GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI.

Department of Electrical Engineering

Scheme for B. Tech. (Electrical Engineering)

SEM III

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
						Theory				Practical		Total	
		Theory Hrs /week	Tutorial Hrs /week	Practical Hrs /week	Total	TA	CT1	CT2	ESE	ICA	ESE		
SHU303	Engineering Mathematics - III	3	--	---	3	10	15	15	60	---	---	100	3
ETU311	Electronic Devices and Circuits	3	---	---	3	10	15	15	60	---	---	100	3
EEU301	Signals & Systems	3	1	---	4	10	15	15	60	---	---	100	4
EEU302	Network Analysis	3	1	---	4	10	15	15	60	---	---	100	4
EEU303	Electrical Measurement and Instrumentation	3	---	---	3	10	15	15	60	---	---	100	3
ETU312	Electronic Devices and Circuits Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU304	Signals & Systems Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU305	Network Analysis Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU306	Electrical Measurement and Instrumentation Lab	---	---	2	2	---	---	---	---	25	25	50	1
SHU305	General Proficiency - II	1	---	2	3	---	---	---	---	50	---	50	2
Total		**16**	**2**	**10**	**28**	**50**	**75**	**75**	**300**	**150**	**100**	**750**	**23**

SEM IV

SHU401	Engineering Mathematics - IV	3	--	---	3	10	15	15	60	---	---	100	3
EEU401	Pulse & Digital Circuits	3	1	---	4	10	15	15	60	---	---	100	4
EEU402	Electrical Machines - I	3	---	---	3	10	15	15	60	---	---	100	3
EEU403	Energy Resources & Generation	3	---	---	3	10	15	15	60	---	---	100	3
EEU404	Electromagnetic Engineering	3	1	---	4	10	15	15	60	---	---	100	4
SHU402	Engineering Mathematics Lab	1	---	2	3	---	---	---	---	25	25	50	2
EEU405	Pulse & Digital Circuits Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU406	Electrical Machines - I Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU407	Numerical Methods Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU408	Computational Lab - I	---	---	2	2	---	---	---	---	25	25	50	1
Total		**16**	**2**	**10**	**28**	**50**	**75**	**75**	**300**	**125**	**125**	**750**	**23**

NOTE:

1) TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Continuous Assessment

2) The ESE duration for all theory courses shall be 2 Hrs 30 Minutes.

SEM V													
EEU501	Electrical Machines -II	3	---	---	3	10	15	15	60	---	---	100	3
EEU502	Power System Analysis- I	3	---	---	3	10	15	15	60	---	---	100	3
EEU503	Control System - I	3	---	---	3	10	15	15	60	---	---	100	3
EEU504	Introduction to Microprocessor and Microcontrollers	3	---	---	3	10	15	15	60	---	---	100	3
EEU505	Industrial Organization & Management	3	---	---	3	10	15	15	60	---	---	100	3
EEU506	Electrical Machines - II Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU507	Power System Analysis - I Lab	---	---	2	2	---	---	---	---	25	---	25	1
EEU508	Control System - I Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU509	Introduction to Microprocessor and Microcontrollers Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU510	Computational Lab-II	1	---	2	3	---	---	---	---	25	25	50	2
EEU511	Self Study - I	---	---	----	0	---	---	---	---	25	---	25	2
Total		**16**	**0**	**10**	**26**	**50**	**75**	**75**	**300**	**150**	**100**	**750**	**23**

NOTE :

1) Self study - I is based on one class test each on the basis of 20% curriculum of the courses EEU501,EEU502,EEU503,EEU504 declared by respective course coordinator at the beginning of the semester.

2) One faculty member shall be appointed as course coordinator for self study - I and his/her teaching work-load shall be consider 1 hr/week

SEM VI													
EEU601	Power Electronics	3	--	---	3	10	15	15	60	---	---	100	3
EEU602	Power System Analysis - II	3	---	---	3	10	15	15	60	---	---	100	3
EEU603	Control System - II	3	---	---	3	10	15	15	60	---	---	100	3
EEU604	Electrical Machine Design	3	---	---	3	10	15	15	60	---	---	100	3
EEU605	Operation Research Techniques	3	---	---	3	10	15	15	60	---	---	100	3
EEU606	Power Electronics Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU607	Power System Analysis - II Lab	---	---	2	2	---	---	---	---	25	---	25	1
EEU608	Control System - II Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU609	Electrical Machine Design Lab	---	---	2	2					25	25	50	1
EEU610	Minor Project	----	----	2	2	---	----	---	----	25	25	50	2
EEU611	Self Study - II	---	---	----	0	---	---	---	---	25	---	25	2
EEU612	Industrial Lecture - I*	1	---	----	1	---	---	---	---	---	---	0	---
Total		**16**	**0**	**10**	**26**	**50**	**75**	**75**	**300**	**150**	**100**	**750**	**23**

NOTE:

1) TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Continuous Assessment

2) The ESE duration for all theory courses shall be 2 Hrs 30 Minutes.

3) * Credits shall be awarded on the basis of combined assessment of Industrial Lecture-I and Industrial Lecture-II

4) Self study-II is based on one class test each on the basis of 20% curriculum of the courses EEU601,EEU602,EEU603,EEU604 declared by respective course coordinator at the beginning of the semester.

5) One faculty member shall be appointed as course coordinator for self study-II and his/her teaching work-load shall be consider 1 hr/week

6)Assessment of Industrial Lecture - I is scheduled in VII sem with Industrial Lecture-II

SEM VII													
EEU701	Switch Gear and Protection	3	---	---	3	10	15	15	60	---	---	100	3
EEU702	Linear & Digital Integrated Circuits	3	---	---	3	10	15	15	60	---	---	100	3
EEU703	Elective - I	3	---	---	3	10	15	15	60	---	---	100	3
EEU704	Interdisciplinary Elective	3	---	---	3	10	15	15	60	---	---	100	3
EEU705	Switch Gear and Protection Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU706	Linear Integrated Circuits Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU707	Elective Lab - I	---	---	2	2	---	---	---	---	25	25	50	1
EEU708	Project Phase - I	---	---	4	4	---	---	---	---	50	--	50	2
EEU709	Seminar	---	---	2	2	---	---	---	---	25	25	50	2
EEU710	Industrial Training /Visit	---	---	---	0	---	---	---	---	50	---	50	1
EEU711	Industrial Lecture - II*	1	---	---	1	---	---	---	---	25	---	25	1
EEU712	Self Study - III	---	---	---	0	---	---	---	---	25	---	25	2
Total		**13**	**0**	**12**	**25**	**40**	**60**	**60**	**240**	**250**	**100**	**750**	**23**

NOTE:

1) * Credits shall be awarded on the basis of combined assessment of Industrial Lecture-I and Industrial Lecture-II

2) Self study - III is based on one class test each on the basis of 20% curriculum of the courses EEU701,EEU702,EEU703 declared by respective course coordinator at the beginning of the semester.

3) One faculty member shall be appointed as course coordinator for self study - III and his/her teaching work-load shall be consider 1 hr/week

4) Students of this department shall select any on Interdisciplinary Elective offered by other departments. Interdisciplinary Elective shown below will be offered to students of the other department.

SEM VIII													
EEU801	Power Systems Dynamics	3	---	---	3	10	15	15	60	---	---	100	3
EEU802	Electrical Drives and Control	3	---	---	3	10	15	15	60	---	---	100	3
EEU803	Elective - II	3	---	---	3	10	15	15	60	---	---	100	3
EEU804	Elective - III	3	---	---	3	10	15	15	60	---	---	100	3
EEU805	Power Systems Dynamics Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU806	Drives and Control Lab	---	---	2	2	---	---	---	---	25	25	50	1
EEU807	Elective Lab-2	---	---	2	2	---	---	---	---	25	25	50	1
EEU808	Project Phase - II	---	---	6	6	---	---	---	---	75	100	175	6
EEU809	Self study - IV	---	---	---	0	---	---	---	---	25	----	25	2
Total		**12**	**0**	**12**	**24**	**40**	**60**	**60**	**240**	**175**	**175**	**750**	**23**

NOTE:

1) TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Continuous Assessment

2) Duration of ESE is 2 Hrs 30 Minutes for all courses

3) Self study - IV is based on one class test each on the basis of 20% curriculum of the courses ,EEU801,EEU802,EEU803,EEU804 declared by respective course coordinator at the beginning of the semester.

4) One faculty member shall be appointed as course coordinator for self study - IV and his/her teaching work-load shall be consider 1 hr/week

LIST OF ELECTIVES

Interdisciplinary Elective (EEU704)	Elective - I (EEU703)	Elective II (EEU803)	Elective III (EEU804)
A) Electromechanical Energy Conversion	A) Digital Signal Processing	A) Multirate DSP and Wavelet	A) HVDC and FACTS
B) Robotics and Automation	B) Advanced Microprocessor	B) Computer Application in EE	B) High Voltage Transmission
	C) Computer Methods in Power System Analysis	C) Network Synthesis	C) Power Quality & Deregulation
	D) Power System Operation and Control	D) Artificial Neural Network	D) Statistical Signal Processing

SHU303 ENGINEERING MATHEMATICS III

Teaching Scheme : 03 L Total: 03 **Credit: 03**

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**

Duration of ESE : 2 Hrs.30 min.

Linear Differential Equations with constant coefficients:

General solution to L.D.E. of n^{th} order with constant coefficients, rules for finding Complementary function., General method for finding Particular integral, P.I. of some standard functions, Method of Variation of Parameters, Cauchy's and Legendre's L.D.E., simultaneous linear differential equations .

Partial Diff. Equations:

Definition, formation of P.D.E., complete solution of PDE, Linear and non-linear PDE of types (i) $f(p, q)= 0$, (ii)$f(p, q, z)= 0$, (iii)$f(p, q, x, y)= 0$,(iv)$f(p, q, x, y, z)= 0$ ie Lagrange's form $Pp+Qq=R$ and Clairaut's form $z = px + qy + f(p, q)$, (v)Equations reducible to above forms. Complete solution of PDE of first and second order by method of separation of variables.

Vector Calculus:

Scalar and vector point functions, Differentiation of a vector function, Tangent and normal components of velocity and acceleration, orthogonal curves, Operator delta, Gradient of scalar point function& their physical meaning . Divergence and Curl of vector point function & their physical meaning. vector identities, solenoidal and conservative fields. Line integral, work done by force.

Functions of complex variables:

Analytic function, C-R equations (Cartesian & polar), Harmonic function, Milne Thompson method for finding analytic function, Conformal mappings, Bilinear transformation.

Text Books:

1) Text book of applied Mathematics, P.N.Wartikar and J.N.Wartikar, Pune vidyarthi griha,Pune 2001.
2) Higher Engineering Mathematics, B.S.Grewal, Khanna publication, 6^{th} edition, New Delhi, 1976.

Reference Books:

1) Advanced Engineering Mathematics, Kreyzig, John Wiley & sons 9^{th} edition 1995.
2) Advanced Engineering Mathematics, John bird 5^{th} edition Elsevier publication 2007.
3) Higher Engineering mathematics, C.R.Wiley, 8^{th} edition John Wiley and sons 1999.
4) http://www.nptel.iitm.ac.in/
5) www.ocw.mit.edu

ETU311 ELECTRONIC DEVICES AND CIRCUITS

Teaching Scheme : 03 L Total: 03 Credit: 03

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks: 100

Duration of ESE : 2 Hrs.30 min.

Diodes and applications: Diode as rectifiers (analysis of single phase rectifiers), analysis of C, L, LC and π - filter, clipping and clamping circuits. Zener diode as a voltage regulator, opto-coupler.

BJT biasing: Types**,** overview of construction, working and V-I characteristics of BJT, methods of biasing- analysis and synthesis of voltage divider biasing, d. c. load line, a. c. load line stability and stability factor.

BJT amplifiers: Transistor hybrid model for CE, CB and CC configuration, determination of h-parameters from the characteristics, analysis of CE amplifier circuit using h-parameter.

Concept of darlington emitter follower, bootstrap emitter follower, RC coupled amplifier, transformer coupled amplifier, direct coupled amplifier

FET amplifiers: Advantages and disadvantages of FET, types**,** overview of construction, working and V-I characteristics of JFET & MOSFET, parameters, method of biasing, common source AC amplifier.

Power & feedback amplifiers: Classification, analysis of class A, B, AB power amplifier – calculation of power gain, efficiency, power dissipation and distortion.

Tuned amplifiers - single tuned, double tuned amplifiers.

The feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers. Types and characteristics of voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

Oscillators & Multivibrators: Barkhausen criteria, RC oscillators - Wein bridge and phase shift, LC oscillators- Hartley, colpitt's, clapp and crystal oscillators.

Self bias bistable multivibrator, commutating capacitor, Schmitt trigger, self bias monostable multivibrator (MMV) - collector coupled. General features of a time base signal, UJT relaxation oscillator, transistor constant current sweep generator, miller and bootstrap sweep generator.

Text Books:

1) Electronic Devices and Circuits, J. Millman, C. Halkias and Satyabrata Jit, 2nd edition Tata McGraw Hill, 2008.
2) Electronic Devices and Circuits, D. R. Cheruku and B. T. Krushna, 2nd edition, Pearson Publications 2008.

Reference Books:

1) Integrated Electronics, Jacob Millman, Christos C. Halkias, 3rd edition, Tata McGraw Hill. 2006
2) Pulse Digital and Switching Waveforms, Jacob Millman, Herbert Taub, Mothiki S. Prakash Rao, 2nd edition, Tata McGraw Hill, 2007
3) http://www.nptel.iitm.ac.in/
4) www.ocw.mit.edu

EEU301/EEU411 SIGNALS & SYSTEMS

Teaching Scheme : 03 L +01T Total : 04 Credit: 04

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks: 100

Duration of ESE : 2 Hrs.30 min.

Introduction to Signals and Systems, System Properties, Convolution of Signals, Linear Shift Invariant Systems and their Properties.

Introduction to Transforms, Fourier series and Fourier Transform, Convergence of Fourier Transform, Properties of Fourier Transform.

Sampling Theorem, Sampling/Reconstruction of Signals, Realistic Sampling, Aliasing, Introduction to Digital Signal Processing, Discrete Time Fourier Transform and Properties.

Introduction to Laplace Transform and Z-Transform, Region of Convergence, Properties of Laplace and Z Transform, Inverse Laplace and Z Transforms, Rational System Functions.

Text Books:

1) Signals and Systems, S. Haykin, 2nd edition, John Wiley and Sons, 1999.
2) Analog and Digital Signal Processing, Ambardar A, Thomson Learning, 2005.

Reference Books:

1) Signals and systems, Oppenheim and Schafer Prentice, 2nd edition, Hall India of India, 1997.
2) Signal & System: Analysis using, Transform Method and Matlab, M.J.Roberts, 2nd edition, McGraw Hill company Ltd., 2003.
3) http://www.nptel.iitm.ac.in/
4) www.ocw.mit.edu

EEU302 NETWORK ANALYSIS

Teaching Scheme : 03 L +01T Total : 04 Credit: 04

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks : 100

Duration of ESE : 2 Hrs.30 min.

Terminal Element Relationships: V-I relationship for Inductance and Capacitance- Constant Flux Linkage Theorem and Constant Charge Theorem- V-I relationship for Independent Voltage and Current Sources - v-i relationship for dependent voltage and current sources- Source Functions: unit impulse, unit step, unit ramp and inter relationship, sinusoidal input ,generalized exponential input.

Basic Nodal and mesh Analysis: Introduction, Nodal analysis, the super node, mesh analysis, the super mesh, nodal vs mesh analysis, computer aided circuit analysis using Pspice

Useful circuit analysis techniques: Linearity and superposition, source transformations, Thevinin's theorem, Norton's theorem, Maximum power transfer theorem, Delta-wye transformations

Time Domain Analysis of Circuits: Linear Differential Equations for Series RC, Parallel RC, Series RL, Parallel RL, Series RLC, Parallel RLC and Coupled Circuits-Complete Solution for step/impulse/sinusoid voltage/current inputs-Natural Response-Transient Response-Time Constant-Rise and Fall times-Concept of d.c steady state and sinusoidal steady state-Frequency Response of simple circuits from steady state solution-Solution of two mesh circuits by differential equation method-Determination of initial conditions. Time domain analysis using Pspice

Review of Laplace Transforms: Laplace Transform-Transform Pairs-Gate Functions-Shifting Theorem-Solution of Differential Equations by Laplace Transforms-Initial and Final Value Theorems-Laplace Transforms of periodic signals-Inversion of transforms by partial fractions-Convolution Theorem and Convolution Integral. *(Review to be done by students. No class hour will be spent for this review.)*

Transformation of a Circuit into s-domain: Transformed equivalent of inductance, capacitance and mutual inductance -Impedance and admittance in the transform domain - Node Analysis and Mesh Analysis of the transformed circuit - Nodal Admittance Matrix and Mesh Impedance Matrix in the s-domain - Solution of transformed circuits including mutually coupled circuits-Input and transfer immittance functions - Transfer functions - Impulse response and Transfer function - Poles and Zeros - Pole Zero plots, using Pspice for transform domain analysis

Sinusoidal Steady State analysis: Introduction, characteristics of sinusoids, forced response to sinusoidal functions, the complex forcing function, The phasor, phasor relationships for R L C, impedance and admittance , sinusoidal steady state analysis with phasors, pspice for sinusoidal steady state analysis.

Two Port Networks: two port networks-characterizations in terms of impedance, admittance, hybrid and transmission parameters-inter relationships among parameter sets-Reciprocity Theorem-Interconnection of Two port networks: Series, Parallel and Cascade - Network Functions-Pole Zero plots and steady state response from pole-zero plots. Use of Pspice for two port networks.

Textbooks:

1. Engineering Circuit Analysis, Hayt & Kemmerly, 7th edition, Tata Mc Graw Hill, 2004

References:-

1. Network Analysis, M.E. Van Valkenberg, PHI , 2005
2. Basic Circuit Theory, Lawrence P Huelsman, 3rd edition, PHI, 2001
3. Circuit and Network Analysis, Sudhakar Shyammohan, Tata Mc Graw Hill, 2005
4. http://www.nptel.iitm.ac.in/
5. www.ocw.mit.edu

EEU303 ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Teaching Scheme : 03 L Total : 03 Credit : 03

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks : 100

Duration of ESE : 2 Hrs.30 min.

Measuring Instruments: Classification, deflecting, controlling, damping, breaking torques. Basic principles of operation of Ammeter & Voltmeter: PMMC, MI, Electro dynamic, Electrostatic: construction, Principle of operation, torque equation, Scale shape, errors, merits & demerits of each type.

Wattmeters & Energy meters: Electro dynamic & Induction type: construction, theory of operation, torque equation, errors & demerits, Electronic energy meter.

Analysis of three phase balanced load, Blondel's Theorem, Measurement of active & reactive power & energy in single phase & three phase circuits.

Instrument Transformer: Need of extension of range: extension using shunt & multipliers Instrument transformers: CT & PT, Theory & construction, Phasor diagram, Ratio & Phase angle error, causes of error, applications Hall effect sensors for voltage and current measurement.

Special Measuring Instruments :- Maximum demand indicator, Trivector meter, Frequency meter, P.F. meter, Phase sequence indicator, Synchroscope, stroboscope, potentiometers.

Measurement of circuit parameters: Different methods of measurement of low, medium & high value of resistance, sensitivity & accuracy of different methods.

AC & DC Bridges: Wheatstone, Kelvin, Maxwell, Wein, Hay, Desauty, Anderson, Schearing.

Generalized instrumentation system , characteristics of measurement & instrumentation system Transducers : Definition, classification, specification, selection & loading effect, Displacement, Velocity, force, & Torque transducers, Resistive, Inductive, capacitive, Strain gauge, Piezoelectric, current & voltage transducers.

Text Books:

1. A course in Electrical, Electronics measurement and Instrumentation, A.K. Sawhney, 5th edition, Dhanpat Rai & Sons, 2006

Reference Books:

1. Electrical Measurement and Measuring Instruments, Golding, Wheeler Publishing House, 2003.
2. Electronic Instrumentation, H.S. Kalsi, TMH 2000
3. Fundamentals of Electrical Measurements, C.T.Baldwin, TMH, 1998
4. http://www.nptel.iitm.ac.in/
5. www.ocw.mit.edu

ETU312 ELECTRONIC DEVICES AND CIRCUITS LAB

Teaching Scheme : 02 P Total : 02 Credit : 01

Evaluation Scheme : 25 ICA + 25 ESE Total Marks: 50

Duration of ESE : 3 Hrs.

Minimum Eight Experiments to be performed covering the Entire Syllabus of ETU311 Electronic Devices and Circuits. Representative list is as follows,

1. To study V-I characteristics of PN- junction diode and Zener diode. Also compare their characteristics.
2. To Study of diode as clipper and clamper.
3. To study half wave & full wave rectifier without filter and to calculate its ripple factor
4. To study bridge full wave rectifier without filter and to calculate its ripple factor.
5. To study half wave & full wave rectifier with filter and to calculate its ripple factor
6. To study bridge full wave rectifier with filter and to calculate its ripple factor.
7. To study the input and output characteristics of a given transistor in common emitter configuration.
8. To Study of CE amplifier- current & power gains and input, output impedances.
9. To study biasing of transistor by following method:
    a. Fixed bias.
    b. Voltage divider bias.
10. To study the frequency response of RC coupled amplifier.
11. Measurement and study of output characteristics of JFET.
12. Measurement and study of output characteristics of MOSFET.
13. To study Hartley oscillator.
14. To study the different types of negative feedback in two stage amplifier and to observe its effects upon the amplifier parameters.
15. To study biasing of transistor by following method:
    a. Fixed bias.
    b. Voltage divider bias.

Note :

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

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

EEU304 SIGNALS & SYSTEMS LAB

Teaching Scheme : 02 P Total : 02 Credit : 01

Evaluation Scheme : 25 ICA + 25 ESE Total Marks: 50

Duration of ESE : 3 Hrs.

Minimum Eight Experiments to be performed covering the Entire Syllabus of EEU301 Signals & Systems. Representative list is as follows

1. To study Z-transform of :
    a) Sinusoidal signals.
    b) Step Functions.
2. To compare fourier and laplace transorm of a signal.
3. To study convolution theorem in time and frequency domain.
4. To study signal synthesis via sum of harmonics.
5. To study LPF & HPF, band pass & reject filters using RC circuits.
6. To demonstrate how analog signals are sampled & how different sampling rates affect the outputs.
7. To study sampling theorem for low pass signals & band pass signals.
8. To determine the components of :
    a) Square Wave.
    b) Clipped Sine Wave.

Note :

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

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

EEU305 NETWORK ANALYSIS LAB

Teaching Scheme : 02 P Total 02 Credit: 01

Evaluation Scheme : 25 ICA + 25 ESE Total Marks: 50

Duration of ESE : 3 Hrs.

Minimum Eight Experiments to be performed covering the Entire Syllabus of EEU302 Network Analysis. Representative list is as follows.

1. To find self inductance of two coils, mutual inductance between the coils and coefficient of coupling.
2. To verify Maximum Power Transfer theorem.
3. To verify Compensation theorem.
4. To verify Tellegen's theorem.
5. To find Z parameters of two, two port networks connected in series.
6. To find Y parameters of two, two port networks connected in parallel.

7. To find transmission parameters of two, two port networks connected in cascade.
8. To study the response of RL series circuit to sinusoidal input and dc input (using MATLAB).
9. To study the response of RC series circuit to sinusoidal input and dc input (using MATLAB).

Note :

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

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

EEU306 ELECTRICAL MEASUREMENT AND INSTRUMENTATION LAB

Teaching Scheme : 02 P Total 02 **Credit: 01**

Evaluation Scheme : 25 ICA + 25 ESE **Total Marks: 50**

Duration of ESE : 3 Hrs.

Minimum Eight Experiments to be performed covering the Entire Syllabus of EEU303 Electrical Measurement and Instrumentation. Representative list is as follows,

1. To study LVDT.
2. To measure three phase power by two-wattmeter method.
3. Calibration of three-phase energy meter at unity power factor.
4. Measurement of capacitance by Desaulty method.
5. Measurement of inductance by Maxwell inductance Capacitance Bridge.
6. Measurement of High resistance by loss of charge method.
7. Calibration of single-phase energy meter at load having UPF, 0.5 lag and 0.5 lead.
8. Measurement of low resistance by Kelvin's double bridge.
9. To study Megger.
10. To study phase sequence meter.
11. Measurement of temperature, pressure-using strain based pressure transducer.
    a) Measurement of temperature using thermocouple.
    b) To study characteristics of RTD, PT 100 transducer.

Note :

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

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

SHU305 GENERAL PROFICIENCY-II

Teaching Scheme : 01T + 02 P Total: 03 Credit: 02

Evaluation Scheme : 25 ICA + 25 ESE Total Marks: 50

Presentation Skill:

Communication boosters – aura words, pronunciation, body language – voice, posture and gesture, eye contact, dress codes.

Function of culture code in presentation – planning, preparing and delivering a presentation, etiquettes, clarity and aliveness of delivery.

General communication skill for presentation – content matching and language matching for specific audience, tone, hummer poise- listener/speaker sensitivity.

Specific communication skill for presentation – icebreaker, small talk dialogue, debate, turn taking, effective and defensive handling of question.

Models of presentation – Public speaking, academic and professional presentation, group discussion, personal interview, technical report writing (IEEE standards).

Managerial skill:

Time management - advantages, time wasters – procrastination, time management tips and strategies.

Stress management- stress and its disadvantages, stress coping ability and stress inoculation training, management of various types of fear, depression and anger.

Conflict management -types of conflict, conflict stimulation and conflict resolution technique for conflict for effective conflict management, effective ways of dealing with people, significance of body language in communication and assertiveness training.

Interpersonal skills -concept of team, advantages of teamwork, promotion of team spirit, team building techniques, nurturing leadership qualities, negotiation skills.

Topics for assignments/practicals:

1. Minimum eight assignments/practicals based on above topics. The representative list is given below
2. Collection of new words concerning various technical and professional subjects
3. Listening of audiocassette or lecture or watching videocassette (based on the topics of managerial skill) followed by speech/seminar by students.
4. Listening of audiocassette or lecture or watching videocassette (based on the topics of managerial skill) followed by group discussion of students.
5. Collecting the information related to the topics of managerial skill using Internet, books,Magazines etc. and its power point presentation or seminar/lecture.
6. Power point presentation on topic related to any subject of programme.
7. Preparing a technical paper in IEEE format.
8. Management games.
9. Personal interview.
10. Extempore elocution, debate.

Text Books:

1. Professional Communication Skills, Alok Jain, Pravin S. ,R. Bhatia, A. M. Sheikh, 3rd edition, S. Chand and Company, New Delhi, 2005
2. Personality Development, E. B. Hurlock, 5th edition, Tata MacGraw Hill, New Delhi, 2006

Reference Books:

1. Power of Positive Thinking, D. J. Mile,1st edition, 28th reprint , Rohan Book Company, Delhi, 2004.
2. All About Self motivation, Pravesh Kumar, 3rd edition, Goodwill Publishing House, New Delhi, 2005.
3. Body Language: How to Read Others Thoughts by their Gestures, Pease, Allan, 3rd edition, Sudha Publications. New Delhi, 1998.
4. Multiple Intelligences: The Theory in Practice: A Reader, Gardner, Howard, 1st edition, Basic Books. New York, 1993.
5. Six Thinking Hats, De Bono, Edward, 2nd Edition, Penguin Books, New York, 2000.

SHU401 ENGINEERING MATHEMATICS - IV

Teaching Scheme : 03 L **Total : 03** **Credit: 03**

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**

Duration of ESE : 2 Hrs.30 min.

Complex integration:

Line and contour integration, singular points, expansion of functions in Taylor's and Laurent's series, Cauchy's integral theorem and integral formula, residue theorem, evaluation of real integrals using residue theorem.

Vector spaces:

Vector spaces and subspaces, null spaces, column spaces and linear transformations, linearly independent sets, bases, coordinate systems, dimensions of vector space, change of bases ,application to difference equations.

Orthogonality and least squares:

Inner product, length and orthogonality, orthogonal sets, orthogonal projections, Gram-Schmidt process, least square problems, inner product spaces

Probability:

Introduction to random processes, probability distributions i.e. discrete and continuous distributions, probability density function, Binomial, Poisson, Normal distributions.

Text Books:

1. Text book of applied Mathematics, P.N.Wartikar and J.N.Wartikar, Pune vidyarthi griha, Pune 2001.
2. Linear algebra and its applications, D.C.Lay, 3th edition, Addison Wesley, 2004.
3. Probability & Statistics for Engineers & Scientists, R.E.Walpole, R.H.Myers, S.L.Myers and Keying Ye, 7th edition Pearson Education, 2005.

Reference Books:

1. Advanced Engineering Mathematics, John bird 5th edition, Elsevier publication, 2007.
2. Advanced Engineering Mathematics, Kreyzig, 9th edition, John Wiley Publication, 1995.
3. Linear Algebra with applications, Nicolson, Mc Graw Hill, 2004.
4. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis, S Pillai, McGraw Hill, 2002.
5. Probability, Random Variables and Random Signal Principles, Peyton Z. Peebles, 2nd edition McGraw Hill, 1987.

EEU401 PULSE & DIGITAL CIRCUITS

Teaching Scheme : 03L + 01T Total : 04 Credit : 04

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE Total Marks : 100

Duration of ESE : 2 Hrs.30 min.

Number system and codes: Positional number system – Binary, octal, decimal, hexadecimal, general conversions, arithmetic operations on unsigned and signed numbers, 1's, 2's, 9's, 10's complement method, negative number representation, BCD codes, gray codes, ASCII codes, error detection and correction codes.

Boolean algebra and logic circuits: Logic gates – basic, derived and universal gates, theorems and properties of Boolean algebra, DeMorgan's theorem, canonical and standard SOP and POS forms, simplification and synthesis of Boolean functions up to 4 variables using gates, Boolean theorems, K-Map, don't care condition and Quine McCluskey method.

Digital logic families: Characteristics of digital ICs, study of TTL,ECL, I^2L, CMOS logic families, BJT and CMOS as a switch, description and operation of TTL and CMOS logic gates, tristate logic.

Combinational logic design: Arithmetic circuits as half and full adder and subtractor, 4-bit adder / subtractor, IC 7483, BCD adder, digital comparator, multiplexer, de-multiplexer, encoder, decoder.

Sequential logic design: One-bit memory cell, S-R, clocked S-R, J-K, master slave J-K, T-type, D-type flip-flops, shift registers, synchronous and asynchronous counters, up/down counters, ripple counters, MOD-n counters.

Semiconductor memories: RAM, ROM, PROM, EPROM, CCD and flash memories. Introduction to CPLD and FPGA.

State machine design approach: State table, state assignment, transition/excitation table, excitation maps and equations, logic realization; Design examples ,Designing state machine using ASM charts; Design examples.

Text Books:

1) Modern Digital Electronics, R.P. Jain, 3rd edition, Tata Mc-Graw Hill, 2005.
2) Digital Electronics-Circuits and Systems, V. K. Puri, 1st edition, Tata McGraw Hill Publications, 2003.
3) Digital Principles and Application, A. P. Malvino, D. P. Leach, 6th edition, Tata Mc-Graw Hill,2006.

Reference Books:

1) Digital Electronics, W. H. Gothman, 2nd edition, Prentice Hall India, 2006.
2) Digital Logic and Computer Design, M. Morris Mano, 3rd edition, Prentice Hall India Ltd. 2005.
3) Digital Principles and Design, D. Givone, 1st edition, Tata Mc-Graw Hill, 2002.
4) http://www.nptel.iitm.ac.in/
5) www.ocw.mit.edu

EEU402 ELECTRICAL MACHINES –I

Teaching Scheme : 03 L **Total: 03** **Credit: 03**

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**

Duration of ESE : 2 Hrs.30 min.

D.C. machines: Construction, principle of operation EMF equation torque equation, Armature winding- Lap, wave single layer double layer, Armature reaction and commutation, method of improving commutation.

D.C. Generators: Types characteristics and application of d.c.shunt, series and compound generators. Parallel operation of D.C. shunt, series and compound generators, Introduction for conducting the tests on D.C. machines as per IS 94320-1979.

D.C. Motors: Characteristics and applications of d.c.shunt, series and compound motors, starting and speed control of motors, Losses and efficiency of motors. Introduction for conducting the tests on D.C. motors as per IS 94320-1979.

Single Phase Transformer: Heat run test separation of core losses into its components Parallel operation equivalent circuit. All day efficiency, conducting the tests on as per Transformer IS 2026-1962.

Autotransformer: Construction working merits demerits and applications.

Three Phase Transformer: Construction, working, types connections, applications testing, parallel operation, Power transformer, Distribution transformer construction.

Three phase to single phase, two phase six phase twelve phase conversion, three winding transformer and tap changing of transformer, Waveforms of no load current and inrush phenomenon.

Text Books:

1. Electrical Machinery, Nagrath Kothari, 4th edition, TMH 2009.
2. Theory of Electrical Machines, Langsdrof, TMH 1999

Reference Books:

1. Electrical engineering Vol.I : Direct Current, Dawes. 4th Edition, PHI, 1998
2. Advance Electrical Technology, H.Cooton, TMH, 1999
3. Electrical Machines Sigma Series, Nagrath and Kothari, TMH 2007
4. http://www.nptel.iitm.ac.in/
5. www.ocw.mit.edu

EEU403 ENERGY RESOURCES & GENERATION

Teaching Scheme : 03 L **Total : 03** **Credit : 03**

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**

Duration of ESE : 2 Hrs.30 min.

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.

Ocean and tidal energy: Ocean energy resources, ocean energy routes, ocean thermal energy conversion, progressive wave, wave data collection, Basic principle of tidal power, components of tidal power plants, operation methods of utilization of tidal energy, estimation of power and energy in simple single basin tidal system.

Other Renewable 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.

Textbooks:

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

Reference book:

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

EEU404 ELECTROMAGNETIC ENGINEERING

Teaching Scheme : 03 L + 01 T Total : 04 **Credit : 04**

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE **Total Marks: 100**

Duration of ESE : 2 Hrs.30 min.

Review of vector analysis: Scalars and vectors, vector algebra, the rectangular coordinate systems, vector components and unit vectors, the vector field, the dot product, the cross product, the cylindrical and spherical coordinate system.

Coulombs Law and Electric field intensity: The experimental law of Coulomb, Electric field intensity, field due to continuous volume charge distribution, field of line charge, field of sheet charge, streamlines and sketches of fields.

Electric Flux density, Gauss's Law and divergence: Electric flux density, Gauss's law, and Applications of Gauss's law: some symmetrical charge distributions, differential volume element, and divergence, Maxwell's First Equation (Electrostatics), The vector operator ∇ and the divergence theorem.

Energy and potential : Energy expended in moving a point charge in electric field, the line integral, definition of potential difference and potential, the potential field of a point charge, the potential field of a system of charges, conservative property, potential gradient, The dipole, the potential gradient in the electrostatic field.

Current and conductors : The nature of dielectric materials, the boundary conditions for perfect dielectric materials, capacitance, capacitance of two wire line, using field sketches to estimate capacitance in two dimensional problems, current analogies

Poisson's and Laplace's Equations: Derivations of Poisson's and Laplace's equations, uniqueness theorem, Examples of solution of Laplace's and Poisson's equations, product solutions of Laplace's equation

The steady Magnetic fields: Biot-Savart's Law, Ampere's circuital law, curl, Stoke's theorem, magnetic flux and magnetic flux density, the scalar and vector magnetic potentials, derivations of steady magnetic field laws.

Magnetic forces, materials, and inductance: Force on moving charge, force on a differential current element, and force between differential current elements, force and torque on a closed circuit, the nature of magnetic materials, magnetization and permeability, magnetic boundary conditions, the magnetic circuit, the potential energy and forces on magnetic materials, inductance and mutual inductance.

Time varying magnetic fields and Maxwell's equations: Faraday's laws, displacement current, Maxwell's equations in point form, Maxwell's equations in integral form, the retarded potentials.

Text books:

1. Engineering Electromagnetics, W.H. Hayt, 7th edition, TMH Publication, 2006

Reference books:

1. Electromagnetic Engineering, N.N.Rao, 5th edition, Prentice Hall, 2005.
2. Applied Electromagnetics, Fawwaz T.Ulaby, Prentice Hall, 1999.
3. Electromagnetic Engineering, Krauss, 4th Edition, Tata Mc Graw Hill, 2003.
4. Electromagnetic Waves, Shevgaonkar, Tata Mc Graw Hill 2002.
5. http://www.nptel.iitm.ac.in/
6. www.ocw.mit.edu

SHU402 ENGINEERING MATHEMATICS LAB

Teaching Scheme : 01 L+ 02 P Total: 03 Credit: 02

Evaluation Scheme : 25 ICA + 25 ESE Total Marks :50

Duration of ESE : 3 Hrs.

Minimum Eight Experiments to be performed covering the Entire Syllabus of SHU401 Engineering Mathematics - IV. Representative list is as follows,

To be conducted with the help of MatLab/ Mapple (Engineering application).

1. Getting started with (inbuilt demonstrations and help) MatLab/ Mapple
2. Matrix operations, Solution of linear equations, Eigen values and eigen vectors.
3. Differentiation, integration of a single variable function.
4. Solution of Linear differential equation.
5. Solution of system of nonlinear equations (example: Newton Raphson, Secant, etc).
6. Plotting of graphs like bar, pie, line etc with given set of data or of given equations.
7. Infinite series expansion (example: Sine, Cosine, etc).
8. Fourier series and Fourier transform.
9. Z- transform.

Note :

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

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

EEU406 PULSE & DIGITAL CIRCUITS LAB

Teaching Scheme : 02 P Total: 02 Credit : 01

Evaluation Scheme : 25 ICA + 25 ESE Total Marks : 50

Duration of ESE : 3 Hrs.

Minimum Eight Experiments to be performed covering the Entire Syllabus of EEU401 Pulse & Digital Circuits. Representative list is as follows,

1. To study diode as a clipper.
2. To study diode as a clamper.
3. To study RC high pass filter.
4. To study RC low pass filter.
5. To study passive integrator.
6. To study passive differentiator. .
7. To study Transistorized Astable Multivibrator

8. To verify different logic gates.
9. Realization of half adder using gates.
10. Realization of half substractor using gates.
11. Implementation of full Adder circuit using gates.
12. To study Flip-Flops.
13. To Study counters.

Note :

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

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

EEU407 ELECTRICAL MACHINES –I LAB

Teaching Scheme : 02 P **Total : 02** **Credit : 01**

Evaluation Scheme : 25 ICA + 25 ESE **Total Marks : 50**

Duration of ESE : 3 Hrs.

Minimum Eight Experiments to be performed covering the Entire Syllabus of EEU402 Electrical Machines –I Representative list is as follows,

1. To identify and understand the functions of various parts of d.c. machines.
2. To plot the OCC of d.c. generator.
3. To find the critical speed of the d.c. generator.
4. To perform and verify the speed control method of d.c. shunt motor
5. To perform the Swinburn test on d.c. machine.
6. To perform the load test on d.c. series generator
7. To perform the load test on d.c. series motor
8. To perform the load test on d.c. shunt generator
9. To perform the load test on d.c. shunt motor
10. To perform the load test on d.c. compound generator
11. To perform the load test on d.c. compound motor
12. To perform the test/tests on d.c. machine to separate the losses at constant speed.
13. To perform the Hopkinson's Test on d.c. machines.
14. To perform the Field test on the d.c. machines
15. To perform the Sumpner's Test on single phase transformer.
16. To identify and understand the functions of various parts of the three phase transformer
17. To perform the OC and SC test on three phase transformer
18. To perform the direct loading test on three phase transformer.
19. To perform the various connections of three phase transformer.
20. To study the scott connection of transformer.

Note :

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

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

EEU408 NUMERICAL METHODS LAB

Teaching Scheme : 02 P **Total : 02** **Credit : 01**

Evaluation Scheme : 25 ICA + 25 ESE **Total Marks : 50**

Duration of ESE : 3 Hrs.

Minimum twelve programming assignments in C/ MATLAB covering complete syllabus. Students shall write and test the programs and submit the report. Representative list is as follows.

1. To obtain root of equation using False Position Method
2. To obtain root of equation using Successive Approximation method
3. To obtain solution of given set of equations using Gauss Seidel method
4. To obtain solution of given set of equations using matrix inversion technique
5. To form Newton's forward difference table and calculate value of variable
6. To form Newton's divide difference table and calculate value of variable
7. To for getting value of variable using Lagrange's method
8. To obtain differentiation using Richardson Extrapolation technique.
9. To obtain differentiation using difference table
10. To obtain integration using Simpson's $1/3^{rd}$ rule
11. To obtain integration using Gaussian quadrature technique
12. To obtain solution of differential equation using Euler's method
13. To obtain solution of differential equation using 4^{th} order RK method
14. To obtain solution of partial differential equation using Jacobi's method

Note-1 : Course Coordinator shall explain the methods, procedures and algorithm to solve problems. Additional one theory lecture shall be allotted in order to cover the methods theoretically. The department shall provide extra 1 hr/week in time table.

Note-2 :

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

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

EEU409 COMPUTATIONAL LAB - I

Teaching Scheme : 02 P Total : 02 Credit : 01
Evaluation Scheme : 25 ICA + 25 ESE Total Marks : 50
Duration of ESE : 3 Hrs.

This laboratory course is intended to extend the concepts studied in various courses. The students are expected to use Matlab for following topics,

1. Ordinary linear constant coefficient differential equations.
2. Graphical solution of differential equations
3. Matrix and linear algebra problems
4. Solution of system of linear equations with Matlab
5. Laplace transform and Fourier analysis
6. Partial differential equations
7. Probability and statistics
8. Detailed study of symbolic Math toolbox

The term work for this laboratory course will consist of at least 50 programs covering the wide range of topics above.

Note :

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

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