

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

Subject Code	Subject	Teaching Scheme				Examination Scheme										
		Hours per week			No. of Credits	Theory						Practical				
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks			Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
								Sessional								
ESE	MSE	IE														
EP-501	Electrical Machines – II	4	1	-	5	3	80	10	10	100	40	-	-	-	-	
EP-502	Microprocessors & Microcontroller	4	0	-	4	3	80	10	10	100	40	-	-	-	-	
EP-503	Signals & Systems	4	0	0	4	3	80	10	10	100	40	-	-	-	-	
EP-504	Electrical Power System – I	4	1	0	5	3	80	10	10	100	40	-	-	-	-	
EP-505	Industrial Economics & Management	4	0	0	4	3	80	10	10	100	40	-	-	-	-	
<b>Laboratories/ Practical</b>																
EP-506	Electrical Machines – II	-	-	2	1	-	-	-	-	-	-	25	25	50	25	
EP-507	Microprocessors & Microcontroller	-	-	2	1	-	-	-	-	-	-	25	25	50	25	
EP-508	Advanced Electrical Workshop	-	-	2	1	-	-	-	-	-	-	25	25	50	25	
<b>TOTAL</b>		20	02	06	25		500				150					
<b>SEMESTER TOTAL</b>		<b>28</b>			<b>25</b>						<b>650</b>					

(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)

**GONDAWANA UNIVERSITY, GADCHIROLI**

**COURSE : B.E. V -SEMESTER (ELECTRICAL/ E&P/EEE) SUBJECT: ELECTRICAL MACHINES-II**

Lectures	Tutorial(s)	Practical	Total periods/week (each of 60 minutes duration)	Credits
04	01	02	07	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	<p><b>Starting, Breaking, Speed Control of Three Phase Induction Motor and Single Phase Induction Motor</b>                      Starting - Direct on line, Autotransformer, Star-Delta and Rotor resistance starting                      Breaking – Regenerative braking, Plugging, Dynamic braking.                      Speed control - by pole changing, frequency control, Varying Rotor resistance and reactance, Varying supply voltage                      Single Phase Induction Motor -Double field revolving theory, equivalent circuit, split phase motor, shaded pole motor, Torque – slip characteristics. No load &amp; block rotor tests</p>	10
II	<p align="center"><b>Basics of Synchronous Machines</b></p> Constructional features of salient and cylindrical pole rotor machine, Principle of generator and motor, armature and field windings, starting of motor, EMF equation, Torque equation, distribution factor, pitch factor, harmonics in the induced EMF	10
III	<p align="center"><b>Cylindrical Pole Synchronous Machines</b></p> Cylindrical Pole Machines - Phasor diagrams and Equivalent circuits of motor and generator, armature reaction, OC & SC tests, SCR, Voltage regulation: synchronous impedance method, Potier's triangle method, synchronous condenser. Salient Pole Machines - Two reaction theory, Phasor diagrams and Equivalent circuits of motor and generator, determination of direct and quadrature axis reactances by slip test.	10
IV	<p align="center"><b>Steady State Analysis of Synchronous Machines</b></p> Power flow equations and power angle characteristic of cylindrical and salient pole machines, losses and efficiency, V & Inverted V -curves, hunting & damper winding, parallel operation of alternator	10
V	<p align="center"><b>Transient Analysis of Synchronous Machines and Special Motors</b></p> Sudden 3- phase short circuit. Transient, sub- transient reactances and their measurements, Time constants and equivalent circuit diagram. Sequence reactances and their measurement. Special motors : Schrage motor, Universal motor, AC series motor, Reluctance motor, Repulsion motor, Hysteresis motor ( Only elementary aspects are expected).	10
		<b>50</b>

**Text Books**

1. Electric Machines, By I.J.Nagrath and D.P.Kothari, Tata McGraw Hill

2. Electrical machinery by Dr.P. S. Bimbhra, Khanna Publisher
3. Generalized Theory of Electrical Machines by Dr.P. S. Bimbhra, Khanna Publisher
4. Electrical Machines by Dr. P.K. Mukherjee & S. Chakravarti , Dhanpat Rai and Sons

**Reference Books**

1. Electric Machinery by A.E. Fitzgerald, C.Kingsley Jr and Umans, McGraw Hill
2. Performance & Design Of AC Machines By M.G Ray, CBS Publishers & Distributors
3. Fundamentals of Electrical Machines, by B.R. Gupta & Vandana Singhal, New Age International

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**(Minimum Eight practical based on above syllabus)**

**GONDAWANA UNIVERSITY, GADCHIROLI**

**COURSE : B.E. V -SEMESTER (ELECTRICAL/ E&P/EEE)**  
**SUBJECT: MICROPROCESSORS & MICROCONTROLLER**

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
<b>I</b>	<b>8 Bit Microprocessor</b> 8085 Microprocessor: Architecture and its operations, Register structure, Pin configuration, Addr/Data bus, Timing, control & status signals. Addressing Modes Instruction Cycle: Fetch Operation, Execute operation, Machine cycle & state, Instruction & Data flow. Timing Diagrams	08
<b>II</b>	<b>Instruction Set &amp; Programming Of 8085</b> Classification, Instruction & Data format, Assembly Language Programming of 8085, Counters & time delays, Stack & subroutines.	12
<b>III</b>	<b>Memory Mapping &amp; Interrupts Of 8085</b> Memory mapped I/O and I/O mapped I/O, Address decoding techniques. Interrupt system of 8085 (Software & Hardware Interrupts), Data transfer schemes, Serial data transfer through SOD & SID line.	08
<b>IV</b>	<b>Interfacing Devices &amp; Applications</b> Internal architecture & programming of PPI 8255, A/D & D/A (0800/0808) convertors. Applications: 7 segment LED display, Measurement of Electrical Quantities – Frequency, Phase angle, Power factor, Voltage, Current, Resistance, Reactance, KW, KVA, KVAR	10
<b>V</b>	<b>Microcontroller</b> Introduction to microcontroller: 8051 architecture, 8051 Internal resources, pin diagram, I/O pins, ports and their internal logic circuits, counters, serial ports, Interrupt structure, SFRs and their addressing, watch-log timer, internal code memory, data memory, stack pointer, flags, bit addressable memory.	12
		<b>50</b>

**Text Books**

1. Microprocessor Architecture Programming and Applications with the 8085 by R. S. Gaonkar
2. Fundamentals of Microprocessor and Microcontrollers by B. Ram
3. Introduction to Microprocessors by Aditya P. Mathur
4. Introduction to Microprocessor for Engineers and Scientist by P. K. Ghosh and P. R. Sridhar

**Reference Books**

1. Microprocessors Principals and Applications by Gilmore
2. Microprocessors – Theory ad Applications by M. Rafiqzaman
3. Microprocessors and Microcontrollers by Krishna Kant
4. Microprocessor and Interfacing and applications by Renu Singh & B. P. Singh

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**(Minimum Eight practical based on above syllabus)**

**GONDWANA UNIVERSITY, GADCHIROLI**

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

**SUBJECT: SIGNALS & SYSTEMS**

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

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

Unit	Contents	Hours
I	Classification of signals: Continuous time and discrete time, even, odd, periodic and non periodic, deterministic and non deterministic, energy and power. Fourier Transform of Elementary signals: exponential, sine, step, impulse, ramp, rectangular, triangular, signum, sinc. Properties of Fourier Transform, Convolution theorem, sampling theorem. Systems: Definition, Classification: linear and non linear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible. Introduction to Laplace Transform	09
II	Linear Time Invariant Systems: Introduction, Discrete Time LTI Systems: The Convolution sum and the convolution Integral , Properties of Linear Time Invariant Systems, Causal LTI Systems described by Differential and Difference equations Singularity functions	09
III	Fourier Transform Analysis: Fourier Series representation of periodic Signals, The Continuous time Fourier transform, discrete Fourier Transform and introduction to FFT	09
IV	Z-Transform: Definition, properties of z-transform, z-transform of standard sequences, inverse Z-transform, relationship of z-transform with Fourier transform, applications of Z-transform to solutions of difference equations, Properties and Applications of Z-transform	09
V	Time and Frequency Characterization of Signals and Systems :-First & Second order Continuous and Discrete time System ,examples of Time and frequency domain Analysis of systems Sampling: Representation of a continuous –Time Signal by its Samples-Sampling Theorem, Reconstruction of a signal from its samples using interpolation, The effect of understanding : Aliasing, Discrete Time Processing of Continuous Time Signal and Sampling of Discrete time Signal	09
<b>Total</b>		<b>50</b>

**TEXT BOOKS:**

1. Signals and Systems by Alan V. Oppenheim, Alan S. Wilsky and S. Hamid Nawab, Publication: Prentice Hall of India Edition: Second Ed., 1997.

**REFERENCE BOOKS:**

1. Signals and Linear Systems by Gabel R.A. and Robert R.A, John Wiley and Sons, New York, 1987, Edition: 3<sup>rd</sup> Edition
2. Systems and Signal Analysis by C. T. Chen Publication: Oxford University Press, India, 3rd Edition, 2004
3. Introduction to Signals and Systems by Michael J. Robert, Publication: Tata Mc-Graw Hill, Edition: Second, 2003.
4. Signals and Systems by S. Haykin and B. V. Veen, Publications: John Wiley and Sons, Inc., Editions: Second Edition, 1999.
5. Signals and Systems Analysis using, Transform Methods and MATLAB by M. J. Roberts Tata McGraw-Hill Publishing Company Limited, Second Edition, 2003.

**GONDWANA UNIVERSITY, GADCHIROLI**

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

**SUBJECT: ELECTRICAL POWER SYSTEM - I**

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

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

Unit	Contents	Hours
<b>I</b>	<p align="center"><b>Supply System &amp; Substations</b></p> <p>Supply Systems: Modern structure of a power system, Generation, transmission and distribution voltage, Comparison of Overhead &amp; Underground System, Choice of transmission voltage. Transmission line configurations, type of conductors, Bundle &amp; Composite conductors, resistance of line, skin &amp; proximity effects. Primary and secondary distribution systems, feeder, distributor and service mains. Connection schemes of distribution system, Radial system, Ring main system, Interconnected systems, AC &amp; DC distribution calculations.</p> <p>Substations: Classification of substations, Indoor &amp; outdoor Substations, Major equipments used in Substation</p>	10
<b>II</b>	<p align="center"><b>Parameters of Transmission line</b></p> <p>Resistance &amp; Inductance :Calculation of resistance &amp; inductance for single phase and three phase lines, Bundled &amp; Composite conductor lines, single and double circuit lines, Transposition of conductors, concept of GMD &amp; GMR, symmetrical and asymmetrical conductor configuration with and without transposition</p> <p>Capacitance : Calculations of Potential difference between two conductors of a group of parallel conductors, capacitance of a two wire line, three phase line with equilateral spacing, three phase line with unsymmetrical spacing, single and double circuit lines, effect of ground on capacitance ,Numerical Problems</p>	10
<b>III</b>	<p align="center"><b>Per Unit System &amp; Performance of Short &amp; Medium transmission lines</b></p> <p>Per Unit System: Representation of power system components Single phase solution of balanced three phase networks. Per Unit reactance diagram. Per unit (PU) system, representation of loads. Numerical problems.</p> <p>Performance of Short &amp; Medium length transmission lines :</p> <p>Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants &amp; Phasor representations. Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.</p>	10
<b>IV</b>	<p align="center"><b>Performance of Long Transmission Lines &amp; Introduction to Load Flow Studies</b></p> <p>Performance of Long Transmission Lines: Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems). Ferranti effect. Power flow through a transmission line. Receiving and sending end power circle diagrams, methods of voltage control and power factor improvement, analytical and graphical methods.</p> <p>Introduction to Load Flow Studies : Load flow problem, classification of buses, network modeling, Y-bus and Z-bus matrices, load flow equation.(Numerical are not expected)</p>	10

<b>V</b>	<b>Overhead Lines Insulators &amp; Underground Cables</b>  Overhead Line Insulators : Types of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential .String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.  Underground Cables: Construction and classification of cables for single and three phase service, Insulation resistance, capacitance and dielectric stresses in cable, Reduction of maximum stresses. Most economical conductor size in cables, Grading of cables, capacitance grading and inter-sheath grading, Capacitance of three core cable and measurements of capacitances.	10
	<b>Total</b>	<b>50</b>

#### TEXTBOOKS

1. Power System Engineering, J Nagrath and D P Kothari, Tata McGraw Hill
2. Power System Analysis and Design, B R Gupta, Wheelers Publishers
3. Electrical Power Systems, Ashfaq Hussain, CBS publishers and distributor
4. Elements of Power system analysis: W.D.Stevenson (MGH).

#### Reference Books

1. Electric power system: B.M.Weedy , John Wiley and sons.
2. Transmission & distribution of electrical Engg. : H.Cotton .
3. Transmission & distribution of electrical Engg : Westing house and Oxford University Press , New Delhi .
4. Power System Analysis, N.V.Ramana, Pearson education, 2010
5. Power System Analysis, Arthur R. Bergen, Vijay Vittal, 2 nd Edition, 2009, PEARSON Education
6. Course in Electrical Power: Gupta, Soni and Bhatnagar (Dhanpat rai and sons).

**GONDAWANA UNIVERSITY, GADCHIROLI**

**COURSE : B.E. V -SEMESTER (ELECTRICAL/ E&P/EEE)**  
**SUBJECT: INDUSTRIAL ECONOMICS AND MANAGEMENT**

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

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

UNIT	CONTENTS	HOURS
<b>I</b>	Demand, Utility and Indifference curves, Approaches to analysis of demand, Elasticity of demand and its measures, Factors of production, Advertising elasticity, Marginalism	09
<b>II</b>	Functions of Central and commercial banks, direct and indirect taxes, monetary and fiscal policy of government, liberalization, globalization and privatization;	09
<b>III</b>	Concept of Industrial management and its scope, Development of scientific management, Principles of Frederick Taylor and Henry Fayol, Functions of management such as planning, organizing, directing, controlling, motivating etc.	09
<b>IV</b>	Introduction to marketing management, Concepts of marketing, marketing mix, channels of distribution, advertising, sales promotion, pricing of the product	09
<b>V</b>	Meaning, nature and scope of financial management, brief outline of profit and loss account, balance sheet, budgets and their importance, ratio analysis, principles of costing.	09
		<b>45</b>

**Recommended Books**

1. Modern Economics – By H.L.Ahuja
2. Modern Economic Theory – By K.K.Dewett
3. Industrial management – By I. K. Chopde
4. Industrial Engg. and Organization Management – By S.K.Sharma