GONDAWANA UNIVERSITY, GADCHIROLI

FOUR YEARS DEGREE COURSE IN ENGINEERING & TECHNOLOGY
COURSE AND EXAMINATION SCHEME WITH CREDIT GRADE SYSTEM
VI- SEMESTER B.E. ELECTRICAL (ELECTRONICS & POWER) ENGINEERING

Subject Code	Subject	Teaching Scheme			No. of Credits	Examination Scheme									
		Hours per week				Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
							ESE	MSE	IE			TW	POE		
EP-601	High Voltage Engineering	4	0	-	4	3	80	10	10	100	40	-	-	-	-
EP-602	Digital Signal Processing	3	1	0	4	3	80	10	10	100	40	-	-	-	-
EP-603	Control Systems - I	4	1	-	5	3	80	10	10	100	40	-	-	-	-
EP-604	Electrical Power System – II	4	0	0	4	3	80	10	10	100	40	-	-	-	-
EP-605	Design of Electrical Machines	4	0	0	4	3	80	10	10	100	40	-	-	-	-
EP-606	Business Communication	-	3	0	-	AUDIT COURSE *									
	Laboratories/ Practical														
EP-607	High Voltage Engineering	-	-	2	1	-	-	-	-	-	-	25	25	50	25
EP-608	Control Systems - I	-	-	2	1	-	-	-	-	-	-	25	25	50	25
EP-609	Minor Project & Seminar *	-	-	2	2	-	-	-	-	-	-	25	25	50	25
	TOTAL	19	05	06	25		500					150			
	SEMESTER TOTAL	30			25		650								

(Note : One Lecture of one hour is equal to one credit, One Tutorial / Practical of three hours is equal to one credit, One Tutorial/ Practical of two hours is equal to one credit, One Practical/Lab, without theory paper of one hour equal to one credit)

*The marks allotted for TW shall be granted on the basis of work carried out by the candidate in pursuing the Minor Project, its results & the Seminar delivered on the same topic. However, the POE marks shall be granted on the basis of viva voce, conducted as per University norms. Each GROUP of Minor Project shall comprise of NOT MORE THAN THREE students.

COURSE :   **B.E. VI -SEMESTER (ELECTRICAL/ E&P/EEE)**
SUBJECT: **HIGH VOLTAGE ENGINEERING**

Lectures	Tutorial(s)	Practical	Total periods/week (each of 60 minutes duration)	Credits
04	0	02	06	04+0+01 = 05

Evaluation System						
Theory				Practical		
MSE	IE	ESE	TOTAL	TW	POE	TOTAL
10	10	80	100	25	25	50

UNIT	CONTENTS	HOURS
I	**Breakdown in Gases & Liquid Dielectrics** Properties of Insulating materials, Breakdown voltage and Dielectric strength, Ionization process, Townsend's criteria for B.D., Breakdown in electro-negative gases, SF_6 as a dielectric, Stremer Theory, Paschen's Law, Time Lag, Vacuum Insulation. Classification and Properties of Liquid Dielectric, Breakdown in Pure and Commercial Liquids, Purification and Reconditioning of Liquid-Dielectrics.	10
II	**Breakdown in Solid Dielectrics & Lightning & Switching Over Voltage & Protection** Factors Affecting the Breakdown of Solid, Intrinsic breakdown, Electromechanical breakdown, Thermal breakdown, Treeing and Tracking, Partial Discharge. Mechanism of lightning,, Mechanism of Lightning strokes, types of strokes. Origin of Switching surges, Characteristics of switching surges, Power frequency over voltages, Control of over voltages due to switching. Protection of lines by ground wires, Tower Footing resistance, Protection by lightning arrester, gap type and gapless L.A., Selection and ratings of L.A., Surge Absorbers.	10
III	**Generation of High voltages & Current** Generation of High D.C. voltages by rectifiers, Voltage doubler Circuits and multiplier circuits (Derivations of expression not required). Electrostatic Machines, Generation of high A.C. Voltages by Cascade Transformers, Resonant transformers. Generation of High-Frequency A.C. High Voltages, Generation of Impulse Voltages: Standard Impulse Wave shapes, Circuits for producing Impulse Waves, Marx Circuit, Generation of Switching Surges, Generation of Impulse Current.	10
IV	**Measurement of High Voltages & Current** Measurement of high AC and DC voltages by micro ammeter, generating voltmeters, resistance and capacitance potential divider, Series impedance voltmeter, CVT, Magnetic type potential transformers, Electrostatic voltmeter, Peak reading AC voltmeter, Sphere Gap arrangement. Measurement of Impulse voltage by potential dividers and peak reading voltmeters. Measurement of high AC, DC currents, measurement of high frequency and impulse current by resistive shunts (Bifiliar strip shunt only)	10

V	**Non-Destructive & High Voltage Testing** Non-destructive testing: Measurement of DC Resistivity, Measurement of Dielectric constant and loss-factor (low and power frequency only), Schering bridge for high charging circuits, for high dissipation factor, Transformer ratio arm bridges. Partial discharge measurements by balance detectors. High Voltage Testing: Testing of insulators, bushings, isolators, circuit breakers, cables transformers, lightning arresters and power capacitors.	10
		50

Text Books -

1.	High Voltage Engineering by M. S. Naidu and V. Kamaraju, Tata McGraw Hill
2.	Fundamentals of High Voltage Engineering by S. K. Singh, Dhanpat Rai & Co.
3.	High Voltage engineering by C.L. Wadhawa, Wiley Eastern Ltd.

Reference Books -

1.	High Voltage Engineering by M. P. Chaurasia, Khanna Publishers.
2.	An Introduction to High Voltage Engineering by Subir Ray, Prentice Hall of India.
3.	High Voltage Engineering - Theory & Practice by M. Khalifa, Marcel Dekker

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(Minimum Eight practical based on above syllabus)

GONDAWANA UNIVERSITY GADCHIROLI

COURSE :   **B.E. VI- SEMESTER (ELECTRICAL/ E&P/ EEE)**

SUB JECT :   **DIGITAL SIGNAL PROCESSING**

Lectures	Tutorial(s)	Practical	Total periods/week (each of 60 minutes duration)	Credits
03	01	--	04	04

Evaluation System						
Theory				Practical		
MSE	IE	ESE	TOTAL	TW	POE	TOTAL
10	10	80	100	--	--	--

Units	Contents	Hours
1	Review of Discrete time systems, Z transform & properties, DFT its properties, radix 2 decimation in time FTT and IFFT, radix 2 decimation in frequency FFT & IFFT	10
2	**Structure of FIR and IIR filters:** Structures for realization of discrete time systems, Basic structures for FIR systems: direct form, cascade form, lattice structure, frequency sampling structure. Basic structure for IIR systems: Direct forms I,II, cascade, parallel forms, lattice and lattice-ladder structures, transposed forms.	10
3	**FIR Filters :** Introduction to FIR filters, linear phase filters, symmetric and anti symmetric filters, Window method, frequency sampling method. Design of FIR filters using Kaiser Window. Comparison of design methods for linear phase FIR filters.	09
4	**IIR Filters :** Introduction to IIR filters, Butterworth approximation, Chebyshev approximation, Design of IIR filter: impulse invariance method, bilinear transformation, approximation derivative method, Frequency transformations: low pass to high pass, band pass, band reject. Comparison between FIR and IIR filters	09
5	**Multirate Digital Signal Processing :** Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Implementation of sampling rate conversion, Applications of multi rate signal processing, Introduction to digital filter banks	09
	Total	**47**

Text Books

1.   "Digital Signal Processing, Principles, Algorithms and Applications", by Proakis J. G and D. G. Manolakis Pearson   Education, PHI.
2.   "Introduction to Digital Signal Processing" by Johnson J. R,   , PHI publications .
3.   , "Digital Signal Processing" by P. Ramesh Babu , Sci- Tech Publications.
4.   Digital Signal Processing by S Salivahanan, C Gnanapriya, TMH ,Publications

Reference Books

1.   "Digital Signal Processing: A Computer based Approach", by S. K. Mitra, TMH, 2001.
2.   "Discrete Time Signal Processing" by Oppenheim A. V and R. W. Schafer, Person Education, India
3.   "Theory and Applications of Digital Signal Processing",   by Rabnier, Gold , TMH. Publications.

COURSE :   **B.E. V- SEMESTER (ELECTRONICS/ E&TC) AND B.E. VI SEMESTER (ELECTRICAL/E&P/EEE)**
SUBJECT: **CONTROL SYSTEM/ CONTROL SYSTEMS-I**

Lectures	Tutorial(s)	Practical	Total periods/week (each of 60 minutes duration)	Credits
04	01	02	05	04+01+01 = 06

Evaluation System							
Theory				Practical			
MSE	IE	ESE	TOTAL	TW	POE	TOTAL	
10	10	80	100	25	25	50	

UNIT	CONTENTS	HOURS
I	**Systems and their Representation** Basic elements in Control Systems, Open loop and Closed loop Systems, Electrical analogy of Mechanical and Thermal Systems, Transfer Function, Block diagram reduction technique, Signal flow graph, Effect of feedback on sensitivity to parameter variation and reduction of the noise.	10
II	**Time Response Analysis** Time response, Time domain specification, Types of test inputs, First and Second order system response, Error coefficient, Generalized error series , Steady State Error, P,PI,PID modes of feedback control.	10
III	**Stability of Control System** Stability of control system, location of roots in S plane for stability, characteristics equation, Routh-Hurwitz criterion, Special cases for determining relative stability, Root locus construction, Root location and its effect on time response, Effect of pole-zero addition on proximity of imaginary axis.	10
IV	**Frequency response methods** Frequency response of linear system, Logarithmic frequency response (Bode) plots from transfer function for various systems, Polar plots for various systems, Estimation of approximate transfer function from the frequency response, Stability analysis from Bode plots, Nyquist criterion, Nyquist Plots and stability analysis.	10
V	**State Space Analysis of Control System** State variable method of analysis, Characteristics of system state, Choice of state variables, representation of vector matrix differential equation, Standard form, relation between transfer function and state variable.	10
		50

Text Books -
1.   Automatic Control Systems (with MATLAB Programs) by S.Hasan Saeed, S.K.Kataria & Sons.
2.   Control System Engineering by Nagrath I.J.Gopal M, Wiley Eastern.
3.   Modern Control Systems by Ogata K,Prentice Hall of India.
4.   Linear Control Systems by B.S.Manke, Khanna Publication.

Reference Books -
1.   Analysis and Design of Control Systems using MATLAB by Rao.V.Dukkipati,New Age.
2.   Modern Control System by Richard Dorf,Robert Bishop, IIth edition 2008.
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(Minimum Eight practical based on above syllabus)

GONDAWANA UNIVERSITY, GADCHIROLI

COURSE : SIXTH SEMESTER B.E. (Electrical/ Electronics & Power/ EEE)

SUBJECT : ELECTRICAL POWER SYSTEM - II

Lectures	Tutorial(s)	Practical	Total periods/week (each of 60 minutes duration)	Credits
04	00	0	04	04

UNIT	CONTENTS	HOURS
I	**Symmetrical Components** Three phase power in unbalanced circuit in terms of symmetrical component. Sequence impedances of Generator, Transformer, Transmission line and passive load. Construction of sequence network of a power system. Phase shift in star-delta transformer.	08
II	**Symmetrical and Unsymmetrical fault analysis** Symmetrical fault analysis: - Transient on transmission line. Short circuit of a synchronous machine (on no load). Short circuit of a loaded synchronous machine. Selection of circuit breakers. Current limiting reactors. Unsymmetrical fault analysis: - Single line to ground, line to line, double line to ground and open conductor faults analysis using symmetrical components.	12
III	**Stability of power system** Steady state, dynamic and transient stability definition. Dynamics of a synchronous machine, swing equation, Power angle equation, Steady state stability studies. Transient stability studies: - Swing curve. Equal area criteria for transient stability. Application of equal area criteria for different disturbances. Solution of swing equations by point- by-point method. Methods of improving transient stability.	12
IV	**Economic Operation of power system** Introduction. Distribution of loads between units within the plant. Optimal unit commitment. Optimum generation scheduling considering transmission losses. Representation of transmission loss using loss formula co-efficient. Derivation of loss formula co-efficient. Simulation of co-ordination equation on digital computer.	10
V	**Neutral grounding in power system and Compensation** Methods of neutral ground, advantages of grounding the neutral of the power system. Shunt and series compensation: - Generalized equation, shunt reactor compensation of very long line with intermediate switching station, series capacitor compensation at line center, shunt reactors at both ends and series capacitor in the middle of line. Elementary idea of sub-synchronous resonance problem and counter measures.	08
		50

Text Books

(1) I.J.Nagrath,D.P.Kothari, "Power System Engineering", Tata Mc Graw Hill
(2) W.B.Stevensen, "Elements of Power System Analysis", McGraw Hill
(3) C.L.Wadhwa, " Electrical Power Systems" New Age International
(4) Ashfaq Husain "" Electrical Power Systems", CBS publication.

Reference Books

(1) B.M.Weedy, "" Electrical Power Systems", John Willey & Sons.
(2) Sony Gupta Bhatnagar "Course in Electrical Power", Dhanpat rai & Sons.
(3) E.W.Kimbark, "Power System Stability", vol.1,John Willey & Sons
(4) P S R Murty, "Operation and Control in Power System",BS Publication

GONDAWANA UNIVERSITY, GADCHIROLI

COURSE :   **B.E. VI -SEMESTER (ELECTRICAL/ E&P/EEE)**
SUBJECT :   **DESIGN OF ELECTRICAL MACHINES**

Lectures	Tutorial(s)	Practical	Total periods/week (each of 60 minutes duration)	Credits
04	00	00	04	04

Evaluation System						
Theory				Practical		
MSE	IE	ESE	TOTAL	TW	POE	TOTAL
10	10	80	100	-	-	-

UNIT	CONTENTS	HOURS
I	**General concept of Design of Electrical Machines** Review of materials used in construction of electrical machines, classification of insulating materials based on permissible temperature rise, Properties of Transformer oil, Ratings & specifications of the Machines, Heating & Cooling characteristics, Calculation for losses	10
II	**Transformer Design** Types of Transformers, Output equations of single phase & three phase transformers, Voltage per turn for winding, Need of stepped core, Necessity of tap changers, Optimum design, Specific loading, Window space factor & window dimension, Main dimension, core, yoke, windings	10
III	**Operating Characteristics of Transformer** Evaluation of resistance, leakage reactance of windings, no load current, estimation of loses, regulation, different methods of cooling in transformer, design of cooling tanks, Different mechanical forces acting on transformer	10
IV	**Induction Machine Design** Output equations, specific electrical & magnetic loadings, turns per phase, number of stator slots, calculation of main dimensions and stator design parameters, various stator slots used in induction motor, choice of number of slots, winding design, slot combination for rotor of cage rotor and wound rotor design, current and other performance from characteristics for design data.	10
V	**Synchronous Machine** Air gap length methods of obtaining sinusoidal o/p voltage, field coil design for salient pole machine and for turbo generator rotor, ventilation of synchronous generator, cooling air circuit, closed ventilation /quantity of cooling medium hydrogen and water as cooling media.	10
		50

TEXT BOOKS
(1)   A course in Electrical Machine Design By AK Sawhney, Dhanpatrai & Sons
(2)   Theory, performance & Design of AC Machines by MG Say, ELBS London
(3)   Principles of Electrical Machine Design with computer programs by SK Sen, Oxford & IBH Company, ND
(4)   Principles of Electrical Machine Design by RK Agrawal, SK Kataria & SonsREFERENCE BOOKS

REFERENCE BOOKS
(1)   A textbook of Electrical Engineering Drawingby KL Narang, Satya Prakashan, ND
(2)   Electrical Machine Design by A. Shanamugasundaram & Gangadharan, Wiley Eastern
(3)   Computer aided design for electrical machines by Vishnu Murti, BS Publications

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(Minimum Eight practical based on above syllabus)

GONDAWANA UNIVERSITY, GADCHIROLI

COURSE :   **SIXTH SEMESTER B.E. (Electrical/ Electronics & Power/ EEE)**

SUBJECT :   **BUSINESS COMMUNICATION (BC)**

Lectures	Tutorial(s)	Practical	Total periods/week (each of 60 minutes duration)	Credits
-	03	-	03	Audit Course

UNIT	CONTENTS	HOURS
I	**Nature & Scope of Communication** Introduction, Functions of Communications, Roles of a Manager, Communication Basics & Networks, Internal Communication, Tips for effective Internal Communication, Miscommunication, Effectiveness in Managerial Communication, Strategies for improving Organizational Communication	05
II	**Business Presentation & Public Speaking** Introduction, Business Presentations & Speeches, Introduction to a Presentation, Main Body, Conclusion, Controlling nervousness & stage fright	05
III	**Interviews** Introduction, Fundamental principles & general preparations, Success in an Interview, Types of Interview Questions, Important non-verbal aspects, Types of Interviewing, Styles of Interviewing	15
IV	**Business Correspondence, Reports & Proposals** Introduction, Important features in Business writing, Basic Principles, Components of Business Letter, Kinds of Business Letters, Effective memo writing skills, Introduction to Technology enabled Business Communication	05
V	**Group Discussion & Team Presentation** Introduction, Methodology, Guidelines for Group Discussion, Role Functions in GD, Types of non-functional behavior, Improving group performance, Team presentations	10
		40

Text Books

(5) Ludlow, Ron & Fergus Panton, "The essence of effective Communication", Prentice Hall of India
(6) Prasad P., "Communication Skills", S.K. Kataria & Sons, Delhi
(7) Meenakshi Raman & Prakash Singh, "Business Communication", Oxford University Press
(8) Stevenson S. and Whitmore, " Strategies for Engineering Communication", John Wiley & Sons

Reference Books

(5) Adair John, " The Effective Communication", Jayco Publishing House, Mumbai
(6) Krishna Murali & KVK Prasad, "Placement & Personality Development", Environmental Protection Society, NIEE
(7) Lesikar, Raymond V. & M.E. Flately, "Basic Business Communication", Tata McGraw Hill

Note   **:**   **The student's assessment & evaluation may be based on response to Concept Review questions, Critical Thinking Questions, Project & Case Studies**