

## SCHEME OF INSTRUCTION & EXAMINATION

### B.E II YEAR (REGULAR)

#### (ELECTRICAL & ELECTRONICS ENGINEERING)

#### SEMESTER - II

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions		Duration in Hrs	Scheme of Examination	
			Periods per Week	L/T D/P		Maximum Marks	Sessi- Exam onals
<b>THEORY</b>							
1.	EE 251	Electrical Circuits-II	4	-	3	75	25
2.	CE 222	Solid Mechanics	4	-	3	75	25
3.	EE 253	Power Systems-I	4	-	3	75	25
4.	EE 254	Electrical Machinery - I	4	-	3	75	25
5.	EC 271	Electronic Engineering - II	4	-	3	75	25
6.	ME 273	Prime Movers and Pumps	4	-	3	75	25
<b>PRACTICALS</b>							
1.	EC 291	Electronic Engg – II Lab	-	3	3	50	25
2.	ME 291	Prime Movers and Pumps Lab	-	3	3	50	25
<b>TOTAL</b>			<b>24</b>	<b>6</b>	<b>-</b>	<b>550</b>	<b>200</b>

**EE 251**

**ELECTRICAL CIRCUITS - II**

Instructions	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

**UNIT – I**

Fourier Series and Integral Fourier series representation of periodic functions, Symmetry conditions. Exponential Fourier Series. Discrete Spectrum, Fourier Integral and its properties, continuous spectrum. Application to simple networks.

**UNIT – II**

**Coupled Circuit** : Analysis of circuits with mutual inductance. Linear transformer, ideal transformer

**Polyphase Circuits** : Analysis of balanced and unbalanced 3 phase circuits, Measurement of polyphase power.

**Network Theorem** : Maximum power transfer theorem. Compensation theorem. Reciprocity Theorem.

**UNIT – III**

**Two Port Parameter** : Z, Y, ABCD, h-parameters. Their inter-relationships series parallel and cascade connection of two ports. Terminated two ports.

**UNIT – IV**

Network Synthesis of Driving point functions, Positive real functions – properties, testing of PR functions, synthesis of LC functions.

**UNIT – V**

Synthesis of RC, RL functions, minimum functions, synthesis of RLC networks, Brune's method, Bott and Duffin method.

**Suggested Reading :**

1. M. R. Van Valkenburg – Network Analysis – Prentice Hall of India – 3<sup>rd</sup> Edn., 1995.
2. Hayt and Kimmerley – Engineering Circuit Analysis – Prentice Hall of India, 5<sup>th</sup> Edn., 2000.
3. M. R. Van Valkenburg – Network Synthesis

**CE 222**

**SOLID MECHANICS**

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### **UNIT – I**

Simple stresses and strains, types of stresses and strains, Hooke's Law – stress strain curve, curve for ductile materials. Modulus of elasticity, poisson ratio. Linear strain, Volumetric strain relations between elastic constants – Compound bars and temperature stresses – changes in lengths.

### **UNIT – II**

Shearforce and Bending Moment – Relation between intensity of load shear force and bending moment – Shear force and bending Moment diagrams for cantilever and simply supported beams with and without overhanging for point loads and uniformly distributed loads.

### **UNIT – III**

Theory of simple bending – Assumptions – Derivation of basic equation  $M/I = F/Y = E/R$   
Modulus of section – Moment of resistance – determination of flexural stresses. Direct and Bending Stresses – rectangular, circular and standard structural sections. Distribution of shear stress.

### **UNIT – IV**

Deflections – Cantilever beams and simply – supported beams including overhanging beams using Macaulay Method for point loads, uniformly distributed loads.  
Strain Energy: In bars due to gradually applied loads, sudden loads impact loads and shock loads.

### **UNIT – V**

Torsion-Theory of pure torsion-Derivation of basic equation  $T/J = q/r = G/L$ . Solid and hollow circular shafts, Strain Energy – Transmission of power – Combined bending and torsion.  
Springs – close coiled helical springs subjected to axial loads and couples – strain energy in springs.

### **Suggested Reading:**

1. Ramamruthan - Strength of Materials – S.Dhanpat Rai & Sons – 1993.
2. B.C. Punmia – Strength of Materials & Theory of Structures – Laxmi Publi. 1992.

## **EE 253**

### **POWER SYSTEMS - I**

Instructions	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### **UNIT – I**

**Steam Power Stations :** Choice of site, layout, various parts of the station – Boilers, turbines, super heaters, economizers, air preheaters etc. and their functions – Pulverized fuel – Coal handling and ash disposal.

**Hydroelectric Power Plants :** Estimation of Pwer – Hydrograph, flow duration curves – Mass curve – Storage pondage – Types of Hydroelectric plants and layouts – Prime movers for hydroelectric plants – Specified speed – Choice for prime mover and number of units.

### **UNIT – II**

**Nuclear Power Plants :** Fissile materials – working principle of nuclear power plants and reactor control – Shielding.

**Non Conventional Energy Sources :** Tidal Power

**Wind Power :** Characteristics of wind power – wind wheels.

**Solar Energy :** Residential cooling – Solar power plant – Solar Concentrators- Flat plate Collector. Schematic description of gas turbines and combined cycle power plants

### UNIT – III

**Construction of Overhead lines :** Overhead line materials – Supports = Sag and Tension Calculations – effect of wind and ice-erection conditions.

**Insulators and Overhead Lines :** Types of Insulators – Potential distribution over a string of suspension insulators – Methods of equalizing the potential – testing insulators.

**Insulated Cables :** Conductors for cables – Insulating Materials- Mechanical protection – Low voltage cables – Grading of cables-3-phase high voltage cables and super voltage cables.

### UNIT – IV

**Inductance and Capacitance of Transmission Lines :** Inductance and Capacitance of overhead line conductors – Single phase and three phase with symmetrical composite conductors – GMR and GMD spacings – Transposition – bundled conductors – effect of earth of capacitance.

### UNIT – V

**Economics of Power Generation :** Load curve, load demand and diversified factors, base load operation, types of costs and depreciation and fund calculations. Methods of power factor improvement, economics of p.f. Improvement, tariffs.

**Distribution :** 2-wire and 3-wire distributors – Ring mains – AC distributions, calculations. Choice of voltage for AC and DC transmission.

### Suggested Reading :

1. C. L. Wadhwa – Electrical Power Systems – Wiley Eastern Ltd., 2<sup>nd</sup> Edn.
2. C. L. Wadhwa – Generation, Distribution and Utilization of Electrical Energy – Wiley Eastern Ltd.
3. S. N. Singh – Electric Power Generation, Transmission and Distribution – Prentice Hall of India Pvt. Ltd, New – 2003.

### EE 254

### ELECTRICAL MACHINERY - I

Instructions	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### UNIT – I

**Principles of Electromechanical Energy Conversion :** Energy in magnetic system – Field energy and mechanical force – Direction of mechanical force developed – Flow of energy in

electro mechanical devices – Singly excited and multiply excited systems – Basic concepts of magnetically induced e.m.f. and force.

### **UNIT – II**

**D.C. Machines :** Brief description of constructional features – Armature windings- simple lap and wave windings – Brush position – Classification of D. C. Machines.

**D.C. Generators :** Generated E.M. F. – Methods of excitation – Armature reaction – Theory of commutation – Types of Generators and their characteristics – Series and Parallel operation.

### **UNIT – III**

**D. C. Motors :** Generation of Electromagnetic torque – Types of motors and their characteristics – Application of motors – Starting and speed control of D.C.Motors – testing of D.C.Motors : Losses and efficiency – Temperature rise and Swinburne’s Test – Hopkinson’s Test – Field’s Test for series motors – Retardation test – Separation of losses.

### **UNIT – IV**

**Single phase Transformers :** Constructional Features, principle of operation-ideal transformer-transformer on ‘NO’ load and ‘ON’ load – Vector diagrams – Equivalent circuit – losses – Testing – Polarity test, O. C. and S. C. tests – Sumpner’s test – regulation and efficiency – All day efficiency – Separation of losses – Excitation phenomena of Transformers.

### **UNIT – V**

**Three Phase Transformers :** Three Phase Transformers Connections

Y-Y,  $\Delta$  -  $\Delta$ ,  $\Delta$  - Y, Y-  $\Delta$ , V- V and Scott connections.

**Stepper Motors :** Types of Stepper Motors – parameters – characteristics – drive circuits and applications.

### **Suggested Reading :**

1. Nagrath I. J. and Kothari D. P. – Electrical Machines – Tata McGraw Hill, 1985.
2. H. Cotton – Advanced Electrical technology – Wheeler & Co., 1995.
3. Kingsley Jr – Electrical Machinery – Tata McGraw Hill.

### **EC 271**

### **ELECTRONIC ENGINEERING – II**

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### **UNIT – I**

**Feedback amplifiers:** Concept of Feedback, Feedback amplifier, Configurations, Circuits, Advantages of negative feedback, Analysis of simple feedback amplifiers using BJTs and FETs.

## UNIT – II

**Oscillators:** Brakhhausen Criterion: RC oscillators, Weinbridge, phase shift, LC Hartley and Colpritts oscillators, Crystal controlled oscillators (Analysis of oscillators using BJTs only) stability of oscillators.

## UNIT – III

**D.C. Amplifiers:** Problems of dc amplifiers, drift compensation techniques, differential amplifiers, importance of CMRR, high CMRR, Differential Ammplifiers.

## UNIT – IV

**Power Amplifiers:** Classification of power amplifiers, analysis of class A and B power amplifiers, Distortion in amplifiers, push pull amplifiers, complementary symmetry.

## UNIT – V

**Wave shaping Circuits:** RC low pass and high pass circuits: response to step, pulse, Ramp and Square wave inputs – differentiating and integrating circuits using diode, clipping circuits for single level and two levels, clamping circuits.

### **Suggested Reading:**

1. Jacob Millman & Christos C.Halkias-Integrated Electronics-McGraw Hill, 1991.
2. Jacob Millman & Christos C.Halkias-Electronics Devices and Circuits-McGraw Hills, 1991.
3. Jacob Millman & Taub-Pulse Digital and Switching Wave forms-McGraw Hill, 1985.

**Measurement of fluid flow:** Devices used for measurement of pressure, velocity and discharge and derivation of relevant formulae.

**Fluid Dynamics:** Derivation of Euler's and Bernoulli's equations and their applications. Impulse momentum equation and its applications.

## UNIT – V

**Laminar and Turbulent flow through pipes:** Distinction between Laminar and Turbulent flow, Reynolds number and its significance. Critical Reynolds number, Laminar and Turbulent flow in circular pipes. Hagen Poiseuille equation, friction losses in pipes. Darcy's equation, Estimation of Darcy's friction factor 'f'. Empirical formulae and Moody's Chart Development of Laminar and turbulent boundary layer on a Flat plate Dimensional analysis and dynamic similarity.

### **Suggested reading:**

1. J.F. Mahew and K.S.Rogers-Thermodynamics-Longman, 1986.
2. S.Nagaratnam-Fluid Mechanics- Khanna Publishers, 1987.
3. R.K.Bansal-Fluid Mechanics & Hydraulic Machines-Laxmi Publications, 1998

**ME 273**

**PRIME MOVERS AND PUMPS**

Instructions	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### UNIT – I

**Fluid Mechanics :** Newtonian and non-Newtonian fluids Viscosity, types of fluid flows continuity momentum and energy equation. Bernoulli's equation and its applications. Laminar and Turbulent flows. Flow through pipes, friction losses in pipes, and Darcy's equation. Reynolds number and its significance. Basic concepts of boundary layers and boundary layers thickness.

### UNIT – II

**Hydraulic Turbines :** Classification and working principles of turbines – Pelton, Francis and Kaplan turbines. Velocity diagram for impulse and reaction turbines. Calculation of blade angles, Workdone, power output and efficiencies. Specific speed of turbines. Functions of draft tube and type of draft tubes. Principles of Similarity, unit quantities, performance and characteristic curves.

### UNIT – III

Generation of steam, dryness fraction and properties of steam. Functions of boilers, Fire tube and water tube boilers, description, working of boilers, Boiler mountings and accessories.

**Steam engines :** Rankine and Modified Rankine cycles for steam engines, Evaluation of Mean Effective Pressure, Power and cylinder dimensions for Single acting and double acting steam engines.

### UNIT – IV

**Steam Turbines :** Classification of steam turbines, Velocity diagrams for Single Stage impulse and reaction turbines, Problems on workdone, blade angles, power output and thermal efficiency of turbine.

**Gas Turbines :** Classification of Gas Turbine – constant pressure combustion, open cycle, closed cycle and constant volume combustion gas turbine plants. Calculation of various efficiencies and parameters.

### UNIT – V

**Pumps :** Reciprocating pumps : working of single and double acting types. Effect of acceleration head and friction. Use of air vessels. Workdone and power required without and with air vessels.

**Centrifugal pumps :** Classification and working of centrifugal pumps, need for priming. Workdone and efficiencies. Specific Speed of pumps. Cavitations and its effect on performance.

### Suggested Reading :

1. P. L. Ballaney – Thermal Engineering – Khanna Publishers, 1993
2. R. Yadav – Steam and Gas Turbine – Galgotia Publishers, 1992
3. S. Ramamrutham – Hydraulic Machines – Dhanpath Rai and Sons, 1992

**ELECTRONIC ENGINEERING – II LAB**  
(Common for EEE and IE)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

**List of Experiments:**

1. Voltage series feedback amplifier
2. Voltage shunt feedback amplifier
3. Current series feedback amplifier
4. Current shunt feedback amplifier
5. Hartley Oscillator
6. Colpitt's Oscillator
7. RC phase shift Oscillator
8. Weinbridge Oscillator
9. Linear wave shaping - Integrator & Differentiator
10. Nonlinear wave shaping – Clipping
11. Class-B-Power Amplifiers
12. Clamping Circuits (Diode)
13. Difference Amplifier (Op.Amplifier)

**ME 291**

**PRIME MOVERS AND PUMPS LAB**

Instructions	3 Periods per Week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

**List of Experiments :**

1. Performance of reciprocating pumps
2. Performance and characteristic curves of centrifugal pumps
3. Performance and characteristic curves of Pelton wheel
4. Performance and characteristic curves of Francis turbine
5. Performance and characteristic curves of Kaplan turbine
6. Performance test on multi cylinder petrol engine
7. Performance test on Diesel engine
8. Study of constructional details and operation of steam boiler
9. Thermal conductivity of composite wall
10. Determination of Stefan Boltzman Constant
11. Determination of Volumetric efficiency of Reciprocating air Compressor
12. Determination of overall efficiency of a Centrifugal Blower

**EE 292**

**ELECTRICAL TECHNOLOGY LAB**

Instructions	3 Periods per Week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

**List of Experiments :**

1. To determine the magnetization curve of a separately excited d.c. generator
2. To determine the load characteristics of a shunt generator
3. To determine the load characteristics of a series generator
4. To determine the performance characteristics of a shunt motor
5. To determine the load characteristics of a d.c. series motor
6. To determine the performance of a compound motor
7. Speed control of d.c. motor
8. O. C. and S. C. tests on single phase transformer
9. Load test on single phase transformer

10. To determine the performance of a three phase induction motor
11. Speed control methods of induction motors
12. Regulation of alternator by O.C. and S.C. tests

**EE 291**

**ELECTRICAL CIRCUITS AND MACHINES LAB**

Instructions	3 Periods per Week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

**List of Experiments:**

In the normal course not less than 10 of the following experiments should be done during the semester:

1. Verification of Thevenin's and Norton theorems
2. Study of 3-Phase balanced and unbalanced circuits.
3. Measurement power by two wattmeter method
4. Study of single-phase circuit
5. Study of self and mutual inductance of coils and their inter connections. Study of capacitor and their inter connections.
6. To determine the magnetization curve of separate excited DC generator
7. To determine the load characteristics of a shunt generator
8. To determine the performance characteristics of a shunt motor
9. To determine the performance characteristics of a compound motor.
10. Speed control of DC shunt motor
11. OC and SC tests on single phase transformer
12. 3-Phase induction motor load test
13. Regulation of an alternator
14. Speed control methods of induction motors

**Curricula and Syllabi for the B.E. Programmes as approved by the University**

To determine the load characteristics of a D.C series motor