objects/engineering

products with geometric details

ME1103.3 Translate the geometrical information of engineering objects into engineering drawings

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1103.1	1	1	0	1	2	0	2	3	0	2	1	1	3	1	2
ME1103.2	3	3	2	1	3	3	3	3	0	2	2	3	2	3	0
ME1103.3	3	1	1	2	3	1	2	1	2	2	3	2	1	2	3

0-Not correlated 1 - Weakly Correlated 2- Moderately Correlated3- Strongly Correlate

SEMESTER – II

Course Code	ME1215	Course category	PC
Course Name	BASIC MECHANICAL ENGINEERING		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	30	10	60	2 hrs. 30 min.	00	00	100	03

Course Objectives:

1. Impart the critical knowledge of metal melting, casting, mechanical working of metals and different joining processes
2. Impart the knowledge of forming methods
3. To inculcate the knowledge of Machining processes
4. To develop the knowledge of hydraulic machinery and turbines
5. To impart the knowledge of power plants and its unconventional types

Contents:

Casting: Mould and its types**,** Pattern making, Types of patterns, Types of casting processes

Machining Process: Introduction Lathe machine, drilling machine and milling machine,Introduction to CNC machines.

Forming: Hot forming and cold forming processes

Welding: Gas welding, Arc welding. TIG MIG welding and Resistance welding: working principle and its application.

Fluid Engineering: Working principal and applications of hydraulic pumps- reciprocating and centrifugal, air compressors- reciprocating and rotary pumps, hydraulic turbines- Pelton, Francis and Kaplan.

Thermal Engineering: Basic concepts of Thermodynamics, Statements of I & II Law of Thermodynamics, Vapour Power & Gas Power Cycles, Internal Combustion engines - two stroke and four stroke- S. I. and C. I. Engines, Introduction to renewable energy sources, Alternative fuels, Energy & Environment.

Text Books:

l. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India. 2014

2. Hajra Chaudhary, Workshop Technology, Vol I .Edition, DhanpatRai and Co (P) ltd

3. M. M. El-Wakil, Power Plant Technology, Mc-Graw Hill, Indian Edition

Reference Books:

1. L Mikell P. Groover. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems
2. Dgarmo, Black &Kohser, Materials and Processes in Manufacturing

Course Outcomes:

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

ME1201.1Illustrate the fundamentals of metal melting, casting, mechanical working of metals, their Necessity and importance

ME1201.2 Explain working principles and classify additive manufacturing processes.

ME1201.3 Differentiate and compare. Joining processes in terms of application, function, Advantages, disadvantages, quality and productivity Interpret necessity.

ME1201.4 Principle, Working and application of hydraulic pumps and systems

ME1201.5 Explain the concept of renewable energy sources and IC engines.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1201.1	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1201.2	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1201.3	2	2	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1201.4	1	1	-	-	-	-	-	-	1	-	-	-	1	2	1
ME12021.5	1	-	-	-	-	-	-	-	1	-	-	-	1	1	1

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

Course Code	ME1211						Course category		EX
Course Name	APPRENTICESHIP / INTERNSHIP								
Teaching Scheme				Examination Scheme					Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	-	-	-	-	-	---	50	-	50	03

Course Objectives:

To make the students competent to:

1. Carry out industry internship / apprenticeship
2. Prepare report of industry internship / apprenticeship

Course Contents:

Industry internship / Apprenticeship

Students must complete Internship/ Apprenticeship for a duration of minimum eight weeks, after completion of second semester of first year. The company/organization for Internship/ / Apprenticeship must be approved by the DFB. All the official formalities to be completed by the student.

The students should undergo related trainings and perform tasks assigned to him in the Industry, under the guidance of Industry personnel. The students shall submit the report based on the Industry Internship / apprenticeship along with the Completion Certificate given by Industry.

Industry internship / Apprenticeship may be carried out in any one of the following construction industry:

At the end of Internship / Apprenticeship, student should submit the report based on training received during Internship / Apprenticeship and also give presentation for the same to the panel of examiners / Evaluation Committee comprising of Experts appointed by the Program Head.

Course Outcome:

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

ME1211.1: Prepare report based on Industry internship / apprenticeship,

ME1211.2: Give presentation based on Industry internship / apprenticeship

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1211.1	-	3	-	3	-	-	2	-	-	1	2	1	2	-	-
ME1211.2	-	3	-	2	-	-	3	-	-	1	2	1	2	-	-

0- Not correlated 1 - Weakly Correlated2- Moderately Correlated 3- Strongly Correlated

Course Code	ME1212	Course category	EX
Course Name	WORKSHOP TECHNOLOGY		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
00	00	00	00	30	20	--	---	--	--	50	03

Course Objectives:

1. To develop the basic understanding of workshop tools and different operations
2. To develop skills and knowledge about the different wood working methods
3. To develop knowledge of different chisel files and striking hammers
4. To impart the knowledge of drill bits reamers
5. To impart the knowledge of holding devices sheet metal and casting techniques

Course contents:

Basic Workshop Tools & Operations: Methods of manufacturing processes – casting, forming, metalremoval processes, joining processes, surface finishingprocesses, basic workshop processes – carpentry, fitting, hand forging, machine forging, sheet metal work, cold and hot workingof metals.

Carpentry: Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning, Pattern making, types of patterns, Pattern making tools.

Fitting : Cutting tools Chisels: Flat chisel, cross cut chisel, half round chisel, diamond point chisel, side chisel, Files: Different parts of a file – sizes and shapes – flat file, hand file, square file ,piller file ,round file, triangular file, half round files

Saws: Hand hacksaw – solid frame, adjustable frame, specifications & uses, hand hacksaw.

Drill bits: Flat drill, straight fluted drill, twist drill, **Reamer**: Hand reamer, machine reamer, straight and spiral flutes reamers, **Striking Tools Hammers:** Parts, ball peen, cross peen, straight peen hammers, soft hammer.

Holding Devices Vices**:** Bench vice, leg-vice, hand vice, pin vice, tool makers vice, pipe vice, care of vices, specifications and uses.

Marking Tools: Surface plate, V-block, angle plate, try square, scriber, punch, prick punch, centre punch,

Sheet Metal : Metals used for sheet metal work., Measuring tools – steel rule, thickness gauge, sheet metal gauge, straight edge, scriber, divider, trammel points, punches, chisels, hammers

Casting and moulding : Moulding & Casting: Introduction to moulding tools and equipment's. Types of casting processes.

Text Books:

l. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India. 2014

2. HajraChaudhary, Workshop Technology, Vol I .II Edition, DhanpatRai and Co (P) ltd

Reference Books:

1. L Mikell P. Groover. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems

2. G garmo, Black & Kohser, Materials and Processes in Manufacturing

Course Outcomes:

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

1. Illustrate the fundamentals of metal melting, casting, mechanical working of metals, their necessity and importance
2. Explain working principles and classify additive manufacturing processes.
3. Differentiate and compare. Joining processes
4. Explain Principle and applications of unconventional machining
5. Use Measuring tools

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1212.1	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1212.2	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1212.3	2	2	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1212.4	1	1	-	-	-	-	-	-	1	-	-	-	1	2	1
ME1212.5	1	-	-	-	-	-	-	-	1	-	-	-	1	1	1

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

Code	ME1213							Course category			EX
Course Name	3D MODELLING LABORATORY										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
00	00	00	00	00	00	00	---	50	00	50	02

Course Objectives:

1. To impart students with the necessary skills for drafting and modelling machine components using CAD tools
2. To impart the fundamental knowledge in designing.
3. To develop the practical knowledge in the field component designing.

It is representative list of practical. The instructor may choose minimum six sheets as per his/her requirement from the list given below.

Course Contents:

Drawing of following machine elements using design software like Pro/Engineer/CATIA/Solidwork etc.

l. Cotter Joints

2. Knuckle Joints

3. Flange Coupling

4. Wall Bracket

5. Plummer Block

6. Stuffing Box

7. Machine tool Components

8. Rivet and Rivet Joints

Text Books:

1. Computer Graphics & Design, P.Radhakrishnan. lrd Edition, DhanpatRai& Sons. 2009

2. Using AUTOCAD. James E Fuller. 8th Edition, Dentnark Publishing Company,2004

3. SolidWorks 2022. Amit Bhatt 5th Edition, CADFOLKS 2022

4. Introduction to Solid Modeling. William E. Howard, Indian Edition McGraw Hill Education

5. A Hands on Introduction to Solidworks . Kristie Plantenberg , SDC publication 2003

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

ME1213.l. Demonstrate the complete methodology of design and drafting.

ME1213.2. Develop skills in designing the automobile engine components using software like Pro/Engineer/CATIA/Solid work etc.

ME1213.3.To know about the industrial models and their usages in practical design and manufacturing Fields

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1213.1	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1213.2	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
ME1213.3	2	2	-	-	-	-	-	1	2	-	-	-	2	1	1

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

Curriculum Structure for
First Year B. Tech. Electrical Engineering

(In light of NEP 2020)

NCrF Level 6

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Near Kathora Naka, Amravati, Maharashtra

PIN 444604

www.gcoea.ac.in

Structure for B. Tech. ProgrammeIn light of NEP 2020

For students admitted in 2023-24 onwards

Key Features of Curriculum

1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc courses
9. Provision for B.Tech. Honours with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.
12. Flexibility for all types of learners i. e Excellent, Good, Normal and Exit

Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Credit Distribution for each year and Exit Option

NCrFLevel	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational/B.Sc. Engg.	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honors and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188

SEMESTER –I													
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		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphics	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Introduction to Artificial Intelligence & Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2				50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2
IKS	SH1106	Indian Knowledge System I from Basket (Introduction to Constitution of India, Political Science, Economics etc)	2			2	30	20				50	2
Total			**15**		**10**	**25**	**210**	**90**	**300**	**150**		**750**	**20**

SEMESTER –II													
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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	CE1201	Engineering Mechanics	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	EE1215	Energy Resources and Generation	3			3	30	10	60			100	3
AE2	SH1203	Modern Indian Language		4		4	30	20				50	2
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
AE3	SH1207	Language Laboratory			2	2				25		25	1
ES9	CE1202	Engineering Mechanics Laboratory			2	2				25		25	1
ES10	EE1201	Basic Electrical & Electronics Engineering Laboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
Total			**14**	**4**	**10**	**28**	**210**	**90**	**300**	**100**		**700**	**20**

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programmes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in secondsemester vice-versa exceptfor courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201.These courses will be offered in respective semesters only.

EXIT CRITERIA FOR U. G. CERTIFICATE (Duration 8 Weeks)													
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		
EX1	EE1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)	--	--	--	--	--	--	--	50	--	50	3
EX2	EE1212	Electrical Wiring and Appliances	03	--	--	03	30	20	--	--	--	50	3
EX3	EE1213	Electrical Wiring and Appliances Laboratory	--	--	04	04	--	--	--	50	--	50	2
	Total		02	--	04	06	30	20		**100**		**150**	8

Course Code	**EE1101**
Course Name	**BASIC ELECTRICAL ENGINEERING**

Teaching Scheme				**Examination Scheme**							**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	--	--	02	30	10	60	2 hrs 30 min	--	--	100	02

Course Objectives:

To make the students aware and understand:

1. Various fundamental methodsto solve basic electrical engineering problems.
2. Concepts of magnetism and electrical machines.
3. Necessity of protection and electrical installation.

Course Contents:

DC Circuits
Electrical circuit elements (R, L and C), Kirchoff's Current andVoltage laws, analysis of simple circuits with dc excitation. Thevenin Theorems.

AC Circuits
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuitsconsisting of R, L, C, RL, RC, RLC combinations (series and parallel). Three- phase balanced circuits, voltage and current relations in star and delta connections.

Magnetic Circuits and Transformers
Basics of magnetic circuits, Magnetic materials, BH characteristics, Electromagnetic induction, ideal and practical transformer, losses, regulation and efficiency by direct loading.

Electrical Machines

Concept of rotating magnetic fields, Construction, working, starting and speed control of three-phase induction motor, Single-phase induction motor and dc motor. [No Numerical on Electrical Machines]

Electrical Installations
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types ofWires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries.Elementary calculations for energy consumption,

Text Books:

1. V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, Second edition,Tata McGraw Hill, 2007
2. Ashfaq Hussain, Fundamentals of Electrical Engineering, Dhanpat Rai & Company, 2010

Reference Books:

1. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press,2011
2. E.Hughes,Electrical and Electronics Technology, Pearson, 2010.
3. V. D. Toro, Electrical Engineering Fundamentals, Prentice Hall India, 1989.
4. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, 2010.
5. D. C. Kulshreshtha, Basic Electrical Engineering, Tata McGraw Hill, 2009.
6. B. L. Theraja, A Text Book of Electrical Technology Vol I and II, S. Chand & Company, 2020

Course Outcomes:

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

EE1101.1 To analyze and solve dc and ac circuits
EE1101.2 To understand the concept of magnetic circuits and transformers
EE1101.3 To calculate efficiency and regulation of transformers
EE1101.4 To understand the working principles of electrical machines
EE1101.5 To understand the components of low voltage electrical installations

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE1101.1	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
EE1101.2	2	3	1	2	--	-	-	-	-	-	-	-	3	-	-
EE1101.3	3	2	1	2	--	-	-	-	-	-	-	-	2	-	-
EE1101.4	3	2	1	-	-	-	1	-	-	-	-	-	3	-	-
EE1101.5	2	1	1	-	-	-	-	-	-	-	-	-	2	-	-

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

Course Code	EE1215	Course category	DSC
Course Name	ENERGY RESOURCES AND GENERATION		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	30	10	60	2 hrs 30 min	00	00	100	03

Course Objectives:

To make the students aware and understand:

1. The Challenges of using sources of energy efficiently and effectively
2. The energy conversion systems for various power plants
3. The importance and relevance of renewable energy sources

Course Contents:

Thermal and Hydro Power plant

Selection of site, working of various parts: Economizer, air preheater, condenser, cooling tower, coal handling system, ash handling system, Classification of hydro power plant according to available head, nature of load, functions of different components and their working.

Nuclear and Diesel Power plant

Methods of producing nuclear reactions, functions of different components of nuclear plant, functions of different components of diesel plant.

Solar Energy and its measurement

Solar constants, solar radiation at earth's surface, solar radiation geometry, solar radiation measurement, estimation of average solar radiation, solar radiation on tilted surface, principle of solar energy conversion in to heat, flat plate collectors, energy balance equation and collector efficiency.

Fuel cells

Chemistry applied to fuel cells, principle and operation, classification and types of fuel cells, performance characteristics of fuel cells, classification of fuel cells system.

Wind Energy

Basic principle of wind energy conversion, wind data and energy estimation, selection of site, basic components of wind energy conversion system (WECS), classification of WEC systems, generating system, energy storage, and application of wind energy.

Other energy resources

Operating principle of energy from biomass. Energy from biogas, geothermal energy. MHD power generation, energy from urban and rural waste, mini and micro hydroelectric power generation, Basic principle of tidal power, components of tidal power plants.

Text Books:

1. S.B.Pandya, Conventional Energy Technology, Tata Mc-GrawHill, 2005.
2. G.D.Rai, Non-Conventional Energy Resources, Khanna Publishers, 2001.

Reference books and websites:

1. I.M.Campbell,Energy and Atmosphere, Wiley, New York, 2006.
2. S.P.Sukhatme, Solar Energy, Tata Mc-Graw Hill, 2006.
3. B.H.Khan, Non-Conventional Energy Resources, Tata Mc-Graw Hill, 2003.
4. http://www.nptel.iitm.ac.in/
5. www.ocw.mit.edu

Course Outcomes:

At the end of this course, students will demonstrate the ability to

EE1202.1 List and explain the main sources of energy and their primary applications nationally and internationally
EE1202.2 Understand the energy scenario and the consequent growth of the power generation from renewable energy sources.
EE1202.3 Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment
EE1202.4 Understand the basic principle of wind and solar power generation, fuel cells and energy from bio-mass
EE1202.5 Understand the issues related to the grid-integration of solar and wind energy systems.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE1202.1	2	-	-	-	1	1	1	-	-	-	-	-	1	-	-
EE1202.2	2	-	-	-	1	1	1	-	-	-	-	-	1	-	-
EE1202.3	2	-	-	-	1	1	1	-	-	-	-	-	1	-	-
EE1202.4	2	-	-	-	-	1	2	-	-	-	-	-	1	-	-
EE1202.5	2	-	-	-	1	1	2	-	-	-	-	-	2	-	-

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

Course Code	EE1201	Course category	ESA
Course Name	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	02	02	--	--	--	---	25	--	25	02

Course Objectives:

To make the students able to:

1. Demonstrate the various laws and theorems of electrical circuits
2. Perform the experiments on electrical machines and able to draw the conclusion from them.
3. Design, build, test and analyse performance of various electronic circuits using Diode, Transistor and FET

Course Contents:

Minimum four experiments related to the course contents of EE1101 (Basic Electrical Engineering) and four experiments related to course contents of ET1201 (Basic Electronics Engineering) are to be performed.

Representative list of experiments related to the course contents of EE1101 (Basic Electrical Engineering):

1. To study basic safety precautions and
2. To use measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope
3. To verify Thevenin's theorem
4. Analysis of RLC series circuit – impedance calculation and verification, drawing phasor diagram
5. Analysis of RLC parallel circuit – impedance calculation and verification, drawing phasor diagram
6. To find efficiency and regulation of single-phase transformer using direct loading method
7. Demonstration of Components of LT switchgear
8. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding - slip ring arrangement) and single-phase induction machine

Representative list of experiments related to the course contents of ET1201 (Basic Electronics Engineering):

1. Study Characteristics of Diode, BJT and FET (Transistor as a Switch)
2. Study transistor (BJT, FET, MOSFET) as an amplifier
3. Study of half wave and Full-wave (Bridge) rectifier with and without capacitor filter circuit.

4. Regulated power supply: study LM78XX and LM79XX voltage regulator ICs and Zener diode as voltage regulator
5. To study clipping and Clamping circuits
6. Study of CC, CB and CE amplifier and observe its frequency response.
7. To study different BJT biasing circuits
8. To study characteristics of Phase shift Oscillator

Course Outcomes:

At the end of this course, students will demonstrate the ability to

EE1201.1 Make electrical connections and analyze the results obtained.
EE1201.2 Understand the usage of common electrical measuring instruments and components of LT switchgear
EE1201.3 Understand and verify the working of diodes, transistors

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE1201.1	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
EE1201.2	2	-	-	-	-	-	-	1	2	-	-	-	2	1	1
EE1201.3	2	2	-	-	-	-	-	1	2	-	-	-	2	1	1

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

ICA –InternalContinuous Assessmentshall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	**EE1211**	**Course category**	**EX**
Course Name	**APPRENTICESHIP/ INTERNSHIP**		

Teaching Scheme				**Examination Scheme**							**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	--	--	--	--	--	---	50	--	50	03

Student exiting the first-year of programme after securing minimum 40 credits, will have to complete the apprenticeship/ internship of minimum eight weeks duration as a partial fulfilment for the award of UG Certificate.

The company/ firm/ organization for apprenticeship/ internship shall be approved by the DFB

The student will have to submit a report after completion of apprenticeship/ internship

Course Code	**EE1212**	**Course category**	**EX**
Course Name	**ELECTRICAL WIRING AND APPLIANCES**		

Teaching Scheme				**Examination Scheme**							**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	--	--	03	30	20	--	---	--	--	50	03

Course Objectives:

To make the students able to:

1. Understand measuring instruments and measure various electrical parameters
2. Design and test domestic wiring.
3. Design and test industrial and commercial wiring

Course Contents:

DOMESTIC WIRING

Connecting common electrical accessoriesin circuits and testing them in series board.
Testing & replacement of different types of fuses.
Identification of different wiringmaterials and their specifications.
Crimping thimbles/lugs of various sizes.
Layout of wiringboards.

INDUSTRIAL WIRING

Tests on insulating materials.
Measurement of insulation resistance, of commercial and industrial installation
Industrial power wiring involving single phase & 3phase motors with switches & starters

COMMERCIAL WIRING

Inverter wiring, Control panel wiring, multistoried building wiring.
Introduction to LAN wiring.
Installation of 1 ph. and 3 ph. on line / off line UPS wiring.
Testing of Industrial wiring and UPS wiring installation.
Industrial wiring installations for mixed load, both light and power.
Layout of L.V. AC/DC machines and their panels.
Wiring of Low power A.C./ D.C. machines in metal conduit system as per I.E. Rules.
Testing of wiring installation.

ELECTRICAL APPLIANCES

Construction, working and testing of
automatic iron, geyser, induction heater. immersion rod, ceiling fan, mixer, grinder and washing machine

Text Books:

1. S. L. Uppal, Electrical Wiring, Estimating and Costing, Khanna Publisher, New Delhi
2. Satheesh Kumar, Electrical Wiring – An Introduction, Ane Books Pvt. Ltd., New Delhi
3. K. B. Bhatia, Study of Electrical Appliances and Devices, Khanna Publisher, New Delhi

Course Outcomes:

At the end of this course, students will demonstrate the ability to

EE1212.1 Design and test domestic wiring

EE1212.2 Design and test industrial wiring

EE1212.3 Design and test commercial wiring

EE1212.4Understand construction and working of electrical appliances

EE1212.5 Test electrical appliances

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE1212.1	2	-	-	-	1	1	1	-	-	-	-	-	1	-	-
EE1212.2	2	-	-	-	1	1	1	-	-	-	-	-	1	-	-
EE1212.3	-	-	-	-	1	1	1	-	-	-	-	-	1	-	-
EE1212.4	2	-	-	-	-	1	2	-	-	-	-	-	1	-	-
EE1212.5	2	-	-	-	1	1	2	-	-	-	-	-	2	-	-

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

Course Code	**EE1213**	**Course category**	**EX**
Course Name	**ELECTRICAL WIRING AND APPLIANCES LABORATORY**		

Teaching Scheme				**Examination Scheme**							**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	04	04	--	--	--	---	50	--	50	02

Course Objectives:

To make the students able to:

1. Measure various electrical parameters with proper care
2. Design, estimate, prepare and test wiring of various circuits.
3. Repair and maintain electrical appliances

Course Contents:

Minimum twenty experiments are to be performed. The representative list of experiments is given below. The concerned course coordinator shall decide the experiments to be performed.

1. Observe safety/ precaution during joints & soldering
2. Make simple straight twist and rat-tail joints in single strand conductors and make married and 'T' (Tee) joint in stranded conductors
3. Prepare a Britannia straight and 'T' (Tee) joint and western union joint in bare conductors
4. Identify the phase sequence of a 3 ø supply using a phase- sequence meter
5. Prepare and connect balanced and unbalanced loads in 3 phase star system and measure the power of 3 phase loads with safety/ precaution
6. Identify the parts of Kit-kat fuse, HRC fuse, MCB, ELCB and test their operation
7. Prepare and mount the energy meter board with due care
8. Draw and wire up the consumers main board with ICDP switch and distribution fuse box
9. Draw and wire-up single-phase domestic pump set in PVC conduit wiring as per IE rule
10. Estimate the material for wiring in PVC casing & capping for two lamps, one fan and one 6A socket outlet & wire-up
11. Demonstrate charging of battery and test for its condition with safety/ precaution
12. Install the pipe earthing & plate earthing and test it
13. Carry out earth resistance improvement
14. Measure the power and energy in a single & three phase circuit using wattmeter and energy meter with CT and PT
15. Measure the value of resistance, voltage and current using digital multi-meter
16. Install light fitting with reflectors for direct and indirect lighting
17. Connect, install and test the H.P.M.V, H.P.S.V, Halogen & metal halide lamp with accessories

18. Prepare and test a decorative serial lamp set for 190 V using 6V bulb and flasher
19. Assemble and install solar photo voltaic light
20. Wire-up PVC Conduit wiring for lighting circuit & 3 phase motor circuit with due care and safety
21. Estimate the material required for the given layout for metal conduit wiring for 3 phase 3 HP squirrel cage induction motor & wire-up as per IE rule.
22. Erect a bus bar chamber on an angle iron board and wire-up for 3
23. Determine the size of cable for main & distribution board of a workshop
24. Test an industrial wiring installation by using Megger
25. Estimate the material and wire-up PVC concealed conduit wiring of three phase installation of 3 stores office building having 4 lamps, 2 fans, one 5 A socket outlet and one buzzer in each room with ELCB protection as per IE rule
26. Prepare and connect batteries with UPS with due care and safety
27. Connect a DC generator, build up the voltage & load with proper safety
28. Service and repair an automatic iron, geyser, induction heater and immersion rod
29. Service, repair and install a ceiling fan
30. Service and repair mixer and washing machine

Course Outcomes:

At the end of this course, students will demonstrate the ability to

EE1213.1 Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;

EE1213.2 Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;

EE1213.3 Apply professional knowledge, core skills & employability skills while performing the job, and repair & maintenance work.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE1213.1	-	2	2	-	2	-	-	1	2	-	2	-	2	1	-
EE1213.2	-	2	2	-	2	-	-	1	2	-	2	-	2	1	-
EE1213.3	-	2	2	-	2	-	-	1	2	-	2	-	2	1	-

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

ICA –InternalContinuous Assessmentshall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Equivalence Scheme:

Sr. No.	New Scheme		Old Scheme	
	Course Code	Course Name	Course Code	Course Name
01	EE1101	Basic Electrical Engineering	EEU121	Basic Electrical Engineering
02	EE1202	Energy Resources and Generation	EEU323	Energy Resources and Generation
03	EE1201	Basic Electrical and Electronics Engineering Lab	EEU122	Basic Electrical Engineering Lab
04	EE1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)	---	No equivalence
05	EE1212	Electrical Wiring and Appliances	---	No equivalence
06	EE1213	Electrical Wiring and Appliances Lab	---	No equivalence

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

(An Autonomous Institute of Government of Maharashtra)

Curriculum Structure for B. Tech. Electronics and Telecommunication Engineering Programme

(In light of NEP 2020)

NCrF Level 6

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Near Kathora Naka, Amravati, Maharashtra

PIN 444604

www.gcoea.ac.in

Sign	Sign	Sign	Sign
Member Secretary	BoS Chairman	Dean Academics	Principal

(Curriculum first year w.e.f 2023-24 Batch)

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

(An Autonomous Institute of Government of Maharashtra)

Structure for B. Tech. Programme In light of NEP 2020

For students admitted in 2023-24 onwards

Key Features of Curriculum

1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / NPTEL etc courses
9. Provision for B.Tech. Honours with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.
12. Flexibility for all types of learners i. e Excellent, Good, Normal and Exit

Sign	Sign	Sign	Sign
Member Secretary	BoS Chairman	Dean Academics	Principal

(Curriculum first year w.e.f 2023-24 Batch)

Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Sign
Member Secretary

Sign
BoS Chairman

Sign
Dean Academics

Sign
Principal

Credit Distribution for each year and Exit Option

NCrF Level	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational/B.Sc. Engg.	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honors and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188

Sign
Member Secretary

Sign
BoS Chairman

Sign
Dean Academics

Sign
Principal

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

(An Autonomous Institute of Government of Maharashtra)

SEMESTER –I													
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		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphics	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Artificial Intelligence and Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2				50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2

Sign
Member Secretary

Sign
BoS Chairman

Sign
Dean Academics

Sign
Principal

(Curriculum first year w.e.f 2023-24 Batch)

IKS	SH1106	Indian Knowledge System I from Basket (Introduction to Constitution of India, Political Science, Economics etc)	2			2	30	20				50	2
Total			**15**		**10**	**25**	**210**	**90**	**300**	**150**		**750**	**20**

Sign
Member Secretary

Sign
BoS Chairman

Sign
Dean Academics

Sign
Principal

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

(An Autonomous Institute of Government of Maharashtra)

SEMESTER –II

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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	CE1201	Engineering Mechanics	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	ET1215	Electronic Communication	3			3	30	10	60			100	3
AE2	SH1203	Modern Indian Language		4		4	30	20				50	2
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
AE3	SH1207	Language Laboratory			2	2				25		25	1
ES9	CE1202	Engineering Mechanics Laboratory			2	2				25		25	1
ES10	EE1201	Basic Electrical & Electronics Engineering Laboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
Total			**14**	**4**	**10**	**28**	**210**	**90**	**300**	**100**		**700**	**20**

Sign
Member Secretary

Sign
BoS Chairman

Sign
Dean Academics

Sign
Principal

(Curriculum first year w.e.f 2023-24 Batch)

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programmes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in secondsemester vice-versa except for courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201**.** These courses will be offered in respective semesters only.

Sign	Sign	Sign	Sign
Member Secretary	BoS Chairman	Dean Academics	Principal

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

(An Autonomous Institute of Government of Maharashtra)

EXIT CRITERIA FOR U. G. CERTIFICATE
(Duration 8 Weeks)

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		
EX1	ET1211	Apprenticeship / Internship								50		50	3
EX2	ET1212	Functional Electronics	03			03	30	20				50	3
EX3	ET1213	Electronics Laboratory			04	04				50		50	2
	Total		03		04	07	30	20		**100**		**150**	8

Sign
Member Secretary

Sign
BoS Chairman

Sign
Dean Academics

Sign
Principal

(Curriculum first year w.e.f 2023-24 Batch)

Department of Electronics and Telecommunication Engineering

Equivalence Scheme

Programme Name:-B. Tech. First Year

(Electronics and Telecommunication Engineering)

Sr. No.	Course code with Name of course(old)		Credit	Course code with Name of course (new)		Credit
1	ETU221	Basic Electronics Engineering	2	ET1201	Basic Electronics Engineering	2
2		Newly Added		ET1215	Electronic Communication	3
3		Newly Added		ET1211	Apprenticeship / Internship	3
4		Newly Added		ET1212	Functional Electronics	3
5		Newly Added		ET1213	Electronics Laboratory	2

Sign Member Secretary | Sign BoS Chairman | Sign Dean Academics | Sign Principal

Course Code	ET1201							Course category			ES8
Course Name	Basic Electronics Engineering										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	-	-	02	30	10	60	2 hrs 30 min	-	-	-	02

Course Objectives:

Studentsundergoing this course are expected to

1. Know physics of Semiconductors of Diode, Transistor etc
2. Study of Solid state devices as switching and circuit component
3. Study working of Amplifier, Oscillator and Operational amplifier
4. Study Applications of Solid State devices through various Circuits

Course Contents:

SEMI-CONDUCTORS AND DIODES: Introduction, Insulators, Conduction in Metals and Semiconductors, Mobility and conductivity, Intrinsic and extrinsic semiconductors, Charge density, current components in semiconductors, Continuity equation, PN junction diode- Characteristics and analysis, Types of diodes- Zener, Photodiodes, LED, Varactor diode, tunnel diodes.

DIODE APPLICATIONS: Rectifiers and filter circuit: Half wave rectifier, Full wave rectifier, bridge rectifier and their analysis, L,C and Pi filters, Series and shunt diode clippers, Clipping at two independent levels, Clamping operation, Clamping circuit, Practical clamping circuits, Basic regulator supply using Zener diode.

TRANSISTORS: Construction and characteristics of BJT, Transistor configuration: CB, CE, CC configuration, Analysis of transistor amplifier using h-parameters, Transistor biasing and bias stabilization: Operating point, Stability factor, thermal stability, Analysis of fixed bias, collector to base bias, Emitter resistance bias circuit and self bias circuit, Bias compensation techniques.

FIELD EFFECT TRANSISTOR: Construction and characteristics of JFET, JFET biasing circuit, JFET amplifier, MOSFET construction and characteristics.

AMPLIFIERS AND OSCILLATORS: Classification of amplifiers, concept of feedback, Characteristics of feedback amplifiers, Single stage RC coupled amplifier, Oscillators, Criterion for oscillation, Phase shift oscillator. Operational Amplifier and its characteristics

Sign Member Secretary | Sign BoS Chairman | Sign Dean Academics | Sign Principal

Text Books:

1. Integrated devices & Circuits by Millman,Halkias & Jit TMH 2/e, 2008
2. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis. Nashelsky, 11th Edition, Pearson, 2015.

Reference Books:

1. Electronic Devices and Circuits by D.R. Cheruku and B.T.Krishna, Pearson, 2/e, 2008
2. Principles of Electronics, Albert Malvino and David Bates, 8th Edition, McGraw Hill, 2015.

Course Outcomes:

After Completion of Course, the student will able to

ET1201.1 Knowledge of physics of Semiconductor

ET1201.2 Knowledge of Amplifiers, OPAMP and Oscillators

ET1201.3 To understand and realise the working of solid state diodes and transistors (BJT, FET and MOSFET), as switch and circuit component

ET1201.4 Ability to choose semiconductor devices as per requirement in circuit elements for different applications.

ET1201.5 Make the circuits using Semiconductor Diode, Transistors.

CO-PO-PSO Mapping

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ET1201.1	1	-	-	-	-	1	1	-	-	-	1	3	2	-	1
ET1201.2	1	1	-	-	-	1	1	-	-	-	1	1	2	-	1
ET1201.3	1	1	-	-	-	1	1	-	-	-	1	1	2	-	1
ET1201.4	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-
ET1201.5	1	-	-	-	-	-	1	-	-	-	-	-	1	-	1

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

Sign Member Secretary | Sign BoS Chairman | Sign Dean Academics | Sign Principal

Course Code	ET1215							Course category			PC1
Course Name	ELECTRONIC COMMUNICATION										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	30	10	60	2 hrs 30 min	--	--	100	03

Course Objectives:

To make the student able

1. To introduce students with basics of communication system.
2. To understand the concept of modulation and demodulation.
3. To understand fundamentals of wave propagation and radio communication
4. To expose the students to the ideas of Radio and Television broadcasting
5. To acquire knowledge of applications in communication such as Radar and Satellite

Course Contents:

Introduction to Electronic Communication: Elements of a communication system, need for modulation, Electromagnetic spectrum and typical applications.

Modulation: Theory of Amplitude, Frequency, Phase Modulation, **Demodulation:** Concept.

Wave Propagation: Propagation of Waves

Radio Communication: AM and FM Radio transmitter and Receiver.

Television Broadcasting: Introduction to Television, Transmitter and Receiver.

Radar Communication: Principle and fundamentals, Basic Pulsed Radar System.

Satellite communication: Satellite communication systems, Satellite orbits.

Text Books:

1. Electronic Communication Systems, George Kennedy, Bernard Davis, McGraw Hill Publication, 5th edition, 2011.

Reference Books:

Sign Member Secretary | Sign BoS Chairman | Sign Dean Academics | Sign Principal

1. Satellite Communication, R. M. Gagliardi, 1 st edition, CBS publications and Distributors, 2004

Course Outcomes:

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

ET1215.1 To introduce students with basics of communication system.

ET1215.2 To describe concept of modulation and demodulation.

ET1215.3 To understand fundamentals of wave propagation

ET1215.4 Illustrate the knowledge of radio and television broadcasting

ET1215.5 Explicate various applications of communication

CO – PO – PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ET1215.1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
ET1215.2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ET1215.3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ET1215.4	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
ET1215.5	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-

0 - Not correlated 1 - Weakly Correlated2- Moderately Correlated 3- Strongly Correlated

Sign Sign Sign Sign
Member Secretary BoS Chairman Dean Academics Principal

Course Code	ET1211							Course category			EX1
Course Name	APPRENTICESHIP / INTERNSHIP										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
-	-	-	-	-	-	-	---	50	-	50	03

Course Objectives:

To make the students competent to:

1. Carry out industry internship / apprenticeship
2. Prepare report of industry internship / apprenticeship

Course Contents:

Industry internship / apprenticeship

Students must complete Internship/ / apprenticeship for a duration of minimum eight weeks, after completion of second semester of first year. The company/organization for Internship/ / apprenticeship must be approved by the DFB. All the official formalities to be completed by the student.

The students should undergo related trainings and perform tasks assigned to him in the Industry, under the guidance of Industry personnel. The students shall submit the report based on the Industry Internship / apprenticeship along with the Completion Certificate given by Industry.

Industry internship / apprenticeship may be carried out in any one of the following construction industry:

i) Central Government Department related to Electronics and Telecommunication Engineering e.g. BSNL, BHARAT ELECTRONICS etc.
ii) State Government Department related to Electronics and Telecommunication Engineering e.g. MSETC, Pune Maharashtra Power Grid Corporation of India Ltd (PGCIL)etc.
iii) Private Limited Company related to Electronics and Telecommunication Engineering AIRTEL MOBILES, SAMSUNG, VIDEOCON etc.

At the end of internship / apprenticeship, student should submit the report based on training received during internship / apprenticeship and also give presentation for the same to the panel of examiners / Evaluation Committee comprising of Experts appointed by the Program Head.

Sign Sign Sign Sign
Member Secretary BoS Chairman Dean Academics Principal

Course Outcome:

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

ET1211.1: Prepare report based on Industry internship / apprenticeship,

ET1211.2: Give presentation based on Industry internship / apprenticeship

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ET1211.1	-	3	-	3	-	-	3	-	-	1	2	1	2	-	-
ET1211.2	-	3	-	3	-	-	3	-	-	1	2	1	2	-	-

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

Sign Member Secretary | Sign BoS Chairman | Sign Dean Academics | Sign Principal

Course Code	ET1212							Course category			EX2
Course Name	FUNCTIONAL ELECTRONICS										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	30	20	00	-	-	-	50	03

Course Objectives:

To make the students aware and understand:

1. Electronic measurement and its parameters
2. Classification of transducers
3. Characteristics and selection of transducers
4. Verification of electronic measurement parameter using electronic instrumentation
5. Working principle of electronic appliances

Course Contents:

Basics of measurement and error: Units and standards; Calibration methods; Static calibration; Classification of errors, Static characteristics: Accuracy, Precision, Significant Figures, Resolution, Sensitivity and Linearity.

Transducers: Definition and classification of transducers, Characteristics of transducers, Selection of transducers, Resistive transducers, Inductive transducers, Capacitive transducers

Electronic measurement: Specification, Block diagram and working principle of Voltmeter, Electronic multimeter, General purpose oscilloscope, Digital storage oscilloscope, Function generator

Electronic Appliances: Working principle and Block diagram of Camera, Washing machine, Air conditioner, LED TV, Automated Teller Machine (ATM), Set-Top-Box, Barcode Scanner and Hearing aids

Text Books:

1. A.K. Sawhney, A course in Electrical & Electronic Measurement and Instrumentation, Dhanpat Rai and Co (P) Ltd., 2004.

2.S. P. Bali, Consumer Electronics, Pearson Education

Sign Member Secretary | Sign BoS Chairman | Sign Dean Academics | Sign Principal

Reference Books and Websites:

1. Albert D. Helfrick & William D. Cooper, Modern Electronic Instrumentation & Measurement Techniques, Prentice Hall of India, 2002.
2. A.J. Bouwens, Digital Instrumentation, Tata McGraw Hill, 1997.
3. E.W.Golding & F.C.Widdis, Electrical Measurements & Measuring Instruments, A.H.Wheeler & Co, 1994
4. https://nptel.ac.in/courses/108105153

Course Outcomes:

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

ET1212.1 Understand Electronic parameters measurement

ET1212.2 Understand classification of transducers

ET1212.3 Identify characteristics and selection of transducers

ET1212.4 Understand electronic parameter measurement using electronic instrumentation**ET1212.5**Describe working principle of electronic appliances

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ET1212.1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
ET1212.2	2	1	1	2	-	-	-	-	-	-	-	-	1	-	-
ET1212.3	2	1	1	2	-	-	-	-	-	-	-	-	1	-	-
ET1212.4	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
ET1212.5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Sign Sign Sign Sign
Member Secretary BoS Chairman Dean Academics Principal

Course Code	ET1213							Course category			EX3
Course Name	ET1213 ELECTRONICS LABORATORY										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
00	00	04	04	00	00	00	--	50	--	50	02

Course Objectives:

To make the students will be able to:

1. To observe the waveforms of AM, FM.
2. To demonstrate television and fiber optic communication link
3. To understand electronic parameter measurement using electronic instrumentation

Course Contents:

Minimum five experiments related to the course contents of ET1212 (FUNCTIONAL ELECTRONICS) and five experiments related to course contents of ET1202 (ELECTRONIC COMMUNICATION) are to be performed.

Representative list of experiments related to the course content of ET1212 (FUNCTIONAL ELECTRONICS):

1. Familiarisation of different active and passive electronic components
2. Study characteristics of resistive, inductive and capacitive transducer
3. Study of electronic multimeter and measurement of different AC, DC parameters
4. Study and perform the functionality of general purpose oscilloscope and digital storage oscilloscope
5. Study and perform the different signals of function generator using oscilloscope

Representative list of experiments related to the course contents of ET1202 (ELECTRONIC COMMUNICATION):

1. To observe the waveforms of amplitude modulation and demodulation
2. To observe the waveforms of frequency modulation and demodulation
3. To demonstrate television set
4. To demonstrate optical fiber communication link

Sign Member Secretary | Sign BoS Chairman | Sign Dean Academics | Sign Principal

5. To study mobile handset

Course Outcomes:

At the end of this course, students will demonstrate the ability to

ET1213.1 Interpret the waveforms of AM, FM.
ET1213.2 Explicate television and fiber optic communication link
ET1213.3 Understand electronic parameters measurement
ET1213.4 Understand characteristics of different types of transducer
ET1213.5 Understand working of function generator and oscilloscope

CO – PO – PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ET1213.1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
ET1213.2	1	-	-	-	-	-	2	-	-	-	-	-	-	-	2
ET1213.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ET1213.4	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-
ET1213.5	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-

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

ICA –Internal Continuous Assessment shall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment.

Sign Sign Sign Sign
Member Secretary BoS Chairman Dean Academics Principal

Curriculum Structure for B. Tech. Information Technology

(In light of NEP 2020)

NCrF Level 6

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Near Kathora Naka, Amravati, Maharashtra

PIN 444604

www.gcoea.ac.in

Structure for B. Tech. Programme In light of NEP 2020

For students admitted in 2023-24 onwards

Key Features of Curriculum

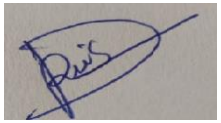
1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc courses
9. Provision for B.Tech. Honours with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.

12. Flexibility for all types of learners i.e. Excellent, Good, Normal and Exit.

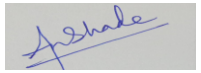
Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Credit Distribution for each year and Exit Option

NCrF Level	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational/B.Sc. Engg.	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honors and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188



Member Secretary



Sign

BoS Chairperson

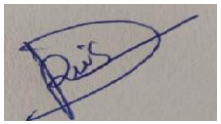
Sign

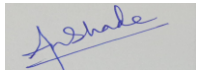
Dean, Academics

Sign

Principal

SEMESTER –I													
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		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphics	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Introduction to Artificial Intelligence & Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2				50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2
IKS	SH1106	Indian Knowledge System 1 from Basket (Introduction to Constitution of India, Political Science, Economics etc)	2			2	30	20				50	2


Member Secretary


Sign
BoS Chairperson

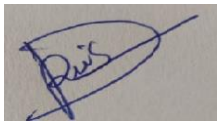

Sign
Dean, Academics

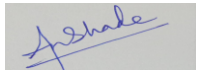

Sign
Principal

Total	15	0	10	25	210	90	300	150	-	750	20

SEMESTER –II

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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	CE1201	Engineering Mechanics	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	IT1215	Python Programming	2			2	30	10	60			100	2
AE2	SH1203	Modern Indian Language		4		4	30	20				50	2
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
AE3	SH1207	Language Laboratory			2	2				25		25	1
PC1	IT1216	Python Programming Laboratory			2	2				25		25	1
ES9	CE1202	Engineering Mechanics Laboratory			2	2				25		25	1
ES10	EE1201	Basic Electrical & Electronics Engineering Laboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
Total			**13**	**4**	**12**	**29**	**210**	**90**	**300**	**125**	**-**	**725**	**20**


Member Secretary


Sign
BoS Chairperson

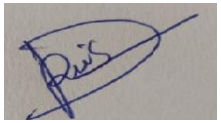

Sign
Dean, Academics

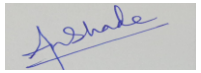

Sign
Principal

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programmes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in second semester vice-versa except for courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201**.** These courses will be offered in respective semesters only.

EXIT CRITERIA FOR U. G. CERTIFICATE
(Duration 8 Weeks)

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		
EX1	IT1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)	--	--	--	--	--	--	--	50	--	50	3
EX2	IT1212	Web Information Management	03	--	--	03	30	20	--	--	--	50	3
EX3	IT1213	Web Development Laboratory	--	--	04	04	--	--	--	50	--	50	2
	Total		03	--	04	07	30	20		**100**		**150**	8


Member Secretary

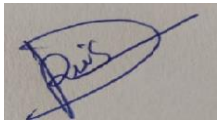

Sign
BoS Chairperson

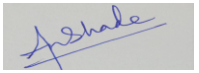

Sign
Dean, Academics


Sign
Principal

Equivalence Scheme: Information Technology Department

Sr. No.	New Scheme		Old Scheme	
	Course Code	Course Name	Course Code	Course Name
1	IT1215	Python Programming	---	No equivalence
2	IT1216	Python Programming Laboratory	ITU429	Python Programming Laboratory
3	IT1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)	---	No equivalence
4	IT1212	Web Information Management	---	No equivalence
5	IT1213	Web Development Laboratory	ITU629	Web & Internet Technology Laboratory


Member Secretary


Sign
BoS Chairperson


Sign
Dean, Academics


Sign
Principal

Course Code	**IT1215**							**Course category**			**PC1**
Course Name	PYTHON PROGRAMMING										
Teaching Scheme				**Examination Scheme**							**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	--	--	02	30	10	60	02 Hrs 30 min	--	--	100	02

COURSE OBJECTIVES

1. To develop Python programs with conditionals, loops and functions.
2. To use Python data structures – lists, tuples, dictionaries.
3. To explore various file operations and OOPS and advanced concepts.

Basics of Python Programming The Programming Cycle for PythonIDE, Interacting with Python Programs Elements of Python, Type Conversion.Variables, expressions and statements, Functions, Case Study: interface, design, Conditionals and recursion, Fruitful functions, Iteration Strings, Case Study: word play.

Lists, Strings Lists, tuples, and dictionaries - basic list operators - replacing, inserting, removing an element, searching and sorting lists. Dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries. String manipulations: subscript operator, indexing, slicing a string; strings and number system.

Files and OOPS Files: Reading and Writing, Format operator, Filenames and path, Databases, Pickling, Pipes, Writing Modules - Classes and functions, Inheritance, Data encapsulation, data modelling persistent storage of objects polymorphism - operator overloading abstract classes exception handling.

GUI Graphical user interfaces; event driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes sizes, fonts, colours layouts, nested frames Plotting, Data Visualisation and Regular expression, Design Patterns.

TEXT BOOKS

1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, Second Edition, Updated for Python 3, Shroff O‘Reilly Publishers, 2016.

Member Secretary BoS Chairperson Dean, Academics Principal

2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python –Revised and updated for Python 3.2", Network Theory Ltd., 2011.

REFERENCE BOOK

1. Martin C. Brown, "Python, the complete Reference", Tata McGraw-Hill, 2001
2. Arockia Mary P, Problem Solving and Python Programming, Shanlax Publications, 2021.

Online Resources

C. Morris, "https://www.kaggle.com/learn/python," [Online]

https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

https://w3resource.com/python-exercises/

https://www.python.org/about/gettingstarted/

https://wiki.python.org/moin/BeginnersGuide/Download

COURSE OUTCOMES

At the end of the course, the students will be able to

IT1201.1 Develop simple Python programs for solving problems.

IT1201.2 Represent compound data using Python lists, tuples and dictionaries.

IT1201.3 Design Python Programs to Read and write data from/to files

IT1201.4 Develop GUI applications for various modules.

IT1201.5 Investigate python's role in different fields.

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IT1201.1	2	3	1	1	1	0	0	0	0	0	0	1	2	1	1
IT1201.2	3	3	2	1	1	0	0	0	0	0	0	1	2	1	1
IT1201.3	3	3	3	1	1	0	0	1	0	0	0	2	2	2	2
IT1201.4	3	3	3	1	1	0	0	1	0	0	0	2	2	2	2
IT1201.5	2	3	3	1	1	2	2	2	1	1	3	2	2	2	3

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

Member Secretary BoS Chairperson Dean, Academics Principal

Course Code	**IT1216**							**Course category**			**PC1**
Course Name	PYTHON PROGRAMMING LABORATORY										
Teaching Scheme				**Examination Scheme**							**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	02	--	--	--	--	---	25	--	25	01

Course Objective

1. Exposing students to free open source software, Python and to open source packages freely available.
2. Enabling students to learn programming aspects of python to solve real-life problems and solution finding process.
3. Introduce open source software paradigm to provide exposure of collaborative team and software creation with current open source world events.

Suggested/Indicative List of Experiments/Assignments, Instructor may conduct any 10 practical based on given list:

(Note: a. Experiments/assignments can be given to students by the instructor as per current scenario of workability and availability of the technology with a flexibility of students' choice in selecting the experiments from the given list. b. Experiments aim can be updated or modified or scaled up as per the requirements of the lab sessions and can be chosen from the reference websites)

Introduction: Open Source definition, open source technology importance in a perspective of Free and open Source Software (FOSS)

I: Introduction and syntax of Python programming

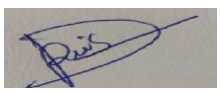
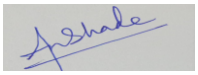
II: Python operators and Looping structures

III: Data Structures in Python

IV: Python Functions, Modules and Packages

V: Object Oriented Programming in Python

I. Experiment on basic control structures & loops.


Member Secretary BoS Chairperson Dean, Academics Principal

a) Write a program for checking the given number is even or odd.

b) Using a for loop, write a program that prints the decimal equivalents of 1/2, 1/3, 1/4 ,..... 1/10

c) Write a program for displaying reversal of a number.

d) Write a program for finding biggest number among 3 numbers.

e) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

II. Experiment on operators & I/O operations.

a) Write a program that takes 2 numbers as command line arguments and prints its sum.

b) Implement python script to show the usage of various operators available in python language.

c) Implement python script to read person's age from keyboard and display whether he is eligible for voting or not.

d) Implement python script to check the given year is leap year or not.

III. Experiment on Python Script.

a) Implement Python Script to generate first N natural numbers.

b) Implement Python Script to check given number is palindrome or not.

c) Implement Python script to print factorial of a number.

d) Implement Python Script to print sum of N natural numbers.

e) Implement Python Script to check given number is Armstrong or not.

IV. Experiment on Lists.

a) Finding the sum and average of given numbers using lists.

b) To display elements of list in reverse order.

c) Finding the minimum and maximum elements in the lists.

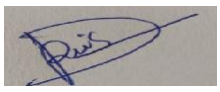
d) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

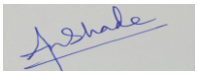
e) Write a program to compute the number of characters, words and lines in a file.

V. Experiment on Strings.

a) Implement Python Script to perform various operations on string using string libraries.

b) Implement Python Script to check given string is palindrome or not.


Member Secretary


BoS Chairperson


Dean, Academics


Principal

c) Implement python script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.

VI. Experiment on functions.

a) Define a function max_of_three() that takes three numbers as arguments and returns the largest number

b) Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between 1000 and 2000.

c) Write a program to perform addition of two square matrices.

VII. Experiment on recursion & parameter passing techniques.

a) Define a function which generates Fibonacci series up to n numbers.

b) Define a function that checks whether the given number is Armstrong

c) Implement a python script for Call-by-value and Call-by-reference

d) Implement a python script for factorial of number by using recursion.

VIII. Experiment on Tuples.

a) Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number. Suppose the following input is supplied to the program: 34, 67, 55, 33, 12, 98. Then, the output should be: ['34', '67', '55', '33', '12', '98'] ('34',67', '55', '33', '12', '98').

b) With a given tuple (1, 2, 3, 4, 5, 6, 7, 8, 9, 10), write a program to print the first half values in one line and the last half values in one line.

IX. Experiment on files.

a) Write Python script to display file contents.

b) Write Python script to copy file contents from one file to another.

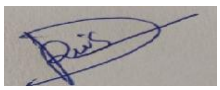
X. Experiment on searching & sorting Techniques.

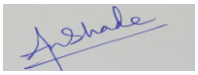
a) Implement a python script to check the element is in the list or not by using Linear search & Binary search.

b) Implement a python script to arrange the elements in sorted order using Bubble, Selection, Insertion and Merge sorting techniques.

XI. Experiment on Exception handling concepts.

a) Write a python program by using exception handling mechanism.


Member Secretary


BoS Chairperson


Dean, Academics


Principal

b) Write a python program to perform various database operations (create, insert, delete, update).

XII. Experiment on:

a) Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour.

b) Write a function that receives marks received by a student in 3 subjects and returns the average and percentage of these marks. Call this function from main() and print the result in main.

c) Write a program to demonstrate database connectivity in python.

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

XIII. Experiments on python Framework.(Architecture of any python Framework (Flask, Django etc.)

a) Create a virtual environment and start a project by installing necessary packages

b) Connect Database with your project.

c) Generate HTML Forms with Form class and store data into the database.

d) Create a Word Counter in any Framework. (The counter will count the number of occurrence of each word in a paragraph).

e) Create an application to send emails using any framework.

f) Create a Login System using any Framework.

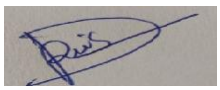
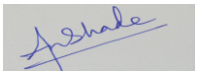
g) Create an Online School System where teacher can create assignments that students can complete and view their results.

h) Create a Weather Application using any Framework and integrate it with some APIs (Application Program Interface).

i) Introduction and small exercises on packages such as - Matplotlib (for the graph plotting), Tkinter (Python GUI programming package), Python web application using Flask, Web2py packages.

j) Introduction to Anaconda Navigator for python.

XIV. Mini Project on:


Member Secretary BoS Chairperson Dean, Academics Principal

1. Develop a mini-project of students' choice to demonstrate creativity. Eg. music player, game-station, student management systems, library management system etc.

a) Create a To-Do List app with registration, login, and CRUD Functionality.
b) Create a Chatting Application with Python.
c) Create a Token-based authentication system to work.
d) Create a Resume Builder and download that resume.
e) Create an app to take notes and store those notes in the backend database.
f) Automatic Tweet Posting
g) Railway Enquiry System.
h) Online Quiz Application
i) Ecommerce website, etc

Course Outcomes

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

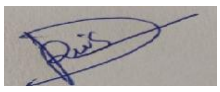
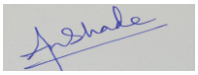
IT1202.1 Implement various applications using open source system of Python

IT1202.2 Create simple GUI applications and develop experiments using Python

IT1202.3 Develop solutions to real- world problems in constructive ways by applying knowledge of Python

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IT1202.1	3	3	0	0	3	0	0	0	0	0	0	2	2	3	1
IT1202.2	3	3	2	0	3	0	0	2	2	2	0	2	3	2	1
IT1202.3	3	3	3	2	0	2	2	2	3	2	3	2	3	3	3

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


Member Secretary BoS Chairperson Dean, Academics Principal

Course Code	**IT1211**							**Course category**			**EX1**
Course Name	**APPRENTICESHIP/INTERNSHIP**										
Teaching Scheme				**Examination Scheme**							**Credits**
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	--	--	--	--	--	---	50	--	50	03

Student exiting the first-year of programme after securing minimum 40 credits, will have to complete the apprenticeship/ internship of minimum eight weeks duration as a partial fulfilment for the award of UG Certificate.

The company/ firm/ organization for apprenticeship/ internship shall be approved by the DFB.

The student will have to submit a report after completion of apprenticeship/internship.

Member Secretary BoS Chairperson Dean, Academics Principal

Course Code	IT1212	Course category	EX2
Course Name	WEB INFORMATION MANAGEMENT		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	--	--	30	20	--	--		--	50	03

Course Objectives:

1. To learn basics of Internet and apply web page design concepts
2. To perform scripting using web pages
3. To understand markup languages
4. To design front end web page and connect to the backend databases
5. To learn for designing interactive web sites as per requirements of applications

Web Page Designing: Basic tools of internet access, www, introduction to internet programming, E-Mail, File Transfer protocol, domain Name, client server application. Standard use for www documents on internet, HTTP, MIME, SGML, DTD, MTNL, URL, URL, Static and Dynamic Web sites, Creation of web pages: HTML tags, Hyperlinks, Frames, style sheets, understanding WordPress.

Scripting-Java Script: Introduction to JavaScript, Basic Syntax, Control Structures, Writing Functions, The Document Object Model, Events Handling

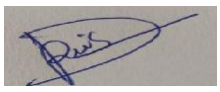
XML: XML basics, analyzing markup languages, structures and syntax, valid vs. well-formed XML, DTD (document type Definitions) classes. Scripting XML, XML processor, parent child relationship, XML as a data, data type in XML, XML namespaces

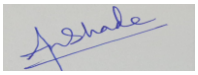
PHP: Introduction, Programming basics, Control and looping structures, Functions, Reading Data in Web Pages, Embedding PHP within HTML and connectivity with MySQL database, LAMP server

ASP.NET Fundamentals: HTTP and HTML, ASP.NET Controls, Data Validation Controls, Working with Images, CSS, Website Design Using ASP.NET: Designing sample application in ASP.net, GET & POST Requests in forms

Text Books:

1. Web Technologies: Achyut S. Godbole & Atul Kahate, 2nd edition Tata McGraw Hill publication.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
3. PHP & MySQL in easy Steps, Mike McGrath, Tata McGraw Hill, 2012


Member Secretary


BoS Chairperson


Dean, Academics


Principal

Reference Books and website links:

1. ASP.NET 3.5 Unleashed, By Stephan Walther, Sams Publishing, 2011.
2. Sams Teach Yourself JavaScript in 24 Hours, By Michael Moncur, 4th Edition 2006

Course Outcomes:

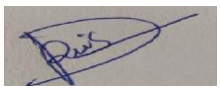
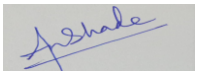
On completion of the course, students will be able to:

IT1212.1 Learn basics of Internet and apply web page design concepts.
IT1212.2 Perform scripting using web pages
IT1212.3 Analyze structure of Markup languages
IT1212.4 Design front end web page and connect to the backend databases
IT1212.5 Design interactive web sites as per the requirements of applications

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IT1212.1	3	0	0	0	0	0	1	0	0	0	0	1	2	3	1
IT1212.2	3	0	3	0	0	0	0	0	0	0	0	1	3	3	1
IT1212.3	3	1	3	0	0	0	1	0	0	0	0	1	3	3	1
IT1212.4	3	0	3	0	0	0	0	0	0	0	0	1	3	3	1
IT1212.5	3	1	3	0	0	0	2	0	0	0	0	1	3	3	1

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


Member Secretary BoS Chairperson Dean, Academics Principal

Course Code	ITU1213							Course category			EX3
Course Name	WEB DEVELOPMENT LABORATORY										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	--	--	--	--	--	---	50	--	50	02

Course Objectives:

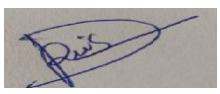
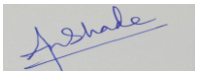
To make the students will be able to:

1. Perform the experiments on Dynamic Hyper Text Markup Language (HTML)
2. Design a application using Cascading Style Sheets (CSS)
3. Perform the practical on Hyper Text Markup Language (DHTML)
4. Develop a program on Extensible Markup Language(XML)
5. Build a web application using Hypertext Pre-processor(PHP)

Suggested/Indicative List of Experiments/Assignments, Instructor may conduct any 10 -12 practical based on given list:

List of Experiments:

1. Create a web page using different HTML tags having three links: About Us, ContactUs, Services to navigate to separate web pages.
2. Create a web page using HTML tags to illustrate the usage of
   - Ordered list
   - Unordered list
3. Create a web page that shows different methods of embedding CSS.
4. Design a web page using different HTML tags and CSS properties to show frame set having header, navigation and content sections.
5. Design a static web page which displays student personal details.
6. Write a JavaScript code that displays simple working calculator on web page.
7. Create a web page showing different methods of embedding JavaScript.


Member Secretary BoS Chairperson Dean, Academics Principal

8. Create a web page showing registration form and validate the form using JavaScript.
9. Create a web page to demonstrate the use of event handling in JavaScript.
10. Create an XML document to store student information and using CSS style sheet

    display that document in any browser.
11. Write an XML document which will display the Book information which includes the following: Title of the Book, Author Name, Publisher Name, Edition and Price. Validate the above document using DTD.
12. Write a PHP program to display the current date, time and day on web page.
13. Write a PHP program to create and display the cookies and sessions on web page.
14. Write a PHP program to connect to MySQL database and store the details entered in the registration form into the MySQL database.
15. Mini Project –Design a mini project using PHP and MySQL that accepts product information : name, category, price from web page and store that into the database and search for a product with the name specified by the user and display the search results on webpage by retrieving form the database.
16. Mini Project - Create a complete website that shows any real time application.

Course Outcomes:

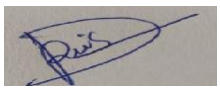
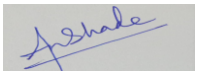
On completion of the course, students will be able to:

IT1213.1 Create and manage static web pages for given scenario.
IT1213.2 Apply web page technologies to establish web applications.
IT1213.3 Implement web applications with effective data management.

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU1213.1	2	3	1	0	0	0	0	0	0	0	0	1	2	3	1
ITU1213.2	3	3	3	0	0	0	0	0	0	0	0	1	3	2	1
ITU1213.3	3	3	3	0	0	0	0	0	0	0	0	1	2	3	1

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


Member Secretary BoS Chairperson Dean, Academics Principal

Equivalence Scheme: Information Technology

Sr. No.	New Scheme		Old Scheme	
	Course Code	Course Name	Course Code	Course Name
1	IT1215	Python Programming	---	No equivalence
2	IT1216	Python Programming Laboratory	ITU429	Python Programming Laboratory
3	IT1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)	---	No equivalence
4	IT1212	Web Information Management	---	No equivalence
5	IT1213	Web Development Laboratory	ITU629	Web & Internet Technology Laboratory

Member Secretary BoS Chairperson Dean, Academics Principal

Curriculum Structure for B. Tech. Computer Science & Engineering Programme

(In light of NEP 2020)

NCrF Level 6

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Near Kathora Naka, Amravati, Maharashtra

PIN 444604

www.gcoea.ac.in

Structure for B. Tech. Programme In light of NEP 2020

For students admitted in 2023-24 onwards

Key Features of Curriculum

1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc courses
9. Provision for B.Tech. Honours with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.
12. Flexibility for all types of learners i. e Excellent, Good, Normal and Exit

Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Credit Distribution for each year and Exit Option

NCrF Level	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational/B.Sc. Engg.	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honors and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188

SEMESTER –I													
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		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphics	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Introduction To Artificial Intelligence & Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2				50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2
IKS	SH1106	Indian Knowledge System I from Basket (Introduction to Constitution of India, Political Science, Economics etc)	2			2	30	20				50	2
Total			**15**		**10**	**25**	**210**	**90**	**300**	**150**		**750**	**20**

Member Secretary | BoS Chairperson | Dean (Academics) | Principal

SEMESTER –II

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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	CE1201	Engineering Mechanics	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	CS1215	Computation Thinking with Python	2			2	30	10	60			100	2
AE2	SH1203	Modern Indian Language		4		4	30	20				50	2
PC2	CS1216	Python Programming Lab Laboratory			2	2				25		25	1
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
AE3	SH1207	Language Laboratory			2	2				25		25	1
ES9	CE1202	Engineering Mechanics Laboratory			2	2				25		25	1
ES10	EE1201	Basic Electrical & Electronics Engineering Laboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
Total			**13**	**4**	**12**	**29**	**210**	**90**	**300**	**125**		**725**	**20**

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programmes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in second semester vice-versa except for courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201**.** These courses will be offered in respective semesters only.

EXIT CRITERIA FOR U. G. CERTIFICATE
(Duration 8 Weeks)

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		
EX1	CS1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)								50		50	3
EX2	CS1212	Web Technology	03			03	30	20				50	3
EX3	CS1213	Computer Hardware & Networking Lab			04	04				50		50	2
	Total		03		04	07	30	20		**100**		**150**	8

Equivalence of Courses in Old Scheme with New Scheme
B.Tech: Computer Science & Engineering
Year: First Year (Semester –I & II)

Courses in Old Scheme				Courses in New Scheme		
Sr No	Course Code	Course Name	No. of Credit	Course Code	Course Name	No. of Credit
1	CSU221	Programming for Problem Solving	03	CS1101	Introduction To Artificial Intelligence & Machine Learning	02
2	CSU222	Programming for Problem Solving Lab	02	CS1102	Coding Laboratory	01
3	MEU224	Computer Hardware Workshop	01	←----------No Equivalence-----→		

Course Code	CS1101							Course category		ES3
Course Name	INTRODUCTION TO ARTIFICIAL INTELLIGENCE & MACHINE LEARNING									
Teaching Scheme				Examination Scheme						Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	--	--	02	30	10	60	2 hrs 30 min	--	--	100	02

Course Objectives:

Students will be able to:
1. The need of artificial intelligence & machine learning.
2. The various techniques and algorithms to solve scientific problems.
3. Identify the patterns in the data using various machine learning algorithm
4. Understand the basic concepts of machine learning
5. Understand application of machine learning

Course Contents:

Introduction to AI and setting up of context for the course: What is machine learning and its relation with AI, Concept of Structured/Unstructured data, Exploration vs Exploitation

Introduction to three main domains of AI/ML applications:
- Numerical/Category/State Data: Tell how data is collected, and how some insights can be gathered through the data. Show how game playing like tic-tac-toe can be played, Show how sales data of a company over years can be used to plan for future, etc.
- Text/Unstructured Data: Tell how processing of text data in reviews can tell about the opinion of a product/service, give example of chatgpt on how it provides answers to logical puzzles, etc.
- Images/Video – Tell how images can be processed to find people of interest, traffic violations, etc.

Review of Mathematics for AI/ML: Matrices, Matrix Multiplication, Set Theory, Discrete Probability: random variables, expectation, independence, conditional probability, Bayes' Rule, Basic Statistics – Mean/Mode/Median, Variance, standard deviation, z-scores Vector Spaces: dot product, vector norm, vector addition, Eigen values and Eigen vectors of matrices

Introduction to Python programming: operators, syntax, statements, and expressions, libraries: NumPy, SciPy, Matplotlib, Keras, and Scikit-Learn

Hypothesis, Training Set and Testing set, Supervised and Unsupervised Learning: Maximum Likelihood, false positives and false negatives, Overfitting and Underfitting, Precision and Recall, Accuracy, correlation and causation

Classification: Binary classification, Linear Regression, Gradient Descent, Naive Bayes Classifier

Clustering: K-means clustering, Hierarchical Clustering

Introduction to Artificial Neural Networks and Deep Learning

Reinforcement Learning: Markov Decision Process, Agents and Environment, States, Rewards, Learning rate and Discount Rate, Policy Learning, Q-Learning

Text Books:

1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow", 2nd Edition, O'Reilly Media, 2019.

Reference Books/Online Resources:

1. Pedro Domingos, "A Few Useful Things to Know about Machine Learning", CACM, 2012. https://sites.astro.caltech.edu/~george/ay122/cacm12.pdf
2. Andrew Ng and Tengyu Ma, Stanford University "CS229 Machine Learning" course Lecture Notes, 2023. https://cs229.stanford.edu/main_notes.pdf
3. Trevor Hastie, Robert Tibshirani, and Jerome Friedman: "The Elements of Statistical Learning", Springer Publications, 2017.
4. Vishal Maini and Samer Sabri, "Machine Learning for Humans", 2017. https://www.dropbox.com/s/e38nil1dnl7481q/machine_learning.pdf?dl=0
5. Mathukumalli Vidyasagar, "A Tutorial Introduction to Reinforcement Learning," SICE Journal of Control, Measurement and System Integration, 2023. https://arxiv.org/pdf/2304.00803.pdf

Course Outcomes:

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

CS1101.1	Apply the knowledge of searching and reasoning techniques for different applications.
CS1101.2	Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning.
CS1101.3	Apply the knowledge of classification algorithms on various dataset and compare results.
CS1101.4	Model the neuron and Neural Network, and to analyze ANN learning and its applications.
CS1101.5	Identifying the suitable clustering algorithm for different pattern.

CO – PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS1101.1	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CS1101.2	2	3	1	2	--	-	-	-	-	-	-	-	3	-	-
CS1101.3	3	2	1	2	--	-	-	-	-	-	-	-	2	-	-
CS1101.4	3	2	1	-	-	-	1	-	-	-	-	-	3	-	-
CS1101.5	2	1	1	-	-	-	-	-	-	-	-	-	2	-	-

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

Course Code	CS1102							Course category			ES4
Course Name	CODING LABORATORY										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	02	02	--	--	--	--	25	--	25	01

Course Objective:

1. To introduce basics of programming and develop logical thinking of students.
2. To help students understand how to model real world problems into the software
3. To implement mathematical statistical, applications into programming using C Language.

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 laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:

Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:

Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:

Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:

Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings

Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:

Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):

Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls

Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation

Lab 11: Pointers and structures

Tutorial 12: File handling:

Lab 12: File operations

Course Outcomes:

The student will able to

CS1102.1	Formulate the algorithms for simple problems and translate given algorithms to a working and correct program.
CS1102.2	Correct syntax errors as reported by the compilers
CS1102.3	Write iterative as well as recursive programs
CS1102.4	Represent data in arrays, strings and structures and manipulate them through a program
CS1102.5	Declare pointers of different types and use them in defining self-referential structures.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS1102.1	2	2	-	2	-	-	-	-	-	-	-	-	2	2	-
CS1102.2	2	3	1	2	--	-	-	-	-	-	-	-	3	2	-
CS1102.3	3	2	1	2	--	-	-	-	-	-	-	-	2	-	-
CS1102.4	3	2	1	-	-	-	1	-	-	3	-	-	3	-	2
CS1102.5	2	1	1	-	-	-	-	-	-	-	-	-	1	-	-

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

Course Code	CS1215							Course category			PC1
Course Name	COMPUTATION THINKING WITH PYTHON										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	--	--	02	30	10	60	2 Hrs 30 Min	--	--	100	02

Course Objective:

To make the students aware and understand:

1. To introduce core programming basics and problem solving
2. To Demonstrate the concept of control structure and looping,
3. To Demonstrate the concept of classes , object, function and operation on various data structure
4. To demonstrate about Python string and file handling ,
5. To understand about Functions, Modules and Mat plot library in Python Programming

Course Content:

Introduction and problem solving: Introduction to python programming, History, Feature and application of Python Programing, Input-Output, Indentation. Types - Integers, Strings, Booleans

Programming Fundamentals & Control Structures: Interactive and Script Mode, Comments, Variables, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, control flow if, if else, nested if else, loops, while, for, nested loops, break, continue and pass,

Class and Object and Function: Classes, Object, Methods and Constructors, Various operations on List, Tuple, Set, and Dictionaries, functions: optional arguments, default values, Passing functions as arguments, recursion, Importing Packages.

Strings and File Handling: String processing. Various String Operation such as comparison , slicing , splitting , Stripping etc. , Exception handling, Basic input/output, Handling files and Various operation of Files such as Create, open, Read. Write, Append and Close,

Visualization in Python: Matplotlib Package – Plotting Graph - Controlling Graphs – Adding Text – More Graph Types – Getting and Setting Values in graph

Text Books

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2017.
2. Mark Lutz, Learning Python, Orielly, 3 Edition 2007.
3. Ashwin Pajankar Hands-on Matplotlib: Learn Plotting and Visualizations with Python 3

Reference Books

1. Think Python, 2 Edition, 2017 Allen Downey, Green Tea Press
2. Core Python Programming, 2016 W.Chun, Pearson.
3. Introduction to Python, 2015 Kenneth A. Lambert, Cengages
4. Matthes, **Eric**, **Python** crash course : a hands-on, project-based introduction to **programming**
5. https://www.w3schools.com/python/python_reference.asp
6. https://www.python.org/doc/
7. https://archive.nptel.ac.in/courses/106/106/106106182/
8. https://nptel.ac.in/courses/115104095

Learning Outcomes:
Student should be able to

CS1215.1 Understand the basic concepts and problem solving in python
CS1215.2 understand the conditional and lopping statements
CS1215.3 Explore python data structures like Lists, Tuples, Sets and dictionaries.
CS1215.4 Explore python the string and file handling concept
CS1215.5 Ability to create practical and contemporary applications using Functions, Modules and mat plot libraries

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS1215.1	3	3	2	---	-	-	-	-	-	-	-	-	2	--	2
CS1215.2	3	3	2	---	--	-	-	-	-	-	-	-	3	1	1
CS 1215.3	1	3	3	2	--	--	---	--	--	--	--	3	3	1	3
CS1215.3	3	2	3	---	---	--	--	--	--	--	--	2	3	--	2
CS1215.5	3	1	2	--	--	-	-	-	-	-	-	2	2	1	1

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

Course Code	CS1216							Course category			PC2
Course Name	PYTHON PROGRAMMING LABORATORY										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	02	02	--	--	--	--	25	--	25	01

Objectives:

1. To perform various core programming basics.
2. To Demonstrate the concept of control structure and looping,
3. To Demonstrate the concept of classes , object, function and operation on various data structure
4. To implement Python string and file handling ,
5. To Implement Functions, Modules and Mat plot library in Python Programming

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.

- Introduction to Python concept of Data Types, Looping Statements, Conditional Statements, List, Dictionary etc.
- Demonstrate the following Operators in Python with suitable examples.
  i) Arithmetic Operators ii) Relational Operators iii) Assignment Operator iv)Logical Operators v) Bit wise Operators vi) Ternary Operator
  vii) Membership Operators viii) Identity Operators
- Demonstrate the following Conditional statements in Python with suitable examples.
  i) if statement ii) if else statement iii) if – elif – else statement
- Demonstrate the following Iterative statements in Python with suitable examples. i) while loop ii) for loop
- d) Demonstrate the following control transfer statements in Python with suitable examples. i) break ii) continue iii) pass
- Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.
- Enter the number from the user and depending on whether the number is even or odd, print out an appropriate message to the user.
- Write a program to generate the Fibonacci series.

- Write a function that reverses the user defined value.
- Write a function to check the input value is Armstrong and also write the function for Palindrome.
- Write a recursive function to print the factorial for a given number
- Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise.
- Write a program to print pyramid pattern in python
- Write a program to demonstrate the use of All string functions in Python
- Demonstrate the following functions/methods which operates on tuples in Python with suitable examples:
  i) len( ) ii) count( ) iii) index( ) iv) sorted( ) v) min ( ) vi)max( ) vii) cmp( ) viii) reversed( )
- Write a program that takes two lists and returns True if they have at least one common member
- Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements.
- Write a Python program to clone or copy a list
- Create a list named friends and include elements like name, date of birth, lucky number, favorite colour, weight, and height.
- Calculate the total number of zeros, positive and negative elements in the list.
- Write a Python script to sort (ascending and descending) a dictionary by value
- Write a Python script to concatenate following dictionaries to create a new one.
  dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60}
- Demonstrate the following functions/methods whichoperates on dictionary in Python with suitable examples:
  i) dict( ) ii) len( ) iii) clear( ) iv) get( ) v) pop( ) vi)popitem( ) vii) keys( ) viii) values()ix) items( ) x) copy( ) xi) update( )
- Write a Python program to sum all the items in a dictionary
- Read a number from the keyboard and check whether the entered number is present or not in the list. If present, then also print the occurrences of a entered number
- Write a program to take in the roll number, name and percentage of marks for n students of Class XI and do the following:
- Accept details of the n students (n is the number of students). Search details of a particular student on the basis of roll number and display result. Display the result of all the students. Find the topper amongst them. Find the subject toppers amongst them.
- Write a program to implements students' management system using OOP Concept.
- Write a program to Display the percentage or CGPA of students in the range of 80-100, 70-80,60-70,40-50, 1-40by using Matplotlib library
- Write a program to create the histogram in Python

Text Books

1. Mark Lutz, Learning Python, Orielly, 3 Edition 2007.

2. Python Programming: A Modern Approach, VamsiKurama, Pearson, 2017.

Reference Books

1. Think Python, 2nd Edition, 2017 Allen Downey, Green Tea Press
2. Core Python Programming, 2016 W.Chun, Pearson.
3. Introduction to Python, 2015 Kenneth A. Lambert, Cengages
4. Matthes, Eric, Python crash course: a hands-on, project-based introduction to programming
5. https://www.w3schools.com/python/python_reference.asp
6. https://www.python.org/doc/
7. https://archive.nptel.ac.in/courses/106/106/106106182/
8. https://nptel.ac.in/courses/115104095

Learning Outcomes:

Student should be able to

CS1216.1 Understand and implements the basic concepts
CS1216.2 Understand and implements conditional and lopping statements
CS1216.3 Apply python data structures like Lists, Tuples, Sets and dictionaries.
CS1216.4 Explore python the string and file handling concept
CS1216.5 Create practical and contemporary applications using Functions, Modules and mat plot libraries

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS1216.1	3	3	2	---	-	-	-	-	-	-	-	-	2	--	2
CS1216.2	3	3	2	---	--	-	-	-	-	-	-	-	3	1	1
CS 1216.3	1	3	3	2	--	--	---	--	--	--	--	3	3	1	3
CS1216.3	3	2	3	---	---	--	--	--	--	--	--	2	3	--	2
CS1216.5	3	1	2	--	--	-	-	-	-	-	-	2	2	1	1

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

Course Code	CS1212							Course category		EX2
Course Name	WEB TECHNOLOGY									
Teaching Scheme				Examination Scheme						Credits
Th	Tu	Pr	Total	Theory				Practical		Total
				MSE	TA	ESE	ESE Duration	ICA	ESE	
--	--	--	--	30	20	--	---	--	--	50	03

Course Objectives:

To make the students aware and understand:

1. The fundamentals of web design
2. Web application development procedures
3. Using environment, frameworks and tools to create websites
4. The basics of database and the connection with web pages
5. Develop the skills to create fully functional and responsive web sites.

Course Contents:

Introduction to the Basics of Web

Web Basics: Internet, Intranet, WWW, Static and Dynamic Web Page; Web Clients; Web Servers; Client Server Architecture: Single Tier, Two-Tier, Multi-Tier; HTTP: HTTP Request and Response; URL, Client Side Scripting, Server Side Scripting, Web 1.0, Web 2.0, SDLC

Hyper Text Markup Language

Introduction to HTML; Elements of HTML Document; HTML Elements and HTML Attributes, Headings, Paragraph, Division, Formating: b, i, small, sup, sub; Spacing: Pre, Br; Formatting Text Phrases: span, strong, tt; Image element; Anchors; Lists: Ordered and Unordered and Definition; Tables; Frames; Forms: Form Elements, ID attributes, Class Attributes of HTML Elements; Meta Tag, Audio, Video, Canvas, Main, Section, Article, Header, Footer, Aside, Nav, Figure Tags; HTML Events: Window Events, Form Element Events, Keyboard Events, Mouse Events

Cascading Style Sheets

Introduction; Cascading Style Sheets (CSS); CSS Syntax; Inserting CSS: Inline, Internal, External, ID and Class Selectors; Colors; Backgrounds; Borders; Text; Font; List; Table; CSS Box Model; Normal Flow Box Layout: Basic Box Layout, Display Property, Padding, Margin; Positioning: Relative, Float, Absolute; CSS3 Borders, Box Shadows, Text Effects and shadow; Basics of Responsive Web Designs; Media Queries, Introduction to Bootstrap

Client Side Scripting with JavaScript

Structure of JavaScript Program; Variables and Data Types; Statements: Expression, Keyword, Block; Operators; Flow Controls, Looping, Functions; Popup Boxes: Alert, Confirm, Prompt;

Objects and properties; Constructors; Arrays; Built-in Objects: Window, String, Number, Boolean, Date, Math, RegExp, Form, DOM; User Defined Objects; Event Handling and Form Validation, Error Handling, Handling Cookies, jQuery Syntax; jQuery Selectors, Events and Effects; Introduction to JSON

Server Side Scripting using PHP

PHP Syntax, Variables, Data Types, Strings, Constants, Operators, Control structure, Functions, Array, Creating Class and Objects, PHP Forms, Accessing Form Elements, Form Validation, Events, Cookies, and Sessions, Introduction to oracle database, Connecting to Database, Creating, Selecting, Deleting, Updating Records in a table, Inserting Multiple Data

Text Books:

1. Web Design with HTML, CSS, JavaScript and jQuery Set, Jon Duckett, John Wiley & Sons
2. Learning PHP, MySQL & JavaScript: with jQuery, CSS & HTML5, Robin Nixon, O'Reilly

Reference Books and Websites:

1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and AJAX, Black Book, Dreamtech Press
2. HTML, XHTML, and CSS Bible by Steven M. Schafer, Fifth Edition, Wiley Publishing, Inc.

Course Outcomes:

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

CS1212.1 To create the user friendly UI using HTML, CSS etc.
CS1212.2 To script client and server side as per the requirements using Java Script.
CS1212.3 To create visualization as per UI/UX theories.
CS1212.4 Analyze the requirements from web site owner and deliver to their satisfaction.
CS1212.5 Create fully functional, usable, interactive, user friendly and responsive Web Sites.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS1212.1	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CS1212.2	2	3	1	2	--	-	-	-	-	-	-	-	3	-	-
CS1212.3	3	2	1	2	--	-	-	-	-	-	-	-	2	-	-
CS1212.4	3	2	1	-	-	-	1	-	-	-	-	-	3	-	-
CS1212.5	2	1	1	-	-	-	-	-	-	-	-	-	2	-	-

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

Course Code	CS1213	Course category	EX3
Course Name	COMPUTER HARDWARE AND NETWORKING LAB		

Teaching Scheme				Examination Scheme							Credit
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	02	02	--	--	--	----	50	--	50	02

Course Objectives

1. To understand to identify hardware components of computer.
2. To Train the students to acquire knowledge in PC Hardware, Software and the field of Networking. 2. To understood and gain knowledge in the basics of PC assembling and networks.
3. To impart detailed knowledge on the setup and maintain of LAN with internet connection
4. To impart knowledge of installation, identification, repairing and upgrading all hardware equipment.

Course Content:

Hardware Identification:

Open the cabinet and identify various motherboards components, connectors, slots, ports (USB, VGA, DVI, and HDMI), cables and Connectors. Identify Motherboard Components and connections. CPU (Processor) RAM (Memory) Hard Drive Connections Mechanical vs. Solid State Drives ROM Drives Graphic Cards, Sound Cards. Use Post Error Debug Card and understand error Code for fault troubleshooting.

Remove-Test Replace/ Install:

Check DDR3 and DDR4 RAM's FSB. Insert it on memory slot. Test and understand various beep sounds in case of trouble. Troubleshoot defects related to SMPS. Install a Graphic and sound cards. Removing the Processor, Installing the Processor. Understand and identify various different processor sockets. Testing of CMOS Battery with multimeter. Replace it. Boot the PC through a BOOTABLE DVD of OS. Partition the disk, Format the drive. Install

Windows 7 and Windows 10 from DVD Disk. How to Backup/Restore your Windows partition with the bootable image. Practise Windows 7 and 10 registry tweaks. Open Device Manager, find various devices and install appropriate driver software (audio, video, chipset, LAN, WLAN, printer and monitor). Configure config.sys file. Open firewall option from control panel. Enable and disable firewall. Allow and block application and port.

User Account Customization:

Create and configure user accounts in Windows 7/8/10. Create Administrator and Limited user account. Install any popular antivirus software. Online and offline updating of antivirus. Extract or uncompress a compressed file. How to compressor make files into one file (use program like WinZip / Winrar).

Junk File Removal:

Use various free and paid Disk clean up utility to remove junk files from hard disk.

Data backup and data recovery:

Use various types of media to backing up your data, and when each method is appropriate. Use Data Recovery software. Recover emails, files, and data from a crashed hard drive or computer.

Outlook Configure & Backup:

Configure outlook and connect with Gmail, use thunderbird IMAP/POP3 along with security features. Configuration of Browsers. Backup and Restore Outlook.

Components of the Computer Network:

Identify various Network tools like : (a) Wire crimper, (b) Wire Map Testers, (c) Multifunction Cable Tester, (d) LAN Tester, (e) Tone Generator etc. Identify various Network device like: (a) Switch (Normal and Managed), (b) Router (Normal and wireless), (c) Rack, Patch Panel, i/o box, (d) Access Point etc. Understand the Layout of network on your lab and campus

Crimping, Punching and Network configuration:

208. Practice crimping with straight and cross CAT 6 cables. . Create cabling in a lab with HUB/Switch and IO Boxes and patch panel.

Text Book:

1. Complete Reference PC Hardware, Craig Zacker, John Rourke, Mc Graw Hill Publication
2. Mastering PC Hardware & Networking, Dr. Ajit Mittal, Dr. Ajay Rana

Course Outcome:

CS1213.1 Assemble and repair Desktop Computer with all its hardware components.

CS1213.2 Install different Operating System and all other application software.

CS1213.3 Set up and configure Networking System using various network devices.

CS1213.4 Share and control resource and Internet connection through network.

CS1213.5 Install and configure Windows server.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS1213.1	2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CS1213.2	2	3	1	2	--	-	-	-	-	-	-	-	3	-	1
CS1213.3	3	2	1	2	--	-	-	-	-	-	-	-	2	-	1
CS1213.4	3	2	1	2	--	-	-	-	-	-	-	-	2	-	1
CS1213.5	3	2	1	2	--	-	-	-	-	-	-	-	2	-	1

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

Curriculum Structure for B. Tech. Instrumentation Engineering Programme

(In light of NEP 2020)

NCrF Level 6

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Near Kathora Naka, Amravati, Maharashtra

PIN 444604

www.gcoea.ac.in

Member Secretary | BoS Chairperson | Dean (Academics) | Principal

Structure for B. Tech. ProgrammeIn light of NEP 2020

For students admitted in 2023-24 onwards

Key Features of Curriculum

1. Multiple entry and exit option after every year.
2. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Co-Curricular Courses (CC) in addition to program core courses.
3. Mandatory internship of one semester.
4. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
5. Mandatory Non-Credit Courses.
6. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
7. Skill based courses and multiple exit level.
8. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc courses
9. Provision for B.Tech. Honours with Research degree through research project.
10. Opportunity for learner to choose courses of their interest in all disciplines.
11. Provision of Skill Based Courses and internship/Field project for exit options at each level.
12. Flexibility for all types of learners i. e Excellent, Good, Normal and Exit

Excellent Students	Normal Students	Exit
B. Tech. Major with Multidisciplinary Minor	B. Tech. Major with Multidisciplinary Minor	Additional 08 credits in the form of skill-based courses / labs, internship, mini projects shall be offered in 8 weeks.
B. Tech. Honors and Multidisciplinary Minor	--	
B. Tech. Honors with Research and Multidisciplinary Minor	--	
B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	--	

Credit Distribution for each year and Exit Option

NCrFLevel	Year / Semester	Exit Option	Credits	Additional Credits for exit students	Total Credits
4.5	Semester I & II	U. G. Certificate	40	08	48
5.0	Semester III & IV	U. G. Diploma	84	08	92
5.5	Semester V & VI	B. Vocational/B.Sc. Engg.	128	08	136
6.0	Semester VII & VIII	B. Tech. with Multidisciplinary Minor	170	--	170
		B. Tech. Honorsand Multidisciplinary Minor	170+18=188	--	188
		B. Tech. Honors with Research and Multidisciplinary Minor	170+18=188	--	188
		B. Tech. with Double Minor (Multidisciplinary and Specialization Minor)	170+18=188	--	188

Member Secretary BoS Chairperson Dean (Academics) Principal

SEMESTER –I

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		
		Induction Program											0
BS1	SH1101	Mathematics-I	3			3	30	10	60			100	3
BS2	SH1102	Physics	2			2	30	10	60			100	2
ES1	ME1101	Engineering Graphics	2			2	30	10	60			100	2
ES2	EE1101	Basic Electrical Engineering	2			2	30	10	60			100	2
ES3	CS1101	Introduction to Artificial Intelligence & Machine Learning	2			2	30	10	60			100	2
AE1	SH1103	Communication Skill			2	2				50		50	1
BS3	SH1104	Physics Laboratory			2	2				25		25	1
ES4	CS1102	Coding Laboratory			2	2				25		25	1
ES5	ME1102	Workshop Practice			2	2				25		25	1
ES6	ME1103	Engineering Graphics Laboratory			2	2				25		25	1
VE1	SH1105	Environmental Science	2			2	30	20				50	2
IKS	SH1106	Indian Knowledge System I from Basket (Introduction to Constitution of India, Political Science, Economics etc)	2			2	30	20				50	2
Total			**15**		**10**	**25**	**210**	**90**	**300**	**150**		**750**	**20**

Member Secretary | BoS Chairperson | Dean (Academics) | Principal

SEMESTER –II

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		
BS4	SH1201	Mathematics-II	3			3	30	10	60			100	3
BS5	SH1202	Chemistry	2			2	30	10	60			100	2
ES7	CE1201	Engineering Mechanics	2			2	30	10	60			100	2
ES8	ET1201	Basic Electronics Engineering	2			2	30	10	60			100	2
PC1	IN1215	Elements of Measurement	2			2	30	10	60			100	2
AE2	SH1203	Modern Indian Language		4		4	30	20				50	2
BS6	SH1204	Chemistry Laboratory			2	2				25		25	1
AE3	SH1207	Language Laboratory			2	2				25		25	1
ES9	CE1202	Engineering Mechanics Laboratory			2	2				25		25	1
ES10	EE1201	Basic Electrical & Electronics Engineering Laboratory			2	2				25		25	1
PC2	IN1216	Elements of Measurement Laboratory			2	2				25		25	1
VE2	SH1205	Universal Human Values	2			2	30	20				50	2
MNC1	SH1206	Yoga & Fitness			2	2						0	0
Total			**13**	**4**	**12**	**29**	**210**	**90**	**300**	**125**		**725**	**20**

Note: In first semester the students of Civil, Mechanical, Electrical and Instrumentation programmes will be offered the courses mentioned under semester I and the students of Computer, IT and Electronics will be offered the courses mentioned under semester II and in second semester vice-versa except for courses SH1101, EE1101, SH1103, SH1201, ET1201, and EE1201.These courses will be offered in respective semesters only.

Member Secretary BoS Chairperson Dean (Academics) Principal

EXIT CRITERIA FOR U. G. CERTIFICATE (Duration 8 Weeks)													
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		
EX1	IN1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)								50		50	3
EX2	IN1212	Industrial Instrumentation	03			03	30	20				50	3
EX3	IN1213	Industrial Instrumentation Laboratory			04	04				50		50	2
	Total		03		04	07	30	20		**100**		**150**	8

Member Secretary | BoS Chairperson | Dean (Academics) | Principal

Equivalence of Courses

Existing structure with New Structure (NEP)

B. Tech: Instrumentation Engineering Year: First Year (Semester – I & II)

New to Old

S. N.	Courses in new scheme (172 credits)			Courses in old Scheme (164 Credits)			Remarks
	Course Code	Course Name	No of Credits	Course Code	Course Name	No of Credits	
1	IN1215	Elements of Measurement	02		No equivalence		Newly Added
2	IN1216	Elements of Measurement Lab	01		No equivalence		Newly Added
3	IN1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)	03		No equivalence		Newly Added
4	IN1212	Industrial Instrumentation	03		No equivalence		Newly Added
5	IN1213	Industrial Instrumentation Lab	02		No equivalence		Newly Added

Member Secretary BoS Chairperson Dean (Academics) Principal

Course Code	IN1215	Course category	ESA
Course Name	ELEMENTS OF MEASUREMENT		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
02	--	--	02	30	10	60	2 hrs 30 min	--	--	100	02

Course Objectives:

To make the students aware and understand:

I. To distinguish the static & dynamic characteristics of an instrument along with theirerror types.
II. To use oscilloscope in measurement of voltage and frequency.
III. To use the different meters required for measurement of electric parameters.
IV. To understand the operation of power and energy measurement.
V. To learn the basic bridges used for R, L, C measurement

Course Contents:

Measurements and errors: Fundamentals of measurements, methods of measurements, Classification of instruments, Static and dynamic characteristics of instruments, Errors in measurements, Types of static Errors, sources of Error, Statistical Analysis.

Oscilloscope: Block diagram of cathode Ray oscilloscope Basic oscilloscope circuits, Observation of Waveform on oscilloscope, CRO Probes measurement of voltage and current, phase and frequency, multi input oscilloscope(Dual beam oscilloscope , dual trace oscilloscope),Introduction of DSO.

Analog and digital meters: D'Arsonval galvanometer, construction, torque equation and dynamic behaviour of galvanometer, PMMC instrument construction, torque equation and error in PMMC instrument, Moving iron instrument construction, torque equation and error in MI instrument ,ohmmeter, DC ammeter, DC voltmeter, multi-range meters.

Measurement of power and Energy: Measurement of Power in DC and AC circuits, Electrodynamometer of wattmeter type instruments: construction, Principle of operation, EDM Wattmeter (single phase) anderrors present. Single phase induction type energy meter, theory, error and compensation, advantages and disadvantages and digital energymeter.

Text Books:

1. A. K. Sawhney, "Electrical and Electronic Measurements and Instrumentation",Dhanpat Rai and Sons, 11th ed., 2000.
2. H S Kalsi, "Electronic Instrumentation", Tata McGraw-Hill, Third ed., 2010

Reference Books and Websites:

1. U.A Bakshi and A.V.Bakshi , "Electrical measurements", Technical PublicationsPune 1 January 2010
2. Albert D. Helfrick, William David Cooper, "Modern electronic Instrumentation andMeasurement Techniques" Prentice Hall, Second ed., 1990
3. Clyde F. Coombs, "Electronic Instrument Handbook", McGraw-Hill, Third ed.,2000.
4. Rohit Khurana, "Electronic Instrumentation and measurement", VIKAS publication.
5. J. B. Gupta, Electrical and Electronic Measurements & Instrumentation, S. K.Katariya & Sons, 1969.

Course Outcomes:

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

IN1215.1 : Distinguish the static & dynamic characteristics of an instrument along withtheir error types

IN1215.2 : Measure the voltage and frequency using oscilloscope

IN1215.3: Use the different meters required for measurement of electric parameters.

IN1215.4 : Understand the operation of power and energy measurement.

IN1215.5 : Differentiate the use of bridges for measurement of R, L, C.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IN1215.1	2	2	-	-	-	-	-	-	-	1	-	-	2	-	-
IN1215.2	2	2	1	2	--	-	-	-	-	-	-	-	1	-	-
IN1215.3	3	2	1	2	--	-	-	1	-	-	-	-	2	-	1
IN1215.4	3	2	1	-	--	-	1	-	-	-	1	-	2	1	-
IN1215.5	2	1	1	-	1	-	-	-	-	-	-	-	2	-	1

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

Course Code	IN1216	Course category	ESA
Course Name	ELEMENTS OF MEASUREMENT LABORATORY		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	02	02	--	--	--	---	25	25	50	01

Course Objectives:

To make the students will be able to:

I. Demonstrate the various types of Measuring Instruments
II. Perform the experiments on electrical machines and able to draw the conclusion from them.
III. Analyze performance of various analog and digital meters.

Course Contents:

Representative list of experiments related to the course contents of IN1201 (**Elements of Measurement**):

1. Determination of Phase Difference Dual Beam/Trace Method Lissajous Figures Method
2. Measurement of voltage, frequency &phase with the help of CRO
3. Calibration and Testing of single phase energy Meter .
4. Usage of DSO for steady state periodic waveforms produced by a function generator. Selection of trigger source and trigger level, selection of time-scale and voltage scale. Bandwidth of measurement and sampling rate.
5. Study of Galvanometer and Determination of Sensitivity and Galvanometer Constants.
6. Measurement of voltage, current and resistance using DC potentiometer
7. Measurement of reactive power using single wattmeter in three-phase circuit.
8. Study of Spectrum Analyzers.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

IN 1216.1 Make electrical connections and analyze the results obtained.
IN 1216.2 Understand the usage of common electrical measuring instruments and components.
IN 1216.3 Explain various measurements techniques for industrial and laboratory applications of various transducers.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IN1216.1	1	1	1	-	-	-	1	1	2	-	-	-	1	1	1
IN1216.2	2	-	-	1	-	-	-	1	1	-	-	1	1	1	1
IN1202.3	2	2	-	1	-	-	-	1	1	-	-	-	-	1	-

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

ICA –Internal Continuous Assessment shall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise using continuous assessment formats, A and B.

Course Code	IN1212	Course category	ESA
Course Name	INDUSTRIAL INSTRUMENTATION		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	--	--	30	20	--	--	--	--	50	03

Course Objectives:

To make the students aware and understand:

I. To select and use required sensor for temperature measurement
II. To derive the working principle and characteristics of pressure transducers.
III. To apply the appropriate flow sensors in classified applications.
IV. To choose the appropriate f sensor for different applications like temperature, pressure,level and flow
V. To understand the basic principles of various smart sensors.

Course Contents:

Temperature Measurement: Introduction, various temperature scales, Expansion thermometers: liquid-in-glass thermometers, bimetallic thermometers, Pressure thermometers: Vapour pressure thermometer, liquid filled thermometer, glass filled thermometer, Electrical resistance thermometer (RTD), thermistors, Thermocouple thermometers: thermoelectric effects, thermocouple, thermocouple material, advantages and limitations of various thermometers

Pressure Measurement: Introduction, various pressure scales, Manometers: Simple manometer, differential manometer, Mechanical gauges: elastic pressure elements, pressure gauges, Electrical pressure transducers: resistive, inductive and capacitive type, advantages and limitations of various pressure gauges

Level Measurement: Methods of level measurement: Direct method: float gauges, sight glass level gauge, Indirect methods: hydrostatic pressure devices, capacitive type level measurement, ultrasonic type level measurement techniques, gamma ray liquid level measurement, Comparative assessment of various level sensors

Flow Measurement: Essential principles of fluid mechanics and properties of fluid, types of fluid flow, continuity equation, Bernoulli's equation, hydrostatic law and pascal's law, Selection criteria of flow sensors. Head Type Flow Meter: Orifice, venturi, nozzle, pitot tube. Variable Area Type Flow Meter: Rota-meter Open Channel: Turbine, Target, Electro Magnetic, Ultrasonic, Vortex Shedding, anemometers. Mass Flow Meter: Coriolis, Thermal & solid flow meters

Smart Sensors & its Applications: Introduction, Definition, Block Diagram of Smart Sensors, Difference between non smart Sensors &Smart Sensors, Smart Transducers, Introduction to Internet of Things (IoT) Sensors and actuators.

Text Books:

1. Bentley, J. P., "Principles of measurement systems", 3rd edition, Pearson Education Asia pvt.ltd
2. Rangan, Mani, Sharma, "Instrumentation: Devices and Systems", 2nd edition,McGraw Hill, 2017
3. A K. Sawhney, "A course in Electrical and Electronic Measurements andInstrumentation"

Reference Books and Websites:

1. Murthy, D.V.S., "Transducers and Instrumentation", Prentice Hall of India Pvt Ltd.
2. Nubert, H.K.P., "Instruments Transducers", Clarenden Press, Oxford
3. Patranabis, D., "Sensors and Transducers", Wheeler Publishing Co. Ltd, NewDelhi.
4. http://nptel.iitm.ac.in

Course Outcomes:

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

IN1212.1: Select and use required sensor for temperature measurement
IN1212.2: Derive the working principle and characteristics of pressure transducers.
IN1212.3: Apply the appropriate flow sensors in classified applications.
IN1212.4: Choose the appropriate f sensor for different applications like temperature, pressure,level and flow.
IN1212.5: Understand the basic principles of various smart sensors

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IN1212.1	2	2	-	-	-	-	-	-	-	1	-	-	2	-	1
IN1212.2	2	2	1	-	--	-	-	-	-	-	-	-	1	-	-
IN1212.3	3	2	1	-	--	-	-	1	-	-	-	-	2	1	1
IN1212.4	3	2	1	-	-	-	1	-	-	-	1	-	2	1	-
IN1212.5	2	1	-	-	-	-	-	-	-	2	-	-	2	1	1

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

Course Code	IN1213	Course category	ESA
Course Name	INDUSTRIAL INSTRUMENTATION LAB		

Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				MSE	TA	ESE	ESE Duration	ICA	ESE		
--	--	--	--	--	--	--	---	50	--	50	02

Course Objectives:

To make the students will be able to:

I. Perform the experiments on various transducers and able to draw the conclusionfrom them
II. Make the students aware of basic concepts of measurement and operationof different types of transducers.
III. Construct the connection diagram for plotting the characteristics of givensensor/ transducer

Course Contents:

Representative list of experiments related to the course contents of **IN1212 (Industrial Instrumentation)** out of them any eight experiments can be perform.

1. To study the characteristics of Resistance Temperature Detector.
2. To study the characteristics of Thermocouple.
3. Characteristics of diaphragm type pressure transducer.
4. Level measurement using ultrasonic transducer.
5. Level measurement using capacitive transducer.
6. Flow measurement using Rotameter and orifice plate
7. Design and Test Air purge probe for Level Measurement
8. Study of Smart sensors

Course Outcomes:

At the end of this course, students will demonstrate the ability to

IN1213.1 Perform the experiments on various transducers and able to draw the conclusionfrom them
IN1213.2 Make the students aware of basic concepts of measurement and operation of different types of transducers.
IN1213.3 Construct the connection diagram for plotting the characteristics of given sensor/transducer

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IN1213.1	1	1	1	-	-	-	1	1	2	-	-	-	1	1	1
IN1213.2	2	-	-	1	-	-	-	1	1	-	-	1	1	1	1
IN1213.3	2	2	-	1	-	-	-	1	1	-	-	-	-	1	-

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

ICA –Internal Continuous Assessment shall be based on the practical record and knowledge/skills acquired. The performance shall be assessed experiment wise usingcontinuous assessment formats, A and B

Equivalence of Courses

Existing structure with New Structure(NEP)

B. Tech: Instrumentation Engineering Year: First Year (Semester – I & II)

New to Old

S. N.	Courses in new scheme (172 credits)			Courses in old Scheme (164 Credits)			Remarks
	Course Code	Course Name	No of Credits	Course Code	Course Name	No of Credits	
1	IN1215	Elements of Measurement	02		No equivalence		Newly Added
2	IN1216	Elements of Measurement Lab	01		No equivalence		Newly Added
3	IN1211	Apprenticeship / Internship of minimum eight weeks (with three reviews)	03		No equivalence		Newly Added
4	IN1212	Industrial Instrumentation	03		No equivalence		Newly Added
5	IN1213	Industrial Instrumentation Lab	02		No equivalence		Newly Added