NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
B.E. (ELECTRICAL ENGINEERING)

FIRST TERM

W.E.F. 2008-09

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Power System operation and Control	4	--	--	3	100	25	--	--
2	Industrial Electrical Engineering	4	--	2	3	100	25	25	--
3	Energy Audit and Conservation	4	--	--	3	100	25	--	--
4	High Voltage Engineering	4	--	2	3	100	25	--	25
5	Elective-I	4	--	--	3	100	25	--	--
6	Seminar	--	--	2	--	--	25	--	--
7	Project – I	--	--	4	--	--	25	--	25
	Total	**20**	**--**	**10**	**--**	**500**	**175**	**25**	**50**
	Grand Total	**30**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Switchgear and Protection	4	--	2	3	100	25	--	25
2	Power System Stability	4	--	2	3	100	25	--	25
3	Industrial Drive and Control	4	--	2	3	100	25	--	25
4	Elective-II	4	2	--	3	100	25	--	--
5	Project – II	--	--	4	--	--	100	--	50
6	Industrial Visit / Case Study	--	--	--	--	--	25	--	--
7	Entrepreneurship Development Skills	--	--	2	--	--	--	--	--
	Total	**16**	**02**	**12**	**--**	**400**	**225**	**--**	**125**
	Grand Total	**30**			**750**				

Elective-I
1. Control System-II
2. Computer Methods on Power System
3. Electromechanical Energy Conservation
4. Optimization Techniques
5. Power System Dynamics

Elective-II
1. Flexible AC Transmission
2. Power System Design Practice
3. Electric Traction Engineering
4. Generation Planning and Load Dispatch
5. Extra High Voltage Transmission

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F : 2008- 09
Term I

1) Power System Operation & Control

Teaching Scheme
Lectures : 4 hrs/week

Examination Scheme
Paper : 100 marks
Duration: 3 Hrs.
Term work:25 Marks

UNIT I: ECONOMIC LOAD DISPATCH & OPTIMAL OPERATION OF POWER SYSTEM

Input Output characteristics, Heat-rate characteristics, Incremental fuel rate and cost, Incremental production cost, , optimum scheduling of generation between different units. (Neglecting transmission losses), Transmission loss as a function of plant generation (A simple system connection two generating plants to load) and incremental transmission loss for optimum economy, Calculation of loss coefficients (Two plants system), Optimum scheduling of generation between different plants considering transmission loss concept and significance of penalty factor, Automatic load dispatch, function and applications

(10 Hrs., 20 Marks)

UNIT II: GENERATOR VOLTAGE CONTROL

Automatic voltage control, generator controllers, Cross coupling between P–f and Q–V control channel, automatic voltage regulator, types of exciters and excitation systems, exciter modeling, transfer function modeling for control static performance and dynamic response of AVR loops.

(10 Hrs., 20 Marks)

UNIT III: LOAD FREQUECNY CONTROL

Automatic load frequency control, speed governing system and hydraulic valve actuator for individual generator, Turbine modeling, generator and load modeling transfer function representation of power control mechanism of generator.

(10 Hrs., 20 Marks)

UNIT IV: ELECTRIC POWER CONTROL

Concept of control area, division of power system into control areas, Load frequency of single areas, two area and multi area (control) power system with and without integral controls. Advantage of pool operation, tie line bias control area exchange.

(10 Hrs., 20 Marks)

UNIT V: VOLTAGE STABILITY AND COMPENSATION

Power system security, Operating stage (State transition diagram), Voltage stability, Comparison of angle and voltage stability, Reactive power flow and voltage collapse, voltage stability analysis and prevention of voltage collapse.

Compensation in power system: Load compensation, load ability of compensated and uncompensated over head transmission line, compensation of transmission line (Shunt& Series). Introduction of FACTS

(10 Hrs., 20 Marks)

Reference:

1) Electrical Energy system theory & Introduction Olle L. Elgerd, TMH.
2) Modern Power system analysis : I. J. Nagrath & D. P. Kothari, TMH.
3) Elements of Power system analysis : Willium D. Stevenson Jr., TMH.
4) Electric Power control : Dr. C.S. Indulkar.
5) Economic Control of power system : L.K. Kirchmayer
6) Electrical Power System Analysis : C L Wadhwa, New Age International Publication

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TERM I

2) Industrial Electrical Engineering

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper :100 Marks**
Practical: 2Hrs/week	**Duration : 3 Hrs.**
	Term work : 25 Marks
	Practical : 25 Marks

UNIT I :- ELECTRIC DRIVES

Industrial group and collective drives, types of motors, their running characteristics , characteristics of load, starting , speed control and reversing of d.c. and 3 phase induction motors, electric braking, plugging, rheostatic braking, regenerative braking. Types of Enclosures.

(10 Hrs., 20 Marks)

UNIT II: - TYPES OF DUTIES

Continuous, intermittent and short time rating , temperature rise and rating calculations for these duties mechanical features , features of load diagram construction, load equalization & use of flywheel.

(10 Hrs., 20 Marks)

UNIT III:- TRACTION SYSTEMS

Requirements of ideal traction system, Systems of track electrification and their comparison, speed time curve, energy consumption calculation, calculation of tractive effort.

(10 Hrs., 20 Marks)

UNIT IV: - TRACTION MOTORS:

General features and types, characteristic and control of locomotive motor coaches, series parallel control .Electric breaking including regenerative breaking, overhead equipment control gear for overhead equipment.

(10 Hrs., 20 Marks)

UNIT V: - NATURE OF LIGHT

Units, luminous efficiency, glare production of light Types & applications of electric lamps polar curves, control of light by reflection , refraction and diffusion, Design of factory lighting, flood lighting, street lighting .

Methods of electric heating & its advantages, transfer of heat, resistance oven, induction heating electric welding.

(10 Hrs., 20 Marks)

Reference Books:

1) J.B.Gupta -- A course in Electrical power
2) S.K. Bhattacharya - Electrical Machines (2nd edition) - Tata Mc Graw Hill
3) V.V.L.Rao - Utilization of electrical energy -TMH
4) O.E.Taylor - Utilization of electrical energy -TMH
5) S.K.Pillai - A course in electrical energy TMH
6) H. Partab - Art & Science of Utilization of electrical energy.

List of experiments:-

1) To perform load test on single phase induction motor &plot its performance characteristics.
2) To perform load test on DC series motor& plot its performance characteristics.
3) Speed control of DC series motor.
4) Rheostatic breaking of three phase induction motor.
5) To perform load test on three phase induction motor & plot its performance characteristics.
6) Rheostatic breaking of DC shunt motor.
7) Speed control of three-phase slip ring induction motor by rotor resistance method.
8) To perform the load test on DC shunt motors and plots its performance characteristics.
9) Study of illumination system.
10) Study of induction heating &Welding.
11) Study of different types of enclosures.

The term work should include a minimum **eight** experiments from above list.

3) Energy Audit and Conservation

Teaching Scheme
Lectures: 4 Hrs/Week

Examination Scheme
Paper : 100 Marks
Duration : 3 Hrs.
Term Work : 25 Marks .

UNIT I: - ENERGY AUDIT

Energy audit, pre-requisite of energy conservation, principles of energy audit, preliminary energy audit and detailed energy audit, procedures of carrying out energy audit. Energy production relationship, specific energy consumption, least square methods consume technique, data energy flow diagram, sankey diagram. Instruments used for energy audit. Policy of government to promote renewable energy.

(10 Hrs., 20 Marks)

UNIT II: - ECONOMICS OF ENERGY CONSERVATION:

Simple payback period analysis, advantages &limitations of payback period, time value of money, net present value method, internal rate of return method, and profitability index for benefit cost ratio. Study and selection of proper tariff for particular application, fixed &variable components in tariff, impact of tariff on energy management.

(10 Hrs., 20 Marks)

UNIT III: - ENERGY MANAGEMENT:

concept of energy management –energy inputs in industrial ,residential, commercial, agricultural and public sector-comparison of different energy inputs on the basis of availability , storage feasibility, cost (per unit output)etc. electrical energy management-energy accounting and management of power factor, voltage profile, current energy requirement ,power demand monitoring target setting etc.

Concept of supply side management and demand side management (DSM), load management, voltage profile management from receiving end .methods of implementing DSM. Advantages of DSM to consumers, utility and society.

(10 Hrs., 20 Marks)

UNIT IV: - ENERGY CONSERVATION

Objectives of energy conservation, planning for energy conservation

i) Motive power: potential for saving electrical energy in motors - oversizing or under loading, speed, improving, efficiency of an existing motor, energy efficient motors, use of soft starters, variable or adjustable speed drives for energy conservation selection of cost effective drive.
ii) Lighting: level of illumination for different areas. Use of right source of lamp for different applications, energy efficient lamps, fixtures and types of illumination controllers.
iii) Heating processes: most efficient space, furnace water heating and welding processes.
iv) Cooling systems: energy saving in air coolers air conditioners, ventilating systems and refrigeration.

(10 Hrs., 20 Marks)

UNIT V: - SCOPE OF CONSERVATION

Energy conservation in industrial, agricultural, commercial, domestic and municipal sectors.

i) Energy conservation in generation, Co-generation, Tri-generation, transmission and distribution, effective measures to reduce the T and D losses.
ii) Energy Efficient motors:- Features of energy efficient motors, high efficiency motor design, European agreement on low voltage electric motor efficiency, NEMA, high efficiency motors,
iii) Determination of cost effectiveness, implementation of motor management program.

(10 Hrs., 20 Marks)

Reference books

1. S. C. Tripathy-Electrical Energy Utilization and conservation – THM Publication.
2. S.Rao-Energy Technology-Khanna Pub.
3. Dr. S.P. Sukhtme-Solar energy.
4. Preceding of the Seminar on " Energy Audit & Demand Side Management" held at Govt. College of Engineering, Pune-5 organized by M.S.E.B.(SEA) ON 16.09.1998
5. Hand Book on energy efficient motors , International Cooper proposition council , B.E. Kushare.

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TERM I

4) High Voltage Enggineering

Teaching Scheme
Lectures: 4Hrs/week
Practical: 2Hrs/week

Examination scheme
Paper : 100 Marks
Duration : 3 Hrs.
Term work : 25 Marks
Oral : 25 Marks

UNIT I: - **BREAKDOWN IN GASES, LIQUIDS & SOLIDS**

Classification of insulating material, gases as insulating media, Ionization and decay process, breakdown in gases, Townsend's law. The streamer mechanism of spark, Paschen's law, corona discharge, electronegative gases. Breakdown in pure and commercial liquids, solid dielectric and composite dielectric, high voltage bushing guarding, shielding and field plotting.

(10 Hrs., 20 Marks)

UNIT II: - **LIGHTING AND SWITCHING OVER VOLTAGE PROTECTION**

Lighting strokes to lines and towers mechanism & characteristics. Protection of transmission lines from lighting, lighting arrestors, insulation co-ordination of HV and EHV power system and substation.

(10 Hrs., 20 Marks)

UNIT III: - **GENERATION OF HIGH VOLTAGE & CURRENTS**

Generations of high dc, ac and impulse voltages, standard impulse wave shapes, generation of weitching surges and high impulse generator

HVDC Power transmission

Kinds of dc links, limitations and advantages of ac & dc transmission. Principle application of dc, ground return advantages & application.

(10 Hrs., 20 Marks)

UNIT IV: - **MEASUREMENT OF HIGH VOLTAGE AND CURRENTS**

Methods of measurement of peak voltage, impulse voltage and high direct current, non destructive measurement and testing, high voltage dielectric loss and capacitance measurements, ratio frequency & partial discharge measurements.

(10 Hrs., 20 Marks)

UNIT V :-TTESTING AND EHV LINE INSULATION

Basic technology , testing of insulators bushing , cables , transformer, surge diverters & threshold current , capacitance of long objects, Electromagnetic interference, E.H.V line insulation design based upon transient over voltages.

(10 Hrs., 20 Marks)

Reference Books:-

1) M.S. Naidu & V.Kamaraju - High voltage Engg - Tata McGraw Hill
2) E.Kuffel and W.S Zaenglo -High voltage Engg - PERgamon Press
3) EHV, Rakash Das - Begamudre
4) C.L. Wadhawa - H.V Engg Wley Eastern
5) K.R. Padiyar; HDVC power transmission systems technology & system interaction -New Age International
6) H.V. Engg - R.S.Jha

List of Experiments:-

1) Measurement of insulation resistance of 600/250 V.P.T by megger.
2) Power frequency withstand test on 11KV, 10/5 amp CT
3) Study of corona discharge
4) Determination of insulating break-down strength of solid, liquid and gaseous dielectric media.
5) Power frequency high voltage withstand test on cable
6) Study of impulse generator.
7) Dry & Wet power frequency withstand test in insulator
8) Flash over test on insulator.
9) Double voltage double frequency withstand test on insulator.
10) Study of calibration of sphere gap.
11) Study of 100KV high voltage testing set.

The term work should include a minimum **eight** experiments, from the above list.

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TERM I

5) Elective-I

I) CONTROL SYSTEM – II

Teaching Scheme
Lectures: 4Hrs/week

Examination scheme
Paper : 100 Marks
Duration : 3 Hrs.
Term work : 25 Marks

UNIT I: - STATE SPACE TECHNIQUES

State, state space and state variables. States variable models of SISO/MIMO linear systems, from differential equations, transfer function and block diagrams, state diagram (Signal flow graphs)

Decomposition of transfer functions in phase variable forms, canonical forms, Jordan canonical form, transfer function from the state model, transfer matrix.

Solutions of state equations, state transition matrix (STM) various methods to obtain STM, Resolvent matrix time response of SISO system.

Controllability and observability of linear systems. Gilibert's method and kalman's test to test the controllability and observability of SISO/MIMO system.

System design using pole placement technique for close loop system via state variable feedback for SISO controllable system.

(10 Hrs., 20 Marks)

UNIT II: - SAMPLE DATA CONTROL SYSTEM

Representation of sample data (Discrete system) review of Z transforms, sample and hold zero order hold. Sampling theorem Z-transform analysis of sampling data control system. (Open loop and closed loop), Z transfer function of systems. Solutions of different equation by Z transfer methods. Response of discrete system.

Pulse transfer functions of open loop and closed loop system with different sample locations.

Digital controller and its transfer functions. Stability analysis, relation between S and Z domain, stability by Jury's test and bi-linear transformation and root locus method.

(10 Hrs., 20 Marks)

UNIT III: - NON LINEAR SYSTEM ANALYSIS I

Behavior of non linear system, various general non linear ties and their characteristics.

Stability analysis by describing function method. Existence and stability of limit cycles.

Limitation of describing function method.

(10 Hrs., 20 Marks)

UNIT IV: - NON LINEAR ANALYSIS II

Liberalization in a small region operating point. Singular point and their nature. Phase plane method of analysis of nonlinear system, construction of phase trajectories by isoclines method. Limit cycle behavior stability analysis, limitation of phase plane method.

(10 Hrs., 20 Marks)

UNIT V: - STABILITY ANALYSIS BY LIAPUNOV METHOD

Concept of stability, asymptotic stability in the large, instability, the sense of a Lipunov, Positive of a scale function, quadratic forms. Second method of Lipnov, stability theorems, Lipunov fuctions stability of linear time invariant systems, Lipunov equations.

Krasowakii's method for time examining the stability of non-linear time invariant system.

(10 Hrs., 20 Marks)

Reference Books :

1) Nagrath & Gopal : Control system engineering - Wiley Eastern
2) OgataK : Modern controll theory - Prentice Hall Of India
3) Naresh Sinha - control system - Wiley Eastern
4) Kuo B.C: Automatic control system - Prentice Hall Of India.

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TERM I

5) Elective-I

II) COMPUTER METHODS ON POWER SYSTEM

Teaching Scheme
Lectures: 4Hrs/week

Examination scheme
Paper : 100 Marks
Duration : 3 Hrs.
Term work : 25 Marks

UNIT – I NETWORK TOPOLOGY

Topology of Electric power system-Network Graphs, Incidence matrices, fundamental loop and cutset matrix, primitive impedance and admittance matrix, singular transformation of network matrix.

(10 Hrs., 20 Marks)

UNIT – II INCIDENCE MATRIX

Formation of bus impedance and admittance matrices by algorithm – Modification of bus impedance and admittance matrix to account for change in networks. Derivation of loop impedance matrix.
Algorithm for formulation of 3- phase bus impedance matrix.

(10 Hrs., 20 Marks)

UNIT – III SHORT CIRCUIT STUDIES

Three phase network, Symmetrical components. Thevenin's theorem and short circuit analysis of multimode power system using bus impedance matrix. Short circuit calculations for balanced and unbalanced short circuit bus impedance and loop impedance matrices.

(10 Hrs., 20 Marks)

UNIT – IV LOAD FLOW STUDIES

: Slack bus, loop buses, voltage control buses, Load flow equations, power flow model using bus admittance matrix, Power flow solution through Gauss-Seidal and N-R methods sensitivity analysis, Second order N-R method, fast decoupled load flow method, Sparsity of matrix.

(10 Hrs., 20 Marks)

UNIT – V FAULT ANALYSIS

Simultaneous faults, Simultaneous Faults by two port network Theory (Z, Y and H-type Faults), Simultaneous faults by matrix Transformations, Analytical simplifications of series and shunt fault.

(10 Hrs., 20 Marks)

References:-

1. J. J. Gringer/W.D. Stevenson, power System Analysis, McGraw Hill. 1994
2. G.W.Stagg and A.H.EI-biad,Computer Methods in Power System Analysis, Mc Graw Hill, 1968.
3. I.J.Nagrath and D.P.Kothari, Modern Power System Analysis, Tata McGraw Hill,1980.
4. G.L.Kusic, Computer Aided Power System Analysis, Prentice Hall, 1986.
5. Hadi Sadaf, Power System Analysis, Tata McGraw Hill.

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TERM I

5) Elective-I

III) Electromechanical Energy Conservation

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
	Duration : 3 Hrs.
	Term work : 25 Marks

UNIT I: - MAGNETICALLY COUPLED CIRCUITS AND TRANSFORMER:

Self and mutual flux linkages and inductances. Voltage
Equation of coupled circuits. Coefficients of coupling and leakage coefficient.
Two winding transformers:
Steady state and transient analysis using mutual and self inductances. Variable frequency transformers.
Energy flow considerations.

(10 Hrs., 20 Marks)

UNIT II: - ELECTROCHEMICAL ENERGY CONVERSION PRINCIPLES:

Electrochemical System, Energy process in electromagnetic systems.
Law of conversation of energy as applied to electromechanical system. Linear and non-linear, singly and doubly excited magnetic systems;
Energy and co-energy, various expressions for forces and torques; Energy, forces and torque in a system of rigid currents. Application to various magnetic field transducers.

(10 Hrs., 20 Marks)

UINT III: -ELECTRIC FIELD AND TRANSDUCERS

Quasi-static electric fields as coupling medium, Energy forces and torques in a system of charged conductors, Application of electric field transducers. Incremental motion transducers (detailed analysis of few cases).

(10 Hrs., 20 Marks)

UNIT IV: - BASIC ROTATING MACHINES:

Common structural features of rotating machines. Machine windings and their basic properties.
Distributed bindings as current sheets.
Equivalence between concentrated and distributed windings M.M.F. and flux distributation and various windings. Rotating magnetic field.

(10 Hrs., 20 Marks)

UNIT V: - TYPES OF ROTATING MACHINES:

Commutator, Synchronous and asynchronous machines
Induced e.m.f.s and electromagnetic torque in non salient pole machines**.**

(10 Hrs., 20 Marks)

Reference Books:

1. Rakosh Das, Begamudre- Electromachinical Energy Conversion- Wiley Eastern Publication.
2. Gourishankar- Electromechnical Energy Conversion.
3. Fitzgerald, Kingsley & Kusko- Eletric Machinary- McGraw Hill Kogo Kusha Ltd.

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TERM I

5) Elective-I

IV) OPTIMIZATION TECHNIQUES

Teaching Scheme
Lectures: 4Hrs/week

Examination scheme
Paper : 100 Marks
Duration : 3 Hrs.
Term work : 25 Marks

UNIT I:- LINEAR PROGRAMMING

Linear Programming, Simplex Method, Revised Simplex Method, Duality, Sensitivity Analysis.

(10 Hrs., 20 Marks)

UNIT II:-NON LINEAR PROGRAMMING

Non Linear Programming, One-Dimensional Minimization, Elimination Methods. Fibonacci Method, Golden Method, Interpolation method, Qadratic and Cubic Interpolation methods.

(10 Hrs., 20 Marks)

UNIT III:-UNCONSTRAINED OPTIMIZATION METHODS

Unconstrained Optimization Methods, Univariate and Pattern Search Methods, Rosenbrock's Method of Coordinates,

(10 Hrs., 20 Marks)

UNIT IV:-OPTIMIZATION METHODS

Simplex method. Descent Methods, Steepest descent Method, Conjugate Gradient Method Reevs Method, Davidon, Fletcher-Powell Method.

(10 Hrs., 20 Marks)

UNIT V:-CONSTRAINED OPTIMIZATION

Constrained Optimization, Complex method, Cutting Plane Method, Method of Feasible Directions. Integer Programming, Dynamic programming.

(10 Hrs., 20 Marks)

References,

1. S.S.Rao, Optimization Theory and Applications, Willey Eastern Limited.
2. H.A.Taha, Optimization Research.
3. R.L.Fox, Optimization methods for engineering design.
4. Hummel Blau, Non-linear Programming.

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TERM I

5) Elective-I

V) POWER SYSTEM DYNAMICS

Teaching Scheme
Lectures: 4Hrs/week

Examination scheme
Paper : 100 Marks
Duration : 3 Hrs.
Term work : 25 Marks

UNIT I: - INTRODUCTION

Reliable electrical power services, Stability of Synchronous machine, Tie-line oscillation, Method of simulation.

Synchronous machine:

Review of synchronous machine equations, parameters, Equation in a-b-c phase co-ordinates and Park's co-ordinates, Representation of external system Phasor diagram p.u. reactances.

(10 Hrs., 20 Marks)

UNIT II: - SYSTEM RESPONSE TO LARGE DISTURBANCES

System of one machine against infinite bus, Classical model, Mechanical and electrical torques, Critical clearing angle and time, Automatic reclosing, Precalculated swing curves and their use.

(10 Hrs., 20 Marks)

UNIT III: - SYSTEM RESPONSE TO SMALL DISTURBANCES

Two machine system with negligible losses, Clarke diagram for two machine series reactance system, Extension of Clarke diagram to cover any reactance network, Equation for steady state stability limit, Two Machine system with losses, Effect of inertia, Effect of governor action, Conservative Criterion for stability, Effect of saliency, saturation and short circuit ratio on steady state power limits.

(10 Hrs., 20 Marks)

UNIT IV: - REGULATED SYNCHRONOUS MACHINES

Demagnetizing effect of armature reaction and effect of small speed changes, Modes of oscillations of unregulated multimachine system, Voltage regulator and governor coach with delay Distribution of power impacts.

(10 Hrs., 20 Marks)

UNIT V: - EFFECT OF EXCITATION ON STABILITY

Effect of excitation on generator power limits, transient and dynamic stability, Examination of dynamic stability by Routh's criterion, Root locus analysis of a regulated machine connected to an infinite bus. Approximate System representation, Supplementary Stabilizing Signals, Linear analysis of stabilized generator.

(10 Hrs., 20 Marks)

REFERENCES:-

1. Synchronous Machines by C.Concordia, John Wiley& Sons.
2. Power System Stability by E.w..Kimbark,Vol.-3,John Wiley & Sons, New York.
3. Power System Control & Stability by P.A. Anderson, Galgotia Publ.
4. Power System Stability by S.B.Crary, John Wiley&Sons.

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B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM I
SEMINAR

Teaching scheme **Examination scheme**
Practical: 2 hrs/ week **Term Work :25** .

1. For seminar every student will individually study a topic in depth assigned to him / her and submit a report and shall deliver Seminar on the topic at the end of term.
2. Selection of topic should be done by students in consultation with concerned guide
    a. Topic should be related to branch but it should be extended part of the branch (latest and advance topic), preferably outside the syllabus.
    b. The topic should be such that the student can gain latest knowledge. Student should preferably refer at least one research paper
3. Seminar topic should not be repeated in the department and registration of the same should be done on first come first served basis
4. Seminar report should be submitted in paper bound copy prepared with computer typing
    a. Size of report depends on advancement of topic.
    b. Student should preferably refer minimum 5 reference books / magazines / proceedings / journals.
    c. Format of content
        i. Introduction.
        ii. Literature survey.
        iii. Theory 1) Implementation 2) Methodology
        3) Application 4) Advantages, Disadvantages.
        iv. Future scope.
        v. Conclusion.

5 FORMAT FOR ASSESSMENT OF SEMINAR for TERM WORK
Title of seminar: _____
Name of guide : _____

Sr. No.	Exam Seat No.	Name of Student	Assessment by examiners					Grand Total
			Topic Selection 5	Literature Survey 5	Report Writing 5	Depth of understanding 5	Presentation 5	25

6 . Assessment of Literature survey will be based on
    a. Collection of material regarding history of the topic.
    b. Implementation.
    c. Recent applications.

7. Assessment of Depth of understanding will be based on
    a. Questioning by examiners.
    b. Questioning by students.
    c. What the student understands i.e. conclusion regarding seminar.

8. Assessment of presentation will be based on;
    a. Presentation time (15 minutes)
    b. Presentation covered (full or partial)
    c. Way of presentation
    d. Questioning and answering (5 minutes)

9. Examiners should be a panel of two one of them must be guide. Examiner must have experience at least 3 years.
   Examiners will be appointed by HOD in consultation with Principal.

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TERM I

PROJECT-I

Teaching Scheme	**Examination Scheme**
PRACTICAL:	**Term Work: 25(Term I)**
4Hrs. /Week (For Term-I)	**Oral : 25 Marks (Term I)**

1. Every student individually or in a group (of appropriate group size) shall take a project in the beginning of the B.E. First Term in consultation with the guide or sponsored by the industry and the project must be completed in the B.E. Second Term.
2. The project proposal must be submitted in the institute in the beginning of the B.E. first Term. While submitting project proposal care is to be taken that project will be completed within the available time of two terms. The final title of the project work should be submitted at the beginning of the B.E. Second Term.
3. Project title should be precise and clear.
4. Selection and approval of topic:
   Topic should be related to real life application in the field of electrical engineering.
   .OR Manufacturing / Fabrication of a prototype unit include selection, concept, design, material manufacturing of the component, testing and performance evaluation.
   OR Computer aided design and analysis of system/electrical equipments.
   OR Problems related to material handling system.
   OR Energy audit of organization / use of renewable energy source.
   OR Low cost automation, electric / microprocessor control of electrical machines, control system, power systems etc.
   OR Software development for solution of problems in control / power systems.
   Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.
5. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solutions evolved etc., duly signed by guide.
6. The group is expected to complete detailed system design, layout etc. in B.E. first Term as a part of term work in the form of a joint report. Project report must be submitted in the prescribed format only.
7. The guides should regularly monitor the progress of the project work.
8. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

A) ASSESSMENT OF PROJECT- I TERMWORK at B.E. FIRST TERM

NAME OF THE PROJECT _____

NAME OF THE GUIDE: _____

Sr No	Exam Seat No	Name Of Student Marks	Assessment by guide (70%)					Assessment by Departmental committee (30%)			Grand Total	Out of 25 Marks
			Liter-ature survey	Topic Se le-tion	Docu m-Entati on	Atte-nden-ce	To-tal	Eval-uation (10%)	Pres-ntaion (20 %)	Total		
			10	05	15	05	35	05	10	15	50	25

Sign of Guide Sign. of Committee Members Sign. of H. O. D.

9. The guide should be internal examiner for oral examination .

10. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.

11. The evaluation at final oral examination should be done jointly by the internal and external examiners.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II

1) SWITCH GEAR & PROTECTION

Teaching Scheme
Lectures: 4Hrs /Week
Practical: 2Hrs/Week

Examination Scheme
Paper : 100 Marks
Duration : 3 Hrs.
Term work : 25 Marks
Oral : 25 Marks

UNIT – I:- ARC PHENOMEN AND INTERRUPTION

Arc phenomenon, maintenance of arc, properties of arc, interruption theories, transient recovery Voltage, transient analysis, RRRV, Interruption of capacitive current, CB rating, current chopping, construction & Operation of air blast & bulk oil CB.

(10 Hrs., 20 Marks)

UNIT – II:-CIRCUIT BREAKERS AND FUSES

Construction & Operation minimum oil C.B, SF6 & vacuum Ckt. C.B., Earth leakage & moulded case C.B, Testing installation & maintenance Of CBs Rewirable Fuses , HRC fuses Characteristics & application.

(10 Hrs., 20 Marks)

UNIT – III:-PRINCIPLES OF RELAYING

Basic Principle of relaying essential features & characteristics , relaying schemes, terminology ,CT's & PTs, electromagnetic relays constructional features, principle of operation , characteristics and application of attraction type and induction type over current, directional distance and differential relays**.**

(10 Hrs., 20 Marks)

UNIT –IV: PROTECTION SCHEMES

Protection of transmission lines, Relaying practice using over current, earth fault, directional distance and differential relays, parallel feeders and ring mains,

Protection of electrical equipments and machines like transformer, motors, generators and buses. Static relaying basic concepts, equipments and protection schemes.

(10 Hrs., 20 Marks)

UNIT –V:-MICROPROCESSOR AND MICROCONTROLLER BASED PROTECTION

Evolution of microprocessor, advantages of digital, use of microprocessor & microcontroller in protection, configuration of microprocessor based control for overcurrent, overvoltage, undervoltage, overfrequency, under frequency, DSP & it's use in power system.

(10 Hrs., 20 Marks)

Reference Books :-

1) T.S. Madharao - Power system protection (static rElay), Tata MacGraw Hill
2) C.R.Mason - The art and science of protective relaying.
3) B.Ram &Vishwakarma D.N - Power system protection & switch gear -TMH
4) Sunil S.Rao - Switchgear & Protection - Khurana Pun
5) Geosonoviz - High voltage circuit beakers
6) B.Ravindranath & M. Chandar, Power system protection & switch gear, New age International.
7) A.R.Warrington-Protective relay.
8) A.G. Phadke & Thorpe- Power system protection their theory & practice Chapman & Hall.

List of experiments:

1) Study of relaying components and control circuit developments.
2) To plot operating characteristics of Inverse time over current relay
3) To study the through fault stability of differential relay.
4) Study of MHO distance relay to plot.
    a) R- X diagram
    b) Relay voltage Vs Admittance characteristic
5) Study of combined over current & earth fault protection scheme of alternator.
6) Protection 3 phase transformer using differential relay (Merz- Price protection scheme)
7) To plot the characteristic of rewirable fuses and MCB
8) Study oil Arc extinction phenomenon.
9)Demonstration of microprocessor base protection of 3 phase IM using MM-30 L & T k make
10)Study of different types fuses.

The term should include a minimum of eight experiments from the above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II

2) Power System Stability

Teaching Scheme	Examination scheme
Lectures: 4Hrs/week	Paper : 100 Marks
Practical: 2Hrs/week	Duration : 3 Hrs.
	Term work : 25 Marks
	Oral : 25 Marks

UNIT I: - BASIC CONCEPT

Meaning of stability, steady state transient & dynamic stability limits, Park's transformation equations, Analysis of transient and subtransient state operation of salient and non salient pole machines, phasor diagrams, voltage behind the transient and subtransient impedances, time constants. Determination of parameters and time constants.

(10 Hrs., 20 Marks)

UNIT II: - STEADY STATE STABILITY

SSSL of short transmission lines, Analytical and graphical methods of solutions, loosy lines effect of inertia conservative criterion, synchronizing co efficient multi machine system.

(10 Hrs., 20 Marks)

UNIT III: - FACTORS AFFECTING STEADY STATE STABILITY

Effect of saturation, saturated reactance, equivalent reactance, graphical method to find equivalent effect of short circuit ration effect of governor action, effect of automatic voltage regulator.

(10 Hrs., 20 Marks)

UNIT IV: - TRANSIENT STATE STABILITY

Review of basic concept, TTS and equal area criterion, swing equation, point by point solution, critical cleaning angle and critical angle and critical clearing time.

(10 Hrs., 20 Marks)

UNIT V: - FACTORS AFFECTING TRANSIENT STATE STABILITY

Effects of types of fault, effect of grounding, effect of high speed reclosing Precalculated swing curves and their use, effects of fault clearing time, effects of excitation and governing action, Methods of improving stability, multi-machine problem .

(10 Hrs., 20 Marks)

Reference Books:

1) E .W. Kimbark - Power system stability, Vol- 1 & 3 - John Wiley
2) S. B.Cray - Power system stability vol- 1 & 2 - John Wiley
3) Nagrath & Kothari - Modern power system analysi -TMH

List of Experiment:

1) Parameters and time constants of synchronous machines
2) Synchronous machine of infinite bus
3) Effect of saturation and & determination of equivalent reactance's of synchronous machines.
4) Retardation test on synchronous machines to find moment of inertia of rotating part and angular momentum.
5) To obtain power angle characteristics of lossy & lossless lines.
6) To study steady state stability by point by point method.
7) To determine the steady state stability limit of short transmission line.
8) To determine SSSL of long transmission line.
9) Study of clerk's diagram.
10) Study of different types of automatic voltage regulator.

The term work should include a minimum **eight** experiments, from the above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II
3) INDUSTRIAL DRIVES AND CONTROL

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
Practical: 2Hrs/week	**Duration : 3 Hrs.**
	Term work : 25 Marks
	Oral : 25 Marks

Unit – I: - ELECTRICAL DRIVES

Concept, classification, advantages, parts of drives, choice of electric drives, fundamental torque equation, types of practical mechanical loads, dynamics of electrical drive- stability of an electrical drive, constant torque drive, constant power drive, selection of a D.C and A.C drive, modes of operation.

(10 Hrs., 20 Marks)

Unit - II: - SPEED-TORQUE CHARACTERISTICS AND CONTROL OF ELECTRICAL DRIVES

Characteristics and equivalent circuits; Dc motor; separately excited, series, shunt, compound.
Induction motors, Synchronous motors.
Basic principles of Speed control; closed loop control, current & speed sensing, Phase locked loop, closed loop position control.

(10 Hrs., 20 Marks)

Unit – III: - SOLID STATE CONTROLLERS:

Dc motor: Using thyristors, Phase control, chopper fed, Dual converters.
Single phase Induction motor: Using triac, Inverter circuit, Using cycloconverters, Speed control of universal motor.
Three phase induction motor: Basic schemes using chopper.
Synchronous motor: Self commutation circuits for three phase Synchronous motor.

(10 Hrs., 20 Marks)

Unit – IV: - AC DRIVES AND SYNCHRONOUS MOTOR CONTROL

Stator voltage control using Ac voltage controller, Inverter fed induction motor (VSI / CSI fed), chopper control in rotor circuit. Slip Energy recovery scheme,
CLC for Induction motor.
open loop control, Self Control Strategy, variable frequency operation, margin angle control.

(10 Hrs., 20 Marks)

Unit – V:- DC DRIVES

Single phase DC Drives for separately & self excited Dc motor (continuous & Discontinuous armature current operation), CLC & TRC Controller, chopper fed Dc Drives. Three phase drives for Dc motors, Full converter & semi- converter operation of Series connected converter.

Micro-processor based control for Drives: Micro-processor based chopper fed Dc motor, Micro-computer based control of Dc drives, using dual converter, Micro-processor based speed control of three phase Induction motor, Synchronous motor control.

(10 Hrs., 20 Marks)

Reference Books :

1) Thyristerised control of Electric Drives – V. Subramanyam, Tata McGraw Hill, New Dehli.
2) Thyristor Power Control- Dubey, Joshi, Sinha, Willey Eastern Publication.
3) Power Electronics Circuit Devices & Applications –M. Rashid, Prentice Hall of India.
4) Fundamentals of Electrical Drives – G. K. Dubey , Narosa Publishing House.
5) Fundamentals of Electrical Drives - Mohammad A. EL-sarkawi, vikas Publishing House.

List of experiments:-

1) Control of d.c motor using single phase half controlled rectifier.
2) Control of d.c motor using single phase fully controlled rectifier.
3) One quadrant chopper control of d.c motor.
4) Two quadrant chopper control of d.c motor.
5) Speed control of single phase induction motor using ac voltage regulator
6) Study of stepper motor drive circuit.
7) Speed control of universal motor.
8) Study of Micro-computer based control of Dc drives,
9) Study of vector control method for induction motor.
10) Study of reversible drives

The term work should include a minimum of eight experiments from above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM - II

ELECTIVE-II

I) FLEXIBLE A.C.TRANSMISSION

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/Week	**Paper : 100 Marks**
Tutorial : 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25Marks

UNIT I:- DEVICES AND CONVERTERS

Advanced Power Semiconductor Devices, Voltage Source Converter, Single Phase Full Wave Bridge Converter Operation. Three Phase, Full Wave Bridge Converter. Three Level Voltage source Converter, PWM Converter. Generalized technique of harmonic elimination and voltage control, current sourced converter, and current source verses voltage sourced converters.

(10 Hrs., 20 Marks)

UNIT II:-FACTS CONCEPTS

FACTS Concepts, Flow of Powers in AC System, Dynamic stability consideration of transmission interconnection. Relative importance of controllable parameters, facts controllers.

(10 Hrs., 20 Marks)

UNIT III:-SHUNT COMPENSATORS

STATIC Shunt Compensator, Methods of Controllable VAR Generation, Static VAR Compensators, Static VAR System.

(10 Hrs., 20 Marks)

UNIT IV:-SERIES COMPENSATORS

STATIC Series, compensator, Variable Impedance Type Series Compensators, Switching Converter, Types and Compensators, External Control for series Reactive Compensators.

(10 Hrs., 20 Marks)

UNIT V:-COMBINED COMPENSATORS

Combined Compensator, Unified Power Flow Controller, Interline Power Flow Controller, Generalized Multifunctional FACTS Controllers.

(10 Hrs., 20 Marks)

References,

1. N.G.Hingorani,' Understandig FACTS', IEEE Press, 1999
2. Yang hue Song,'Flexible AC Transmission Systems (FACTS), IEEE Press, 1999

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B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM - II

ELECTIVE-II

II) POWER SYSTEM DESIGN PRACTICE

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/Week	**Paper : 100 Marks**
Tutorial : 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25Marks

UNIT I:- DESIGN FUNDAMENTALS

Electrical & mechanical design of transmission line. Design of EHV transmission lines.

(10 Hrs., 20 Marks)

UNIT II: - DESIGN OF DISTRIBUTION SYSTEMS

Improvement and expansion of power system. Bus bar arrangements, isolating switches.

(10 Hrs., 20 Marks)

UNIT III:- CIRCUIT BREAKERS

Circuit breakers: operating mechanism, rating and selection, operating under special conditions, specification and technical details for deranged tender preparations.

(10 Hrs., 20 Marks)

UNIT IV: - LIGHTING ARRESTORS

Rating characteristics, testing technical defects, standards followed for details insulation co ordination. Power transformers different types, tapping , fittings, cooling, drying rating, cost comparison, testing technical details for ordering and tender preparations.

(10 Hrs., 20 Marks)

UNIT V: - SHUNT CAPACITORS

Need, construction, location, connections, protection, analysis, special types, testing, technical details. Earthing: Earthing systems, step potential, touch potential and transfer potential.

(10 Hrs., 20 Marks)

REFERANCES:-

1) Pratapsingh Satnam & P.V. Gupta. – Substation Designed equipments, Dhanpat Rai & Sons.
2) M. V. Deshpande: - Electrical Power system Design.

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B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM - II

ELECTIVE-II

III) ELECTRIC TRACTION ENGG.

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/Week	**Paper : 100 Marks**
Tutorial : 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25Marks

UNIT I: - TRAIN MOVEMENT AND PERFORMANCE

Speed time curve, its analysis and construction, schedule speed and factors affecting it, train resistance and its components. Tractive effort calculations, average acceleration and speed, energy output and consumption.

(10 Hrs., 20 Marks)

UNIT II: - POWER TRANSMISSION AND WEIGHT TRANSFERENCE

Methods of transmission of power from motor to wheels .Idea about riding quantities of an electric loco motive, grouping of motor and weight transference, adhesive weight factors affecting slip.

(10 Hrs., 20 Marks)

UNIT III: - TRACTION MOTORS

Performance of (i) d.c. motors (ii) a.c. single phase series motors at low frequencies and at commercial frequency and (iii) poly phase induction motors, under traction service conditions, specific problems and method of overcoming them, special features of construction effect of differences in driving wheel diameters and speed time curves on division of load, traction motor ratings, speed factor, track and overhead equipments.

(10 Hrs., 20 Marks)

UNIT IV: - POWER SUPPLY FOR TRACTION

Overhead and conductor rail system, third rail construction, Bonding of conductor and track rails, overhead construction for trolley, buses and railways, quaternary's construction, temperature effects, current collectors, out times of feeding and distributing system for d.c low frequency, a.c and commercial frequency, a.c. traction voltage drop control, Electrolytic and inductive coordination, power loading curves, Positions of substations and load - sharing .

(10 Hrs., 20 Marks)

UNIT V :- BRAKING ON ELECTRIFIED RAILWAYS

Mechanical versus electric breaking, rheostatic braking, Regenerative braking, method and energy saved in the process, Magnetic track brakes.

Traction control: Duty cycle, Methods of traction motor control, series-Parallel and other types of controllers, use of interlocks, run back prevented, multiple unit control, Master controllers, Reverses, Dead man's handle, use of Metadyne and Megavolt.

(10 Hrs., 20 Marks)

Reference Books:-

H. Partab: Modern Electric traction, Dhanpat Rai & sons.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM - II

ELECTIVE-II

IV) GENERATION PLANNING AND LOAD DISPATCH

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/Week	**Paper : 100 Marks**
Tutorial : 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25Marks

UNIT-I: - GENERATION

Hydropower, fossil fuels nuclear power generation system. Chronological Load curves, power duration curve, integrated duration curve hydrography, flow duration curve, mass duration curve or hydro power generation stations.

Co-ordination of steam, hydro & nuclear power stations. Optimum generation allocation- line losses neglected & including the effect of transmission losses for thermal power generations.

Low range& short range hydro thermal scheduling of generation the short term and long term hydro thermal scheduling of generation.

(10 Hrs., 20 Marks)

UNIT-II:-PLANNING

Objectives of generation system planning, long term and short term planning. Stages in planning. Policy studies.

(10 Hrs., 20 Marks)

UNIT-III:- LOAD ENERGY FORECASTING

Classification of loads, load forecasting methodology.

peak demand forecasting- non whether sensitive forecast- weather sensitive forecast-total forecast- annual and monthly peak demand forecast.

(10 Hrs., 20 Marks)

UNIT-IV: - GENERATION SYSTEM COST ANALYSIS

Capacity cost, production cost, tuning of addition production analysis- production analysis involving nuclear unit production analysis involving hydro unit. Fuel inventories, energy transition off peak energy utilization.

(10 Hrs., 20 Marks)

UNIT-V:-GENERATION SYSTEM RELIABILITY ANALYSIS

Probabilistic generation unit- model &load model effective load- reliability analysis for isolated system- interconnected system- reliability of interconnected system.

(10 Hrs., 20 Marks)

Reference Books:-

1) Generation of Electric Energy – B.R. Gupta,
   Euresia Publishing House Pvt. Ltd., New Dehli.
2) Power System Planning – R.L.Sullivan, McGraw Hill.
3) Economic Control of Interconnected System – Kirchmayers L.K.,
   John Wiley & Sons, New York.

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B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM - II

ELECTIVE-II

V) EXTRA HIGH VOLTAGE TRANSMISSION

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/Week	**Paper : 100 Marks**
Tutorial : 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25Marks

UNIT I:-AC POWER TRANSMISSION

Basic aspects of A.C. Power transmission, power-handling capacity and line loss, surface voltage and conductors, electrostatic field of EHV lines. Measurement of electrostatic fields. Electromagnetic interference. Traveling waves and standing waves, Line energization with trapped-charge voltage. Reflection and refraction traveling waves. Transient response of system with series and shunt lumped parameters. Principles of traveling protection.

(10 Hrs., 20 Marks)

UNIT II:-LIGHTNING AND PROTECTION

Lightning & lightning Protection, Insulation coordination based lightning.

(10 Hrs., 20 Marks)

UNIT III:-OVERVOLTAGES IN EHV SYSTEM

Over Voltage in EHV system caused by switching operation, Origin of over voltage and their types caused by interruption of inductive and capacitive currents, Ferro-response over voltage, calculation surges, Power frequency voltage control and over voltages, Power circle diagram.

(10 Hrs., 20 Marks)

UNIT IV:-STABILITY CONSIDERATIONS

Reactive power flow and stability in power systems. Steady-state static real power and reactive power stability, transient stability. Basic principles of system voltage control. Effects of transformer tap changing in the post disturbance effect of generator excitation adjustment, Voltage collapse in EHV lines, reactive power requirement for voltage in long line. Voltage stability

(10 Hrs., 20 Marks)

UNIT V:-MAXIMUM POWER TRANSFER AND STABILITY LIMIT

Power Transfer at voltage stability limit of EHV lines, Magnitude of receiving end voltage, Voltage Magnitude of receiving end voltage during maximum power transfer. Magnitude of Maximum power and stability limit. Optimal reactive power at voltage stability limit

(10 Hrs., 20 Marks)

References,

1. A.Chakrabarti, D.P.Kothari, A.K. Mukhopdadhyay, Performance, operational & control of EHV power system, Wheeler publications.
2. Rakosh Das Begamudre,'Extra high-voltage A.C. transmission Engineering' New Age International.
3. S.Rao, EHVAC & HVDC transmission Engineering & practice' - Khanna publications.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II

PROJECT -II

Teaching Scheme	**Examination Scheme**
PRACTICAL:	
4Hrs. /Week (For Term-II)	**Term Work: 100(Term II)**
	Oral : 50 Marks (Term II)

1. The Project group in, BE. first Term will continue the project work in B.E. Second Term, and complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in B.E. Second Term on or before the last day of the term
5. Project report must be submitted in the prescribed format only..

Submission of project report:

The student shall submit a detailed report base on his/her project work to his/her institutional guide. It shall include relevant circuit diagrams, graphs, photographs, specification sheets etc.

Format for the project report shall be as follows:

a) The report shall be neatly typed on white paper .The typing shall be of normal spacing and only on one side of the "A4 "size paper.

b) The report shall be submitted with front and back cover card paper, neatly cut and bound together.

c) Front cover shall have the following details in block capitals in the following sequence.

Title at the top, followed by the name of the candidate with roll no and exam seat no in the next line. Name of the guide with designation below the details of the candidate. The name of the institute and year of submission on separate lines at the end.

d) Project work approval sheet in the form of a certificate duly signed, shall be included.

e) The format of the text of the project report:

The synopsis shall be followed by literature survey. The report of analytical or experimental work done, if any shall then follow. The discussion and conclusion shall form the next part of the text. It shall be followed by nomenclature and symbols used and then acknowledgement .The bibliography shall form the last section.

The total number of typed pages, excluding cover, shall be about 50 to100.All the pages shall be serially numbered.

Number of copies of the project report submitted to the department shall be equal to number of students in a group plus three.The oral examination will be base on the project report.

6. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

B) ASSESSMENT OF PROJECT II TERMWORK (B.E. SECOND TERM)

NAME OF THE PROJECT: _____

NAME OF THE GUIDE: _____

Sr. No	Exam. Seat No	Name Of Students	Assessment by guide (70%)						Assessment by department (30%)			Grand Total
			Fabrication /software / actual work	Execution of project	Project report	Scope/ Cost / Utility	Attende-nece	Total	Evaluation (10%)	Prese-ntaion (20%)	Total	
		Marks	20	10	20	10	10	70	10	20	30	100

Sign of Guide. Sign of Committee Members Sign. of H. O. D.

7. The guide should be internal examiner for oral examination .

8. The external examiner should be from the related area of the concerned project. He should have minimum of five
years of experience at degree level / industry.

9. The evaluation at final oral examination should be done jointly by the internal and external examiners.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II
INDUSTRIAL VISIT

Term work:25 Marks.

EDUCATION TOUR / TECHNICAL VISITS / CASE STUDY AND ITS EVALUATION

1. During B.E. First Term / Second Term or during vacation between B.E. First Term / Second Term every student; shall visit minimum two industries, factories arranged by colleges and accompanied by teachers. There shall be at least one teacher for a group of 20 students and at least one non-teaching staff accompanied with the students.

2. The colleges should obtain appropriate certificates of visit from the concerned organizations just after the visits.

3. Students should submit written report about the visits individually at the end of B.E. Second Term .

4. The report should contain information about the following points:

   (a) The organization - activities of organization and administrative setup technical personnel and their main duties.
   (b) The project *I* industry brief description with sketches and salient technical information.
   (c) The work *I* processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.
   (d) Suggestions (if any) for improvement in the working of those organizations.

5. The evaluation of the report of technical visits will be made by panel of two teachers appointed by principal based on following points:

   (a) Coverage aspect: All above points should be covered.
   (b) Detailed observations: System *I* Process / Product explained with data, diagram specifications.
   (c) Quality of presentation: Report should be very objective and should consist of clear and systematic organization of topics and information.
   (d) Viva - voce: A viva -voce shall be conducted on the technical visit report by the teachers to assess the specific knowledge gained by the students for technical applications.

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NORTH MAHARASHTRA UNIVERSITY, JALGAON

B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM - II

ENTREPRENEURSHIP DEVELOPMENT SKILLS

Practical: 2 hours/week.

1. Entrepreneurship:

Aim alternative to seeking jobs- promote self- employment end accelerate industrialization. Entrepreneurship development program in India and Maharashtra an overview. Institutions promoting entrepreneurship, their objectives and mode of functioning.

2. Motivation, requirement and constraints:

Affiliation, power, achievement, GOAL SETTING, FINCIAL AND CARRER RISK AND Rewards. Sources of information- "where to go and for what?" Entrepreneurial personality, creavity and qualities.

3 Selecting the right entrepreneurship field

Search and scanning: Small scale/ medium scale industries/ manufacturing/ transporting/ consultancy. Criteria for selecting product for elopements/ manufacturing.

4 feasibility report: Market survey, selecting right infrastructure, location and government subsidies, sources of technology, recruiting right people, identifying customers, finding out competitors, preparation of feasibility report, project report.

5 Organizational set-ups: advantages and limitations of proprietorship, partnership, co- operatives, private limited and public limited