

**NORTH MAHARASHTRA UNIVERSITY,
JALGAON (M.S.)**

**Teachers, Paper Setters and Examiners
Guideline Manual**

for

**Third Year Electrical Engineering
Faculty of Engineering and Technology**



SEMESTER – V and VI

W.E.F 2014 – 2015

Electrical Machines-II

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit-I

Sr. No	UNIT-I: Synchronous Alternator-I	Lecture required	References
a	Principle of generator, construction, excitation system,	01	5 -9
b	Arrangement of armature winding, E.M.F. equation , winding factors.	01	5 -9
c	Alternator on- load , effect of armature current ;	01	1 -9
d	effect of armature current ;armature reaction ;resistance drop;	01	1 -9
e	Concept leakage reactance, synchronous reactance and synchronous impedance.	01	1 -9
f	Voltage regulation of non salient pole alternator by direct load testing,	01	1 -9
g	synchronous impedance method; (e.m.f. method),	01	1 -9
h	Voltage regulation by m.m.f. method and potier triangle method	01	1 -9
i	Problem on m.m.f. method and potier triangle method.	01	1 -9
Guidelines for the examiners and paper setters: Numerical may be asked from sr. no. b,f,g,h,i			

Unit-II

Sr.No.	UNIT-II: Synchronous Alternator-II	Lecture required	References
a	Two reaction theory for salient pole machines, direct axis and quadrature axis reactance	01	1 -9
b	Determination of X_d and X_q by slip test; Voltage regulation of salient pole alternator.	01	1 -9
c	Power: power angle relation for non salient pole machines and salient pole	01	1 -9
d	Parallel operation of alternator: need and conditions	01	1 -9
e	Method of parallel operation, Two alternators working in parallel,	01	1 -9
f	Effect of changing mechanical torque and excitation.	02	1 -9
g	Load sharing between two parallel connected alternators.		
h	Alternator on an infinite bus	01	1 -9
i	Induction generator	01	1 -9
Guidelines for the examiner and paper setter. Numerical may be asked on Sr. No. g			

Unit - III

Sr.No.	Unit-III: Synchronous Motors:	Lecture required	References
a	Motor action , and salient features of synchronous motor	01	1 -9
b	phasor diagram on the basis of synchronous impedance	01	1 -9
c	expression for gross mechanical power develop; power flow.	01	1 -9
d	Operation with constant load and variable excitation : locus of tip of current phasor under the above condition and v curve	02	1 -9
e	Operation with const. excitation and variable load : locus of tip of current phasor circle phasor.	02	1 -9
f	Starting method, hunting and it causes and remedies.	01	1 -9
g	Numerical on excitation emf(back emf), power develop and synchronous motor as KVAR compensator.	01	1 -9
Guidelines for the examiner and paper setter. Numerical may be asked on Sr. No. g			

Unit - IV

Sr.No.	Unit-IV: Poly Phase Induction Machines	Lecture required	References
a	Type and construction , working principal of induction motor	01	1 -9
b	induction motor as generalized transformer, slip, rotor e.m.f., current, power, torque relations,	01	1 -9
c	Torque slip characteristics, condition for maximum torque	01	1 -9
d	Power stage in induction motor, losses and efficiency	01	1 -9
e	Circle diagram and computation,	02	1 -9
f	Methods of starting of slipring and cage rotor induction motor ,varies types of starters,	01	1 -9
g	Double squirrel cage motors, cogging, crawling of induction motor	01	1 -9
h	Speed control of induction motor	01	1 -9
Guidelines for the examiner and paper setter. Numerical from sr. No. b,c,d,e and f			

Unit - V

Sr.No	Unit-V : Single Phase Motor	Lecture required	References
a	Classification, production of magnetic field, equivalent circuit, production of torque, speed torque characteristic and application of capacitor start induction motor,	02	4,6,8,9
b	Classification, production of magnetic field, equivalent circuit, production of torque, speed torque characteristic and application of split phase induction motor,	02	4,6,8,9
c	Classification, production of magnetic field, equivalent circuit, production of torque, speed torque characteristic and application of shaded pole induction motor, AC series and universal motor. Comparison of single phase and three phase induction motor.	02	4,6,8,9
d	Special purpose machines:- single phase synchronous motor, repulsion motor,	02	4,6,8,9
e	Reluctance motor, hysteresis motor, and linear induction motor	01	4,6,8,9
Guidelines for the examiner and paper setter.			

Reference Books:

1. E.W.Clayton. "Design and Performance of D.C. Machines"
2. M.G.Say. "Design and Performance of A.C. Machines" CBS Publication
3. Langsdorf, "A.C.Machines," TMH.
4. Nagrath and Kothari "Electric Machine" -TMH
5. S K Bhattacharya, "Electrical Machines" -TMH
6. B. L. Theraja, "Electrical Technology", Vol - II, S. Chand Publication
7. P. S Bimbhra, "Electrical Machinery" 2/E, Khanna Publishers
8. Ashfaq Husain, "Electrical Machines", Dhanpat Rai & Co
9. V K Mehta and Rohit Mehta, 'Principles of Electrical Machines' S Chand Publication
10. <http://nptel.iitm.ac.in>

POWER SYSTEM-II

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Unit-I Line parameters	Lecture required	References
a	Introduction: Constituents of power system and role, necessity of power system analysis	01	1,3,7
b	Real, reactive, complex power and its direction.	01	1,3,7
c	Line parameters: Inductance of three phase line with equilateral spacing	01	1,3,7
d	Inductance of three phase line with unsymmetrical spacing	01	1,3,7
e	Bundled conductor, parallel circuit lines	01	1,3,7
f	Capacitance of transmission line: capacitance of two wire	01	1,3,7
g	capacitance of equilateral and unsymmetrical spacing	01	1,3,7
h	effect of earth on the capacitance of three phase transmission line	01	1,3,7
i	bundled conductors, parallel circuit three phase line	01	1,3,7
Guidelines for the examiners and paper setters: Numerical may be asked from Sr. No. c,d,f,g			

Unit - II

Sr.No.	Unit-II : Representation of power system component and characteristic of transmission line	Lecture required	References
a	Representation of power system: Single phase representation of balance three phase network	01	1,2,3,7
b	one line diagram	01	1,2,3,7
c	Impedance diagram (reactance diagram)	01	1,2,3,7
d	per unit system	01	1,2,3,7
e	representation of synchronous machine and power transformer	01	1,2,3,7
f	characteristic and performance of long transmission line : equivalent circuit of long line, Ferranti effect	02	1,2,3,7
g	power flow through transmission line	01	1,2,3,7
h	method of voltage control, receiving end circle diagram	01	1,2,3,7
Guidelines for the examiner and paper setter. Numerical may be asked on Sr. No. c			

Unit - III

	Unit-III: Symmetrical fault analysis	Lecture required	References
a	Transient on transmission line	01	1,3,6,7
b	short circuit current and reactances of synchronous machine on no load and loaded condition	01	1,3,6,7
c	The bus impedance in fault calculations	01	1,3,6,7
d	algorithm for short circuit studies	01	1,3,6,7
e	Synthesis of unsymmetrical phasors from their symmetrical components	01	1,3,6,7
f	operators	01	1,3,6,7
g	symmetrical components of unsymmetrical phasors	01	1,3,6,7
h	power in terms of symmetrical components.	01	1,3,6,7
Guidelines for the examiner and paper setter. Numerical may be asked on Sr. No. g			

Unit - IV

Sr.No.	Unit-IV: Unsymmetrical faults	Lecture required	References
a	Single line to ground fault (LG) on an unloaded generator	01	1,3,6,7
b	line to line fault (LL)on an unloaded generator	01	1,3,6,7
c	double line to ground fault(LLG)on an unloaded generator	01	1,3,6,7
d	unsymmetrical fault on power systems: Single line to ground fault (LG)on a power system through impedance	01	1,3,6,7
e	line to line fault (LL)on a power system through impedance	02	1,3,6,7
f	double line to ground fault(LLG)on a power system through impedance	02	1,3,6,7
g	analysis of unsymmetrical faults	01	1,3,6,7
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Unit - V

	Unit - V: Load flow analysis	Lecture required	References
a	Introduction, bus classifications, nodal admittance matrix (YBUS)	02	1,2,4,5,6,8
b	development of load flow equations	01	1,2,4,5,6,8
c	load flow solution using Gauss Siedel	02	1,2,4,5,6,8
d	load flow solution using Newton-Raphson method	01	1,2,4,5,6,8
e	approximation to N-R method	01	1,2,4,5,6,8
f	Introduction to surge Impedance loading and its derivation	01	1,2,4,5,6,8
g	Introduction to travelling wave on long transmission line	01	1,2,4,5,6,8
Guidelines for the examiner and paper setter. Numerical may be asked from sr. no. a			

Reference Books:

1. Kothari & Nagrath, "Modern Power System Analysis" fourth edition Tata Mc. Graw Hill
2. W.D. Stevenson, Jr. "Elements of Power System Analysis", Mc Graw Hill.
3. C.L. Wadhwa, "Electrical Power System", New Age International.
4. Stagg and El-Abiad, "Computer Methods in Power System Analysis" TMH.
5. Hadi Sadat; "Power System Analysis", Tata McGraw Hill.
6. L. P. Singh; "Advanced Power System Analysis & Dynamics", New Age International
7. Chakraborty, Soni, Gupta & Bhatnagar, "Power System Engineering", Dhanpat Rai & Co.
8. T.K Nagsarkar & M.S. Sukhija, "Power System Analysis" Oxford University Press, 2007.
9. <http://nptel.iitm.ac.in>

POWER ELECTRONICS

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Modern Power Semi-conducting Devices	Lectures required	References
a	Thyristors: Introduction, Basic Structure, Operating Characteristics of SCR (Static Characteristics and Dynamic Characteristics during Turn-on and Turn-off)	02	1-6
b	Thyristor Turn-on Methods	01	1-6
c	Thyristor Protection, di / dt, dv/dt Protection, Design of Snubber Circuits (Numericals may be asked)	01	1-6
d	Introduction, Basic Structure, ON-OFF Control and Operational characteristics and Applications: DIAC, TRIAC	02	1-6
e	Introduction, Basic Structure, ON-OFF Control and Operational characteristics and Applications: Gate turn-off Thyristor (GTO)	01	1-6
f	Introduction, Basic Structure, ON-OFF Control and Operational characteristics and Applications: PUT, Light Activated thyristor (LASCR) (NO NUMERICAL)	01	1-6
g	Introduction, Basic Structure, ON-OFF Control and Operational characteristics and Applications: MOS Controlled Thyristors (MCT)	01	1-6
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Unit - II

Sr.No.	Gate Triggering Circuits, Commutation Techniques, Multi-Connections of SCRs	Lecture required	References
a	Introduction, Basic Structure, ON-OFF Control and Operational characteristics and Applications Insulated Gate Bipolar Transistor (IGBT), Metal- Oxide Field Effect Transistor (MOSFET), MOS Controlled Thyristors (MCT)	02	1-6
b	Gate Triggering Circuits/ Firing circuits: R, RC firing circuits(half wave and full wave firing circuits)	01	1-6
c	Ramp and Pedestal triggering	01	1-6
d	Commutation Techniques/ Turn-off methods: Forced and Natural, Classification of Forced Commutation-	03	1-6

	Class A, Class B, Class C, Class D, Class E, Class F.		
e	Multi-Connections of SCRs: Series, Parallel connection, String Efficiency	02	1-6
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Unit - III

Sr.No.	Full Wave controlled Rectifiers	Lecture required	References
a	Single phase Full Wave Bridge Rectifiers (B-2) connection: With Resistive and Inductive load (R-L load in rectifying and inverting mode)	02	1-6
b	Single phase Full Wave Mid-point converters(Rectifiers) (M-2) connection: With Resistive and Inductive load (R-L load in rectifying and inverting mode)	02	1-6
c	Single phase Symmetrical and Asymmetrical Semiconverters (Half Controlled Bridge Circuits): With Resistive and Inductive load	02	1-6
d	Three phase Full Wave Full-Controlled Bridge Rectifiers (B-6) connection: With Resistive and Inductive load	02	1-6
e	Effect of Source Impedance and Effect of Overlap angle (Single phase and Three phase Full Wave Full-Controlled Bridge Rectifiers)	01	1-6
Guidelines for the examiner and paper setter. Numerical may be asked from Sr. No. a,b,c,d,e			

Unit - IV

	Inverters	Lecture required	References
a	Inverters classification, Series inverter	01	1-6
b	Single Phase Parallel inverter	01	1-6
c	Single Phase Half Bridge and Full Bridge Voltage Source Inverters (With Resistive and Inductive load)	01	1-6
d	Harmonic reduction	01	1-6
e	Three Phase Bridge Inverters (180-Degree and 120-Degree mode Voltage source inverters)	02	1-6
f	Dual Converters: Principle of Operation Ideal and Non-ideal, Dual Converters With and Without circulating current Schemes	02	1-6
g	Cycloconverters: Principle, Single Phase Cycloconverters (Different types)	01	1-6

Guidelines for the examiner and paper setter.
Question should not be asked on introductory part.

Unit - V

	DC Choppers	Lecture required	References
a	Principle of Operation, Step Down, Step Up Chopper	02	1-6
b	Multi-Phase Choppers. AC Choppers	01	1-6
c	Chopper Configuration: Class A, Class B, Class C, Class D, Class E	02	1-6
d	AC Regulators: Single Phase Half and Full wave with Resistive and Inductive load, Three Phase AC regulators	02	1-6
e	Speed Control of DC motors: Chopper fed Separately Excited DC motors and DC Series Motors.	02	1-6
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Reference Books:

1. M. Rashid, "Power Electronics", PHI Pub.
2. M.D. Singh and Khanchandani, "Power Electronics", TMH Pub.
3. M. Rammamurty, "An Introduction to Thyristors and its Applications", East-West Press
4. Mohan, Undeland and Riobbins, "Power Electronics", Wiley India Pvt. Ltd.
5. L Umanand, "Power Electronics Essentials & Applications", Wiley India Pvt. Ltd.
6. P S Bhimbra, "Power Electronic" Khanna Publishers
7. <http://nptel.iitm.ac.in>

Electromagnetic Engineering

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Unit-I ELECTROSTATIC	Lecture required	References
a	Coulomb's Law, Concept of electric field and field due to point charge	01	1-6
b	Concept of volume charge density: electric field due to line charge, sheet of charge	02	1-6
c	Electric flux-density, Gauss's law and Divergence theorem	01	1-6
d	Energy expended in moving a point charge in electric field, Concept of potential difference between two points and potential due to point charge	01	1-6
e	Potential-gradient and relationship between electric field and potential	01	1-6
Guidelines for the examiners and paper setters: Numerical may be asked from Sr. No. a,b,c,d,e.			

Unit - II

	Unit-II DIPOLES, CONDUCTORS, DIELECTRICS AND CAPACITANCE	Lecture required	References
a	Dipole and its electric field and dipole-moment, Energy-density in electrostatic field	02	1-6
b	Concept of current-density, Current continuity equation, properties of conductors	01	1-6
c	Boundary conditions between conductor and free-space, Boundary conditions between two perfect dielectrics	02	1-6
d	Capacitance between parallel plates, co-axial cable and spherical shells, Energy stored in capacitors	02	1-6
e	Poisson's and Laplace's equations to calculate potential, capacitance and electric field	01	1-6
Guidelines for the examiner and paper setter. Numerical maybe asked from Sr. No. a,b,c,d,e			

Unit - III

	Unit-III MAGNETOSTATICS	Lecture required	References
a	Biot-savart law and its vectorial form, Magnetic field due to infinite long current carrying conductor	02	1-6
b	Ampere's circuital law and its applications to co-axial law	01	1-6
c	Curl operator	01	1-6
c	Scalar and Vector magnetic potential	01	1-6
d	Magnetic flux-density, Stoke's theorem	01	1-6
e	Lorentz's force equation, Energy stored in magnetic field	02	1-6
Guidelines for the examiner and paper setter. Numerical may be asked from Sr. No. a,b,c,d,e			

Unit - IV

	Unit-IV TIME VARYING FIELDS	Lecture required	References
a	Maxwell's equations in integral and differential form in time-varying fields, free-space, phasor form	02	1-6
b	Uniform plane-wave, Wave motion in free-space, perfect conductor, skin-effect	02	1-6
c	Wave motion in perfect dielectric and lossy dielectric medium	01	1-6
d	Poynting theorem	01	1-6
e	Reflection of uniform plane wave by perfect dielectric (Normal and oblique incidence)	01	1-6
f	Reflection of uniform plane wave by perfect conductor (Normal and oblique incidence)	01	1-6
Guidelines for the examiner and paper setter. Numerical may be asked from Sr. No. a,b,c,d,e,f.			

Unit - V

	Unit - V RADIATION AND ANTENNAS	Lecture required	References
a	Antenna fundamentals: Radiation intensity, Directive gain and Directivity, Power gain and efficiency, Effective length, Effective aperture, Radiation resistance	02	2-6
b	Reciprocity between transmitting and receiving antennas	01	2-6
c	Vector retarded potential, Radiation pattern	01	2-6
d	Antenna Arrays: Broadside arrays, End-fire Array, Binomial Array, Tchebyscheff Array	02	2-6
e	Principle of pattern multiplication	01	2-6
f	Types of Antennas: Folded dipole, Yagi-Uda Antenna, Horn Antenna, Parabolic and Cassegain Antenna	02	2-6
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Reference Books:

1. W.H. Hyat, "Engineering Electromagnenic", Tata Mc Graw Hill.
2. S. P. Seth, "Elements of Electromagnetic fields", Dhanpat Roy and Sons
3. R G Kaduskar, " Principles of Electromagnetics", Publication- Wiley
4. Gottapu Sasibhushana Rao, " Electromagnetic Field Theory and Transmission Lines", Publication- Wiley
5. Edward C. Jordan & K. G. Balmain, Electromagnetic Waves & Radiating Systems Second Edition, PHI
6. K.D. Prasad, Antenna and Wave Propagation, Satya Publication
7. <http://nptel.iitm.ac.in>

Industrial Organization & Management

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	UNIT I: Principles of Management	Lectures required	References
a	Basic Concepts: Definition, Nature, Importance, Management: Art and Science & as a Profession, Management Vs Administration,	02	1,2
b	Evolution of Management: Introduction to Scientific Management by Taylor,	01	1,2
c	Administrative, Management by Fayol, Contribution of Peter Drucker	01	1,2
d	Levels & Functions of Management Forms of Business Organization.	02	1,2
e	Approaches to Management: Decision Theory Approach, Contingency Approach, Systems Approach.	01	1,2
f	Organization: Formal & Informal, Line & Staff relationship, Centralization vs. Decentralization,	01	1,2
g	Span of Management, Departmentation, MBO	01	1,2

Unit - II

	UNIT II:- Managerial Economics:	Lecture required	References
a	Introduction: Meaning & Scope of Economics, Basic Theories,	01	1,3,6
b	Law of Demand & Supply, Elasticity of Demand & Supply.	02	1, 2,3
c	Consumer Theories: Meaning of Utility & Law of Diminishing Utility	02	1,3,6
d	Cost Concepts: Opportunity Costs, Sunk Costs, Marginal Cost,	02	1, 2, 3
e	Total & Variable Costs, Fixed Costs, Contribution, Law of Diminishing Return	02	1, 2, 3

Unit - III

Sr.No.	UNIT III: Operational Management	Lecture required	References
a	Plant location and layout: Factor affecting plant location,	01	1,2,3
b	Different type of plant layout, CPM PERT,	02	1,2,3

c	Quality control manufacturing system, store and inventory control	02	1,2,3
d	Work study –techniques of work study and method study,	02	1,2,3
e	work measurement, different charts and diagrams used in method study	01	1,2,3
Guidelines for the examiner and paper setter. Problems may be asked on CPM and PERT .			

Unit - IV

Sr.No.	UNIT IV: Human Resource Management	Lecture required	References
a	Human resource planning, Recruitment, Selection, Placement & Induction	02	1,2
b	Performance Appraisal & Development, Employee Training,	01	1,2
c	Internal & External Mobility & Retention Management, Wage & Salary	01	1,2
d	Administration, Fringe Benefits & Incentives Payments, Collective Bargaining, Performance appraisal , compensation	01	1,2
e	Industrial Laws: The factories Act 1947, The Workmen's Compensation Act 1923,	01	1,2
f	Maternity Benefit Act The Payment of Wages Act 1936, The Apprentices Act 1961,	01	1,2
g	Industrial safety, prevention of accidents pollution control act	01	1,2

Unit - V

	UNIT V: Marketing Management & Financial Management	Lecture required	References
a	Introduction to Marketing: Concept of Market, Types of Market, Definition, Nature & Scope of Marketing.	01	1,7,8
b	Marketing Approaches, Marketing Process, Functions of Marketing Management, 7 P's of Marketing.	01	1,7,8
c	Advertising media of advertising market forecasting	01	1,7,8
d	New trends in Marketing: Green Marketing, e- marketing & Viral Marketing.	01	1,7,8
e	Introduction to Financial Management: Meaning, Nature & Scope of Financial Management,	02	1,7,8
f	Capital Structure, Types & Sources of Finance, Money Market & Capital Market, Role of Financial Institutions in	02	1,7,8

	Industry		
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Reference Books:

1. O P Khanna, "Industrial Engineering Managements"
2. L.M.Prasad, "Principles of Management", Himalaya Publications Ltd
3. D.N. Dwivedi, "Managerial Economics", Vikas Publications
4. S.Chand by S.S.Khanka "Human resource Management"(Text & Cases),
5. P.Subba Rao "Essentials of HRM & IR" (Text, Cases & Games), Himalaya Publishing House
6. R.S.N. Pillai, Bhagavathi , "Legal Aspects of Business" (Mercantile Laws including Industrial & Company Laws)
7. Philip Kotler, "Marketing Management", Tata McGraw Hill
8. Ravi M. Kishor, "Financial Management", Taxmann Publication.

Electrical Machines-II

(Lab Course Contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	Determination of voltage regulation and efficiency of three phase alternator by direct load test.	02
2	Open and short circuit test on three phase alternator: determination of its regulation by e.m.f. method and m.m.f. method.	02
3	Zero power factor test on three phase alternator: determination of regulation by Potier triangle method.	02
4	Determination of direct axis and quadrature axis reactance by slip test on synchronous machine. Determination of voltage regulation by two reactance theory.	02
5	Synchronizing alternators: lamp methods and use of synchroscope.	02
6	Synchronous alternator on infinite bus: behavior of machine under change in mechanical power and excitation.	02
7	Characteristic of synchronous motor at constant load and variable excitation.	02
8	Characteristic of synchronous motor at constant excitation and variable load.	02
9	Determination of performance of three phase induction motor by direct load test.	02
10	Determination of performance of three phase induction motor by no load, blocked rotor test and construction of circle diagram.	02
11	No load and blocked rotor tests on capacitor start single phase induction motor and determination of parameters of equivalent circuit.	02
12	Load test on single phase induction motor.	02
13	Speed control of three phase Slip Ring Induction Motor.	02

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical. Evaluation will be based on paper work , performance and oral in the practical examination.

POWER SYSTEM-II

(Lab Course Contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	Measurement of ABCD parameters of a medium transmission line	02
2	Measurement of ABCD parameters of a long transmission line	
3	Plotting of receiving end circle diagram to evaluate performance of medium transmission line	02
4	Study of the effect of VAR compensation on the profile of receiving end voltage using capacitor bank	02
5	Static measurement of sub-transient reactance of a salient-pole alternator	02
6	Measurement of sequence reactance of a synchronous machine	02
7	Determination of steady state power limit of a transmission line	02
8	Unsymmetrical fault analysis for LL, LG, LLG FAULT ON A.C / D.C network analyzer	02
9	Formulation and calculation of Y- bus matrix of a system using software	02
10	Solution of a load flow problem using Gauss-Seidal method using a software	02
11	Solution of a load flow problem using Newton-Raphson method using software	02
12	Unsymmetrical fault analysis of a 3-bus system using a software	02
13	Calculation of inductance and capacitance for symmetrical and unsymmetrical configuration of transmission line using software	02

Note: Lab file should consist of minimum **Eight** experiments out of eight experiments any two experiments using professional software such as MALAB, Matpower, PSIPCE etc.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical. Evaluation will be based on paper work , performance and oral in the practical examination.

Power Electronics

(Lab Course Contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	1. Triggering Circuit of SCR	02
2	Characteristics of SCR, MOSFET,	02
3	Commutation circuit class C, class D	02
4	Single phase full wave controlled rectifiers R, R-L load.	02
5	Single phase semi-converter	02
6	Three phase full wave controlled rectifiers	02
7	Step up chopper	02
8	Step down chopper	02
9	Series and parallel inverter	02
10	Three phase inverter	02

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked questions on practical. Evaluation will be based on answers given by student in oral examination.

Electrical and Electronics Workshop

(Lab Course contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	Details and Layout of DC Armature Windings.	02
2	Details and Layout of AC Armature Windings.	02
3	Study of substation equipment: a. Classification and use of Lightening arrester b. Different type of isolators. c. Substation earthing	02
4	Transformer a. Standard rating, vector group of power transformer. b. Standard rating of instrument transformer c. Class of accuracy for instrument transformer.	02
5	Study of Starters: a. Three phase induction motor starter. b. Study of three phase induction motor reverse forward starter.	
6	Study of different contactor ,relay and timer with switching demonstration.	02
7	Study of automatic star delta and soft starter for three phase induction motor.	02
8	Study and Testing of: a. Diode b. BJT c. MOSFET d. IGBT	02
9	Study of Electronic ballast and fan regulator:	02
10	Fabrication of single phase capacitor filter rectifier circuit. Or fabrication of any small electronic circuit for domestic and commercial application.	02

Note: The term work should include a minimum **eight** experiments. Workshop practical practices should be based on above mentioned topics.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Software Application-I

(Course Contents)

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

	Unit-I Introduction to Matlab	Lectures required	References
a	Standard MATLAB windows	01	1-8
b	Operations with variables : naming ,checking existence, clearing and operations	01	1-8
c	Arrays : columns and rows: creation and indexing , size & length , multiplication, division, power and operations	01	1-8
	Unit-II Writing script		
a	Writing script files : logical variables and operators , flow control and loop operators Writing functions : input/output arguments , function visibility, path and Matlab startup.	01	1-8
b	Simple graphics : 2D plots and figures and subplots	01	1-8
	Unit-III Data and data flow in Matlab		
a	Data types: Matrix, string, cell and structure, creating, accessing elements and manipulating of data of different types.	01	1-8
b	File Input-Output: Matlab files , text files , binary files , mixed text-binary files	01	1-8
	Unit-IV Function minimization and parameters search.		
a	Polynomial fit : 1D and 2D fits ,	01	1-8
b	Data windowing , Error bounds	01	1-8
	UNIT V: Marketing Management & Financial Management		
a	Pre-defined dialogs: handle graphics : graphics objects , .	01	1-8
b	properties of objects	01	1-8
c	modifying properties of graphics objects	01	1-8

Reference Books:

1. Rudra Pratap, "Getting Started With Matlab: A Quick Introduction For Scientists And Engineers" Oxford University Press.
2. Dr. Shailendra Jain, "Modeling & Simulation using MATLAB-Simulink", Wiley India.
3. Yashavant Kanetkar, "Let Us C", BPB Publications, 10/E, 2010.
4. Stephen G Kochan "Programming in C", Pearson Education, 3/E, 2004.
5. Using MATLAB, Version 6, The Math Works, Inc., 2000.
6. MATLAB function reference, The Math Works, Inc., 2000.

7. Using MATLAB Graphics, Version 6, The Math Works, Inc., 2000.
8. MATLAB Release Notes for Release 12, The Math Works, Inc., 2000.

Software Application-I **(Lab Course Contents)**

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	A. Simple Arithmetic Calculation: Perform simple arithmetic calculations: Addition, subtraction, multiplication, division and exponentiation. B. Assign values to variables. C. Suppress screen output. D. Control the appearance of floating point numbers on the screen.	02
2	A. Compute the Y-Coordinates of line with given slope m and the intercept c at the x coordinates. B. Create a vector t with 10 elements: 1, 2, 3,....., 10 and compute the following quantities: $X= t \sin(t)$, $Y=(t-1)/(t+1)$, $Z=\sin(t^2)/ t^2$ C. Create Matrices, Vectors for finding the size of matrices and perform the addition, subtraction, multiplication, transpose and inverse operation.	02
3	Create : Simple sine plot, line plot, an exponentially decaying sine plot, space curve, log scale plot, Overlay plot and Fancy plots.	02
4	Create Polynomial curve fit and compare different fits.	02
5	A. Create a line along with an explicit handle and then use set command to change the line style, its thickness, and values of some y-coordinates. B. Write some text at a specified position, create its handle, and then use the set command to change the font size, font, and string of the text.	02
6	Study of different types of errors.	02
7	Write program to find voltage and power in voltage divider circuit.	02
8	Write a program to calculate voltage across any resistance in a circuit.	02
9	Write a program to find transient response in RC circuit.	02
10	Write a program to find transient response in RL circuit.	02
11	Write a program to plot voltage and current in resistive circuit.	02
12	Write a program to plot voltage and current in inductive and capacitive circuit.	02

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

Industrial Training/EDP/Special Study

Industrial Training	<ul style="list-style-type: none"> • Student shall undergo industrial training for a minimum period of two weeks during summer vacations between fourth semester and fifth semester. • The industry in which industrial training is taken should be a medium or large scale industry • The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training. • Every student should write the report separately. • Institute / Department/T&P Cell have to assist the students for finding Industries for the training. • Students must take prior permission from Department before joining for Industrial Training.
EDP (Entrepreneurship Development Program)	<ul style="list-style-type: none"> • Student has to participate in Entrepreneurship Development Program for a minimum period of One week during summer vacations between fourth semester and fifth semester. • Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers. • Every student should write the report separately. • Institute / Department may arrange Entrepreneurship Development Program at their campus. • Students must take prior permission from Department before attending any Entrepreneurship Development Program.
Special Study	<ul style="list-style-type: none"> • Student has to submit name of three topics of his interest to the department. • Special study in a group shall not be allowed. • The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student. • Every student must submit the paper bound report based on special study at the end of Fifth semester. • Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc. • Evaluation of special study shall be done based on

	presentation made by student, followed by brief question answer session.
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Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

- | | |
|---|------------------|
| (a) Report | 10 marks. |
| (b) Presentation | 10 marks. |
| (c) Viva-voce at the time of presentation | 05 marks. |
| Total: | 25 marks. |

**NORTH MAHARASHTRA UNIVERSITY,
JALGAON (M.S.)**

**Teachers, Paper Setters and Examiners
Guideline Manual**

for

Third Year Electrical Engineering

Faculty of Engineering and Technology



SEMESTER -VI

W.E.F 2014 - 2015

Control System-I

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Unit-I The Control System:	Lecture required	References
a	Open loop & closed control;	01	1-11
b	Servomechanism, Physical examples.	01	1-11
c	Transfer functions,	01	1-11
d	Block diagram algebra,	01	1-11
e	Signal flow graph	01	1-11
f	Mason's gain formula	02	1-11
g	Reduction of parameter variation and effects of disturbance by using negative feedback	02	1-11
Guidelines for the examiners and paper setters: Numerical may be asked from Sr. No. b,c,d,e,f,g			

Unit - II

	Unit-II -Time Response analysis:	Lecture required	References
a	Standard test signals,	01	1-11
b	Time response of first and second order systems,.	01	1-11
c	time response specifications,	01	1-11
d	Steady state errors and error constants.	01	1-11
e	Design specifications of second order systems: Derivative error, derivative output,	01	1-11
f	integral error and PID compensations,	02	1-11
g	design considerations for higher order systems,	01	1-11
h	performance indices	01	1-11
Guidelines for the examiner and paper setter. Numerical may be asked from Sr. No. b,c,d			

Unit - III

	Unit-III Control System Components:	Lecture required	References
a	Constructional and working concept of ac servomotor	01	1-11
b	synchros	01	1-11
c	Stepper motor.	01	1-11
d	Stability and Algebraic Criteria concept of stability and necessary conditions,	01	1-11
e	Routh-Hurwitz criteria and limitations.	01	1-11
f	The root locus concepts,	01	1-11
g	construction of root loci	02	1-11
Guidelines for the examiner and paper setter.			

Numerical may be asked from Sr. No.d,e,f,g

Unit - IV

	Unit-IV Frequency response Analysis:	Lecture required	References
a	Frequency response,	01	1-11
b	correlation between time and frequency responses,	01	1-11
c	polar and inverse polar plots,	01	1-11
d	Bode plots	01	1-11
e	Stability in Frequency Domain: Nyquist stability criterion,	01	1-11
f	assessment of relative stability: gain margin and phase margin,	01	1-11
g	Constant M&N circles.	02	1-11
Guidelines for the examiner and paper setter. Numerical may be asked from Sr. No. a, b, c, d, e, f.			

Unit - V

	Unit - V Introduction to Design:	Lecture required	References
a	The design problem and preliminary considerations lead, lag and lead-lag networks,	01	1-11
b	Design of closed loop systems using compensation techniques in time domain and frequency domain.	01	1-11
c	Review of state variable technique: Review of state variable technique,	02	1-11
d	conversion of state variable model to transfer function model and vice-versa,	02	1-11
e	Diagonalization, Controllability and observability and their testing	02	1-11
Guidelines for the examiner and paper setter. Numerical may be asked from Sr. No. a, b, c, d, e, f.			

Reference Books:

1. Nagrath & Gopal, "Control System Engineering", 4th Edition, New age International.
2. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
3. B.C. Kuo & Farid Golnaraghi, "Automatic Control System" Wiley India Ltd, 2008.
4. Norman s Nise, "Control System Engineering" Wiley India Pvt Ltd
5. Dr. Rajeev Gupta, "NISE's Control System Engineering" Wiley India Pvt Ltd
6. D.Roy Choudhary, "Modern Control Engineering", Prentice Hall of India.
7. Ajit K Mandal, "Introduction to Control Engineering" New Age International,2006.
8. R.T. Stefani, B.Shahian, C.J.Savant and G.H. Hostetter, " Design of Feedback Control Systems".
9. Narendra Singh Beniwal and Beniwal,"Automatic control system with Matlab Programming "University Science Press.
10. Eugene Xavier S.P. and Joseph Cyril Babu,J., "Principles of control systems "S.Chand

11. S.Sivangaraju,L.Devi ,”Control Systems Engineering “New Age International Publishers.

Electrical Measurement-II

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Unit-I Introduction to instrumentation:	Lecture required	References
a	Definition, purpose, measurement – definitions, types of instruments	01	1-6
b	Classification of instruments.	01	1-6
c	Generalized measurement system	01	1-6
d	Standards and calibrations.	01	1-6
e	Instrument Response: Instrument Response to step, ramp, sinusoidal i/p up to second order system.	02	1-6
f	Errors – types – gross, systematic, random, limiting	01	1-6
g	Sources of errors, techniques to minimize them.	01	1-6
Guidelines for the Examiners & Paper setter. Numerical for Error & its compensation Method.			

Unit - II

	Unit-II - Introduction to transducers:	Lecture required	References
a	Definition, classification, selection of transducer.	01	1-6
b	Measurement of temperature: using R T D, thermocouple.	01	1-6
c	Measurement of temperature: using bimetallic, thermocouple, Pressure thermometers, pyrometers.	01	1-6
d	Pressure Measurement: Bourdon Tubes, bellows,	01	1-6
e	Pressure Measurement: diaphragms.	01	1-6
f	Vacuum Measurement: McLeod gauge	02	1-6
g	Vacuum Measurement: pirani gauge	01	1-6
h		01	1-6
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Unit - III

	Unit-III Flow measurement:	Lecture required	References
a	Rota meter, electromagnetic flow meter	01	1-6
b	Hot wire anemometer, ultrasonic flow meter.	01	1-6
c	Displacement measurement : LVDT	01	1-6
d	Strain gauge, -types, working principles	02	1-6
e	Circuitry Level measurement :mechanical, pneumatic methods	01	1-6

f	Electrical methods- capacitance level gauge, hot wire / carbon resistance method	01	1-6
g	Nucleonic level gauge, ultrasonic method.	02	1-6
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Unit - IV

	Unit-IV A.C. Bridges:	Lecture required	References
a	Classification of AC bridges, ,	01	1-6
b	Maxwell and Anderson bridge.	01	1-6
c	Hay and Schering bridge.	01	1-6
d	Campbell and Wein Bridge	01	1-6
e	Special measuring instruments- construction and principles of 1 \emptyset & 3 \emptyset p.f. meters	02	1-6
f	Frequency meters ,synchronoscope, trivector meter	01	1-6
g	Max. Demand Indicators, C.R.O.	01	1-6
Guidelines for the examiner and paper setter. Numerical on AC Bridges			

Unit - V

	Unit - V Recorders:	Lecture required	References
a	Necessity and classification of recorders, ,	01	1-6
b	Construction, working, types- strip chart, circular chart recorder.	01	1-6
c	Self balance and potentiometric recorder.	02	1-6
d	X-Y recorder, ultraviolet recorder.	02	1-6
e	Electronic technique : for measurement of voltage, current, power, energy, phase angle and rms values.	02	1-6
Guidelines for the examiner and paper setter. Question should not be asked on introductory part.			

Reference Books:

1. E. W. Golding. , "Electrical Measurements and Measuring instruments", Reem Publication.
2. C. T. Baldwin. , "Fundamentals of Electrical Measurements", Kalyani Publication
3. Cooper and Derflick, "Electronic Instrumentation and Measurements Techniques", 3rd edition, Prentice-Hall of India.
4. A. K. Sawney. "Electrical & Electronic Measurement and Instrumentation" Danpant Rai & Co.
5. J.B. Gupta, "Electrical & Electronic Measurement and Instrumentation", S K Kataria & Son.
6. R K Rajput, "Electrical & Electronic Measurement and Instrumentation", S Chand.
7. <http://nptel.iitm.ac.in>

Electrical Machine Design

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Unit-I Introduction:	Lecture required	References
a	Principles of design and design factors.	01	1-5
b	Rating, specifications, standards	01	1-5
c	Brief study of magnetic, electric, insulating and other material.	01	1-5
d	Theory of solid body heating, heating and cooling time curve	01	1-5
e	Rating of machines, and type of duty.	01	1-5
f	Design of Starters-Shunt Motors, Series Motor	02	1-5
g	Design of Slip ring induction motor starter.	01	1-5
Guidelines for the examiners and paper setters: Numerical may be asked from Sr. No.,f,g			

Unit - II

	Unit-II - Design of Transformer:	Lecture required	References
a	Design of distribution and power Transformer,-types, classifications, specifications,	01	1,3,4,6,7
b	Core construction, transformer winding	01	1,3,4,6,7
c	Design of transformer, output equation of single phase and three phase transformer	02	1,3,4,6,7
d	Overall dimension, design of core, winding	02	1,3,4,6,7
e	Estimation of leakage reactance for H.V. and L.V. winding	01	1,3,4,6,7
f	Resistance of winding, calculation of losses	01	1,3,4,6,7
g	Determination of voltage regulation	01	1,3,4,6,7
Guidelines for the examiner and paper setter. Numerical based on overall Dimension, Winding design, resistance, leakage reactance			

Unit - III

	Unit-III Design Performances of Transformer:	Lecture required	References
a	No Load Current of single phase, Three phase transformer.	01	1,3,4,6,7
b	Magnetizing Volt-ampere	01	1,3,4,6,7
c	Change of parameters with change of frequency	02	1,3,4,6,7
d	Temperature rise of transformers, transformer oil as a cooling medium	01	1,3,4,6,7

e	Temperature rise in plain walled tanks, design of tank with tubes, air blast cooling, forced oil circulation	02	1,3,4,6,7
f	Thermal rating of transformers ,	01	1,3,4,6,7
g	Heating time constant of transformers.	01	1,3,4,6,7
Guidelines for the examiner and paper setter. Numerical may be asked from all topics			

Unit - IV

	Unit-IV Induction motors:	Lecture required	References
a	Relation between rating and dimensions of rotating Machines-symbols.	01	1-6
b	Main dimensions , total loading, specific loading , output equation , factor affecting size of rotating machines	02	1-6
c	Choice of specific magnetic loading , choice of specific electric loading	01	1-6
d	Variation of output & losses with Linear dimensions	01	1-6
e	Separation of D and L- d.c. Machines, Induction Motors , Synchronous Machines, standard Frames.	01	1-6
f	Design of three phase Induction Motors-design output equation, choice of average flux density in air gap	02	1-6
g	Choice of ampere conductors per metre, efficiency & power factor, main dimensions.	01	1-6
Guidelines for the examiner and paper setter. Numerical based on Separation of D and L for three phase induction motor, main dimension of three phase IM.			

Unit - V

	Unit - V D.C. ans A.C. Machine Windings:	Lecture required	References
a	D.C. Machine Windings- types of D.C. Windings, choice.	01	1-6
b	Design of simplex and duplex lap and wave Windings	01	1-6
c	Equalizer connections, dummy coils, concept of multiplex Windings, reason for choosing them.	02	1-6
d	A.C. Machine Windings- single and double layer	02	1-6
e	single phase ac Windings with integral and fraction slots, three phase Windings.	02	1-6
Guidelines for the examiner and paper setter. Numerical based on design of DC& AC Machine winding.			

Reference Books:

1. A. K. Sawhney, Electric Machine Design Tenth Edition, Danpat ray and sons.
2. A. E. Clayton, Performance and Design Of DC Machine, Third Edition, ELBS, ISAAC Pitman Sons.
3. A. E. Clayton Performance and Design Of AC Machine, Third Edition, ELBS, ISAAC Pitman Sons.
4. N. Vinogradov, Electric Machine Winder, MIR Publication.
5. Say and Taylor, D.C. Electric Machine, ELBS, Pitman Sons.
6. Feinberg, Macmillan, Modern Power Transformer Design Practices. First Edition, Feinberg, Macmillan,
7. Transformers BHEL.
8. <http://nptel.iitm.ac.in>

Microprocessor and Microcontroller

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Unit-I 8085 Microprocessor	Lecture required	References
a	8085 Microprocessor: Organization, architecture,	02	1-3
b	Generation of control signal,	01	1-3
c	Addressing mode,	01	1-3
d	Instruction format	01	1-3
e	Instruction set, classification of instructions,	02	1-3
f	interrupt.- interrupt structure	02	1-3
Guidelines for the examiners and paper setters: Program may be asked on accepting data serially and sending data serially.			

Unit - II

	Unit-II Programming Memory interfacing:	Lecture required	References
a	Introduction assembly language programming ,	02	1-3
b	Stack , subroutine, types of subroutine	01	1-3
c	I/O Mapped I/O and memory mapped I/O	01	1-3
d	Memory module chip capacity, address space,	02	1-3
e	Memory specification,	01	1-3
f	Types of memory-	01	1-3
g	memory organization & interfacing	01	1-3
Guidelines for the examiner and paper setter. Program may be asked on interfacing of memory ICs such as 2KB and 4 KB .			

Unit - III

	Interfacing Peripherals and Applications	Lecture required	References
a	Study of common peripheral devices and architecture	01	1-3
b	Architecture of 8155 ,Control word format	01	1-3
c	different modes of operation 8155 static RAM, I/O ports	01	1-3
d	timers,	01	1-3
e	Architecture of 8255 ,Control word format	01	1-3
f	8255 operating modes, initialization of ports	01	1-3
g	Architecture of 8255 ,Control word format	01	1-3
h	8279 keyboard display interface,	01	
Guidelines for the examiner and paper setter. Program for initializing ports of 8255 PPI			

Unit - IV

	Data Conversion and Applications :	Lecture required	References
a	Data conversion D to A – types,	01	1-3
b	Ladder, R-2R A to D converters,	01	1-3
c	SAR type, dual slope.	01	1-3
d	ADC0808 architecture, interfacing.	01	1-3
e	Microprocessor Applications: Frequency measurement,	01	1-3
f	phase angle and power factor measurement ,	01	1-3
g	current voltage measurement,	01	3
h	KVA , KW and Maximum demand measurement,.	01	3
Guidelines for the examiner and paper setter. Question may not be asked on introductory part.			

Unit - V

	Microcontroller:	Lecture required	References
a	8051microcontroller:architecure	01	4-5
b	registers, pins, SFRs	01	4-5
c	memory organization,	01	4-5
d	I/O port structure. interrupts,	01	4-5
e	timer and counter, serial port.	01	4-5
f	8051Instruction set classification,	01	4-5
g	addressing mode,	01	4-5
h	simple assembly language programs, Programming related to Timer/Counter	01	4-5
Guidelines for the examiner and paper setter. Programming related to Timer/Counter			

Reference:

1. R.S. Gaonkar ."Microprococer Architecture, Programming, & Applications with 8085", Third edition, Penram International Publication (India) Pvt. Ltd.
2. Leventhal, "8085 Assembly Languages Programming" Tata McGraw Hill.
3. B. Ram,"Fundamentals of Microprocessors & Microcontrollers", Dhanpat Rai Publication.
4. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", Second Edition.
5. Kenneth J. Ayala "The 8051 Micro Controller :Architecture, Programming,", Penram International, Mumbai.
6. <http://nptel.iitm.ac.in>

Entrepreneurship Development

Teachers, Paper setters and Examiners should follow the guidelines as given below.

Unit - I

Sr.No.	Introduction to Entrepreneurship	Lecture required	References
a	Introduction, Concept of entrepreneurship: Significance of entrepreneurship	01	1-4
b	Theories of entrepreneurship, Models of entrepreneurship development	01	1-4
c	Definition of entrepreneur: Traits and characteristics of successful entrepreneur	01	1-4
d	Functions of an entrepreneur , Types of entrepreneurs	01	1-4
e	Factors influencing entrepreneur, Professional vs. family entrepreneurs, Entrepreneurial leaders vs. managers	01	1-4
f	Entrepreneurial process: Entrepreneurial motivation, Entrepreneurial barriers,	01	1-4
g	Women as entrepreneur , Role of woman entrepreneurs in society, Barriers to women entrepreneurs	01	1-4
h	Myths of entrepreneurship, Problems faced by entrepreneurs and capacity building for entrepreneurship,	01	1-4
i	Profiles of successful entrepreneurs.	01	1-4
Guidelines for the examiners and paper setters: Question should not be asked on introductory part.			

Unit - II

Sr.No.	Financial requirements of a new Enterprise:	Lecture required	References
a	Financial requirements of a new Enterprise: Estimating financial requirements	01	1-4
b	Estimation of fix capital requirements, Estimation of working capital requirements	01	1-4
c	Identifying the sources of finance –sources of long-term financing:	01	1-4
d	Sources of medium-term financing , Sources of short-term	01	1-4
e	Institutions providing financial assistance: Venture capital funding- venture capital	01	1-4
f	funding in the Indian scenario Venture capital funding process, Importance of financial management,	01	1-4

g	Working capital management, Accounting and book keeping	01	1-4
h	Financial statement,	01	1-4
i	Financial ration analysis	01	1-4
Guidelines for the examiners and paper setters: Question should not be asked on introductory part.			

Unit - III

Sr.No.	Expansion strategies of an Enterprise	Lecture required	References
a	Expanding and enterprise: Expansion through concentration	01	1-4
b	Expansion through integration,	01	1-4
c	Expansion through diversification	01	1-4
d	Expansion through cooperation	01	1-4
e	Expansion through internationalization	01	1-4
f	Expansion through digitalization	01	1-4
g	Organization life cycle,	01	1-4
h	Strategic management, The essence of business ethics	01	1-4
Guidelines for the examiners and paper setters: Question should not be asked on introductory part.			

Unit - IV

Sr.No.	Challenges for small Enterprises	Lecture required	References
a	Problem faced by small enterprises: Managerial problems,	01	1-4
b	Marketing management	01	1-4
c	Human resource,	01	1-4
d	Production management, Technological problems	01	1-4
e	Role of central and state governments in promoting small enterprises: Fiscal and tax concessions for small enterprises,	01	1-4
f	Industrial policies for small enterprises, Importance of marketing,	01	1-4
g	Customer relationship management (CRM),	01	1-4
h	Marketing services	01	1-4
Guidelines for the examiners and paper setters: Question should not be asked on introductory part.			

Unit - V

Sr.No.	Institutional Support for small enterprises and decision support system	Lecture required	References
a	Institutions supporting small scale enterprises: Small scale industries (SSI) board	01	1-4
b	Khadi and village industries commission (KVIC), Micro, small and medium enterprises development organization (MSME-DO),	01	1-4
c	National small industries corporation limited (NSIC), National institute for entrepreneurship and small business development (NIESBUD)'	01	1-4
d	Indian institute of entrepreneurship (IIE), State industrial development / Investment Corporation (SIDCs/SIICs),	01	1-4
e	State directorate of Industries (SDIs), District industry centers (DICs) ,Industry associations , Non-Governmental organization	01	1-4
f	Institutions providing financial association: Small industries development bank of India (SIDBI), State financial corporation (SFCs)	01	1-4
g	Technological up gradation and moderation of small enterprises: ISO 9000/14001 certification fee reimbursement scheme,	02	1-4
Guidelines for the examiners and paper setters: Question should not be asked on introductory part.			

Reference Books:

1. Alpana Trehan, "Entrepreneurship" Published –Dreamtech Press.
2. Jack M. Kaplan, "Patterns of Entrepreneurship" Published -WILEY.
3. Poornima M. Charantimath, "Entrepreneurship Development –Small Business Enterprises" Publisher –Pearson.
4. Thomas W. Zimmerer & Norman M. Scarborough, "Essential Of Entrepreneurship and Small Business Management" 4th Edition , Publisher –Pearson.

Control System-I Lab

(Lab contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	To determine speed-torque characteristics of an ac servomotor.	02
2	To study potentiometer as an error detector.	02
3	To study DC position control system	02
4	To determine time response of second order control system	02
5	To determine speed-torque characteristics of dc servomotor.	02
6	To study PID Controller.	02
7	To study synchro-transmitter and receiver and obtain output V/S input characteristics.	02
8	To Study Stepper Motor.	02
9	To determine time domain response of a second order system for step input and obtain performance parameters by using software .	02
10	To convert transfer function of a system into state space form and vice-versa, by using software .	02
11	To plot root locus diagram of an open loop transfer function and determine range of gain 'k' for stability by using software.	02
12	To plot a Bode diagram of an open loop transfer function by using software.	02
13	To draw a Nyquist plot of an open loop transfer functions and examine the stability of the closed loop system by using software	02

Note: The minimum eight experiments are to be performed from the following list of experiments. Any Six experiments compulsorily to be performed from no 1 to 8 and any two from 09 to 15.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked questions on practical. Evaluation will be based answers given by student in oral examination.

Electrical Measurement-II LAB (Lab Course Contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	Strain Measurement using strain gauge .	02
2	Study of CRO of it's different types and Applications.	02
3	Measurement of temperature by RTD/Thermocouple.	02
4	Study of pressure transducers.	02
5	Study of recorders.	02
6	Study of LVDT.	02
7	Measurement of inductance by Andersons Bridge.	02
8	Measurement of capacitance and loss angle of capacitor by Schering bridge.	02
9	Step response of meters.	02
10	Measurement of systematic errors of wattmeter.	02
11	Study of CRO of it's different types and Applications.	02

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical . Evaluation will be based on paper work , performance and oral in the practical examination.

Microprocessor and Microcontroller LAB (Lab Course Contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	Study of architecture and instructions of 8085 along with opcodes.	02
2	Study of architecture and instructions of 8051..	02
3	8255 interfacing	02
4	Memory interfacing	02
5	Microprocessor 8085 assembly language programs based on data transfer instruction	02
6	Microprocessor 8085 assembly language programs based on arithmetic instruction	02
7	Microprocessor 8085 assembly language programs based on logical instruction	02
8	Applications of microprocessor 8085 in measurement of electrical quantities.	02
9	Applications of microprocessor 8085 in Electrical drives and speed control for stepper motor .	02
10	Microcontroller 8051 assembly language programs based on data transfer instruction.	02
11	Microcontroller 8051 assembly language programs based on arithmetic and logical instructions.	02
12	Generation of delay using Timers of 8051 in mode 0, 1 and	02

Note: The term work should include a minimum **eight** experiments on hardware kits and simulation.

Guide lines for ICA :

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:-

In ESE the student may be asked to perform any one practical . Evaluation will be based on paper work , performance and oral in the practical examination.

Software Application-II (Lab Course Contents)

Teacher should facilitate learning following lab experiments:

S.N.	Lab Experiment	Hours required
1	Build a simple circuit with Power System blocks and connect it to other Simulink blocks	02
2	Use the Powergui block and analyze static and frequency-domain response.	02
3	Create an electrical subsystem, simulate transients, and discretize simple circuits.	02
4	Single phase fully controlled converter using R and RL load using MATLAB / SIMULINK	02
5	Single phase AC voltage regulator using MATLAB / SIMULINK	02
6	Formation of Y bus matrix by inspection / analytical method using MATLAB Software	02
7	Formation of Z bus using building algorithm using MATLAB Software	02
8	Gauss Seidal load flow analysis using MATLAB Software	02
9	Newton Raphson method of load flow analysis using MATLAB Software	02
10	Fast decoupled load flow analysis using MATLAB Software	02
11	Fault analysis using MATLAB Software	02

Note: Lab file should consist of minimum **Eight** experiments.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and assignment submitted by the student in the form of journal.

Minor Project

1	Every student shall undertake the Minor Project in semester VI. It is expected that the broad area of major project shall be finalized by the student in the beginning of the VI semester and Minor project undertaken may be a part of Major Project.
2	Each student shall work on an approved project, a group of 05 students (maximum) shall be allotted for the each minor project and same group may be continued for major project.
3	Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
4	Each student is required to maintain separate log book for documenting various activities of minor project.
5	The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.

Guide lines for ICA : Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A**.

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Docu mentation	Design /Simul ation/L ogic	PCB/hard ware/prog ramming	Result Verifica tion	Present ation	Total
			5	10	10	10	10	5	50

