



**SCHEME FOR
FOURTH SEMESTER (ELECTRICAL ENGINEERING)**

Sr. No.	Subject	Study Scheme			EVALUATION SCHEME						Total Marks
					INTERNAL ASSESSMENT		EXTERNAL ASSESMENT (EXAMINATION)				
					Theory	Practical	Written Paper		Practical		
					Max. Marks	Max. Marks	Max. Marks	Hrs.	Max. Marks	Hrs.	
4.1*	Electrical Machines-I	4	-	3	25	25	100	3	50	3	200
4.2*	Energy Sources and Management of Electrical Energy	5	-	-	25	-	100	3	-	-	125
4.3*	Electronics - II	4	-	3	25	25	100	3	50	3	200
4.4*	Electrical Engineering Design and Drawing – II	-	-	6	-	75	100	3	50 (viva)	-	225
4.5*	Instrumentation	3	-	2	25	25	100	3	50	3	200
4.6*	Estimating and Costing in Electrical Engineering	4	-	-	25	-	100	3	-	-	125
# Student Centered Activities including Entrepreneurial Awareness Camp		-	-	6	25	-	-	-	-	-	25
Total		20	-	20	150	150	600	-	200	-	1100

* Common with other diploma programmes

** Common with diploma programme in Power Station Engineering

+ Includes 25 marks for Viva-voce

Student Centered Activities will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g.

photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defense/Disaster Management activities etc.



SYLLABUS: Polytechnic (EE)

Department: Electrical Engineering – 4th Semester

Subject: Electrical Engineering Design and Drawing-II (Theory)

Subject Code: 120944

Detailed Contents

Unit No.1 Contractor Control Circuits

- Topic No.1: DOL starting of 3-phase induction motor
- Topic No.2: 3-phase induction motor getting supply from selected feeder
- Topic No.3: Forwarding/reversing of a 3-phase induction motor
- Topic No.4: Two speed control of 3-phase induction motor
- Topic No.5: Limit switch control of a 3-phase induction motor
- Topic No.6: Sequential operating of two motors using time delay relay
- Topic No. 7: Manually generated star delta starter for 3-phase induction motor
- Topic No.8: Automatic star delta starter for 3-phase Induction Motor

Unit No.2 Earthing

- Topic No.9: Concept and purpose of earthing
- Topic No.10: Different types of earthing, drawings of plate and pipe earthing
- Topic No.11: Procedure of earthing, test of materials required and costing
- Topic No.12: Method of reducing earth resistance
- Topic No.13: Relevant IS specifications of earth electrode for earthing a transformer, a high building
- Topic No.14: Earthing layout of distribution transformer
- Topic No.15: Substation earthing layout and earthing materials
- Topic No.16: Key diagram of 11KV, 33Kv, 66KV, 132 KV sub-stations

Unit No.3 Drawings of Machine Parts

- Topic No.17: End cover of induction motor
- Topic No.18: Rotor of a squirrel cage induction motor
- Topic No.19: Field coil of a DC motor
- Topic No.20: Terminal plate of an induction motor
- Topic No.21: Motor body (induction motor) as per IS specifications
- Topic No.22: Slip rings of 3-phase induction motor

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment(Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	6	-	75	100	3	50	3	225

REFERENCE BOOKS:

1. Electrical Design and Drawings by Raina & Bhattacharya
2. Electrical Design & Drawings by Sarabjeet Singh
3. IEEE Guide 80 for Earthing, IEEE Publication, New York
4. Electrical Controls in Industry by Charles Siskind
5. BIS for Electrical Earthing



Detailed Contents

Unit No.1 Introduction to Electrical Machines

- Topic No.1: Definition of motor and generator, concept of torque
- Topic No.2: Torque development due to alignment of two fields and the concept of torque angle
- Topic No.3: Electro-magnetically induced emf
- Topic No.4: Elementary concept of an electrical machine
- Topic No.5: Comparison of generator and motor

Unit No.2 DC Machines

- Topic No.6: Main constructional features, Types of armature winding
- Topic No.7: Function of the commutator for motoring and generation action
- Topic No.8: Factors determining induced emf
- Topic No.9: Factors determining the electromagnetic torque
- Topic No.10: Types of dc generation on the basis of excitation, Voltage built up in a dc shunt generator
- Topic No.11: Significance of back e.m.f., the relation between back emf and Terminal voltage
- Topic No.12: Armature Reaction
- Topic No.13: Commutation methods to improve commutation
- Topic No.14: Performance and characteristics of different types of DC motors
- Topic No.15: Speed control of dc shunt/series motors
- Topic No.16: Need of starter, three point dc shunt motor starter and 4-point starter
- Topic No.17: Applications of DC motors
- Topic No.18: Losses in a DC machine
- Topic No.19: Determination of losses by Swinburne's test

Unit No.3 Transformers (single phase)

- Topic No.20: Introduction
- Topic No.21: Constructional features of a transformer and parts of transformer
- Topic No.22: Working principle of a transformer
- Topic No.23: EMF equation
- Topic No.24: Transformer on no-load and its phasor diagram
- Topic No.25: Transformer -neglecting voltage drop in the Windings–Ampere turn balance – its phasor diagram
- Topic No.26: Mutual and leakage fluxes, leakage reactance
- Topic No.27: Transformer on load, voltage drops and its Phasor diagram
- Topic No.28: Equivalent circuit
- Topic No.29: Relation between induced emf and terminal Voltage, regulation of a transformer Mathematical relation
- Topic No.30: Losses in a transformer
- Topic No.31: Open circuit and short circuit test. Calculation Efficiency, condition for maximum efficiency- Maintenance of Transformer, scheduled Maintenance
- Topic No.32: Auto transformer construction, saving of copper, working and applications
- Topic No.33: Different types of transformers including dry type transformer.

Unit No.4 Transformers three phase

- Topic No.34: Construction of three phase transformers and accessories of transformers such as Conservator, breather, Buchholz Relay, Tap Changer
- Topic No.35: Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star
- Topic No.36: Conditions for parallel operation.
- Topic No.37: On load tap changer
- Topic No.38: Difference between power and distribution transformer
- Topic No.39: Cooling of transformer



STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment(Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
4	-	-	25	-	100	3	-	-	125

REFERENCE BOOKS:

1. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, Education Pvt Ltd. New Delhi
2. Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
3. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi
4. Electrical Machines by JB Gupta, SK Kataria and Sons, New Delhi
5. Electrical Machines by Fitzgerald
6. Electrical Machines by Smarajit Ghosh-Pearson Publishers, Delhi.

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (Hrs.)	Marks Allocation (%)
1	Introduction to electrical machine	6	10
2	DC Machine	24	40
3	Transformers(single phase)	24	35
4	Transformers three phase	10	10
Total		64	100



Subject: Electrical Machine-I (Practical)

Subject Code: 30951(P)

LIST OF PRACTICALS

1. Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding
2. Speed control of dc shunt motor (i) Armature control method (ii) Field control method
3. Study of dc series motor with starter (to operate the motor on no load for a moment)
4. Study of 3 point starter for starting D.C. shunt motor.
5. To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load
6. To find the efficiency and regulation of single phase transformer by actually loading it.
7. Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations
8. Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as
 - (a) Star-star
 - (b) Star delta
 - (c) Delta star
 - (d) Delta - Delta configuring conditions.

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment(Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	3	-	25	-	-	50	3	125



Detailed Contents

Unit No.1 Introduction

- Topic No.1: Purpose of estimating and costing, Performa for making estimates,
- Topic No.2: Preparation of materials schedule, costing, price list, Preparation of tender document net price list, market survey
- Topic No.3: Overhead charges, labor charges, electrical point method and fixed percentage method,
- Topic No.4: Contingency, profit, purchase system, enquiries, comparative statements,
- Topic No.5: Orders for supply, payment of bills. Tenders – its constituents, finalization, specimen tender.

Unit No.2 Types of wiring

- Topic No.6: Cleat, batten, casing capping and conduit wiring, comparison of different wiring systems, selection and design of wiring schemes for particular situation
- Topic No.7: Selection of wires and cables, wiring accessories and use of protective devices i.e. MCB, ELCB etc. Use of wire-gauge and tables

Unit No.3 Estimating and Costing

- Topic No.8: Domestic installations; description of various tests to test the wiring installation before commissioning, standard practice as per IS and IE rules. Planning of circuits, sub circuits and position of different accessories, electrical layout, preparing estimates including cost as per schedule rate pattern and actual market rate (for house of two room set along with layout sketch).
- Topic No.9: Industrial installations; relevant IE rules and IS standard practices, planning, designing and estimation of installation for single phase motors of different ratings, electrical circuit diagram, starters, preparation of list of materials, estimating and costing exercises on workshop with single-phase, 3-phase motor load and the light load (3-phase supply system)
- Topic No.10: Service line connections estimate for domestic up to 10 KW and Industrial loads up to 20 KW (over-head and underground connections) from pole to energy meter.

Unit No. 4. Estimating the material required for

- Topic No.11: Transmission and distribution lines (overhead and underground) planning and designing of lines with different fixtures, earthing etc. based on unit cost calculations
- Topic No.12: Substation: Types of substations, substation schemes and components, estimate of 11/0.4 KV pole mounted substation up to 200 KVA rating, methods of earthing of substations, Key Diagram of 66KV/11 and 11 KV/0.4 KV Substation.
- Topic No.13: Single line diagram, layout sketching of outdoor, indoor 11kV sub-station or 33kV substation

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment			External Assessment(Examination)			
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
3	1	-	25	-	100	3	-	-	125

REFERENCE BOOKS:

1. Electrical Installation, Estimating and Costing by JB Gupta, SK Kataria and Sons, New Delhi
2. Estimating and Costing by SK Bhattacharya, Tata McGraw Hill, New Delhi
3. Estimating and Costing by Surjeet Singh, Dhanpat Rai & Co., New Delhi
4. Estimating and Costing by Qurashi
5. Estimating and Costing by SL Uppal, Khanna Publishers, New Delhi
6. Electrical Estimating and Costing by N Alagappan and B Ekambaram, TMH, New Delhi

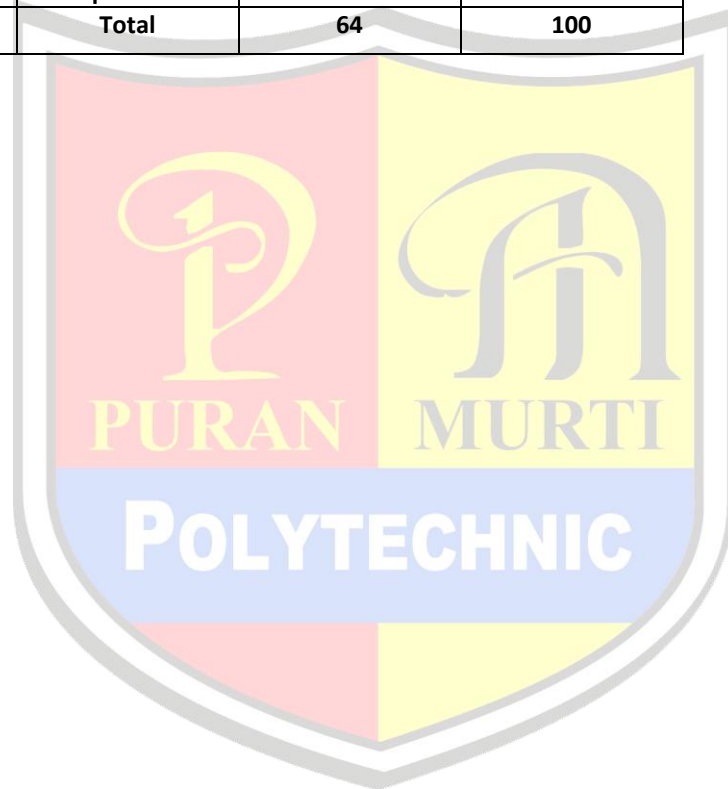


PM POLYTECHNIC

A Unit of Puran Murti Educational Society
Approved by AICTE, Ministry of HRD, Govt. of India,
Affiliated to State Board of Technical Education, Panchkula, Haryana

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (Hrs.)	Marks Allocation (%)
1	Introduction	8	15
2	Types of Wiring	10	20
3	Estimating and costing	30	40
4	Estimating the material required for	16	25
	Total	64	100





Subject: Energy Sources and Management of Electrical Energy (Theory)

Subject Code: 120942

Detailed Contents

Unit No.1 Introduction

- Topic No.1: Various energy sources, importance of non-conventional sources of energy
- Topic No.2: Present scenario, future prospects and economic criteria

Unit No.2 Solar Energy

- Topic No.3: Principle of conversion of solar radiation into heat
- Topic No.4: Photo-voltaic cell
- Topic No.5: Electricity generation
- Topic No.6: Application of solar energy like solar water heaters, solar furnaces, solar cookers, solar lighting, solar pumping

Unit No.3 Bio-energy

- Topic No.7: Bio-mass conversion technologies- wet and dry processes
- Topic No.8: Methods for obtaining energy from biomass
- Topic No.9: Power generation by using gasifiers

Unit No.4 Wind Energy

- Topic No.10: Wind energy conversion, windmills
- Topic No.11: Electricity generation from wind- types of wind mills, local control, energy storage

Unit No.5 Geo-thermal and Tidal Energy

- Topic No.12: Geo-thermal sources
- Topic No.13: Ocean thermal electric conversion
- Topic No.14: Open and closed cycles, hybrid cycles
- Topic No.15: Prime movers for geo-thermal energy conversion
- Topic No.16: Steam Generation and electricity generation

Unit No.6 Magneto Hydro Dynamic (MHD) Power Generation

- Topic No.17: Introduction

Unit No.7 Chemical Energy Sources

- Topic No.18: Design and operating principles of a fuel cell
- Topic No.19: Conversion efficiency, work output and e.m.f of fuel cells, applications

Unit No.8 Energy Conservation and Management

- Topic No.20: Need for energy conservation with brief description of oil and coal crisis.
- Topic No.21: Environmental aspects
- Topic No.22: Energy efficiency- its significance
- Topic No.23: Energy efficient technology an overview
- Topic No.24: Energy conservation in Domestic sector- Lighting, home appliances
- Topic No.25: Need for energy efficient devices
- Topic No.26: Energy conservation in Industrial sector- Motors, Industrial lighting, Distribution system, Pumps, Fans, Blowers
- Topic No.27: Energy conservation in Agriculture sector, Tube-well pumps
- Topic No.28: Diesel-generating sets, Standby energy sources
- Topic No.29: Macro Level approach for energy conservation at design stage

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment(Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
5	-	-	25	-	100	3	-	-	125



REFERENCE BOOKS:

1. Solar Energy – Principles of thermal collection and Storage SP Sukhatme, Tata McGraw Hill Publication, New Delhi.
2. Non-Conventional Energy Resources by RK Singal, SK Kataria and Sons, New Delhi
3. Solar Energy Utilization; GD Rai ; Khanna Publishers, New Delhi.
4. Reviews of Renewable Energy Sources, Vol. 3, Edited by MS Sodha, S.S. Mathur, MAS Malik, TC Kandpal ; Wiley Eastern Limited, New Delhi.
5. Renewable Energy Sources and Conversion Technology by NK Bansal, Manfred Kleemann, Michael Meliss, Tata McGraw Hill Publishing Co. Ltd New Delhi.
6. Energy Today and Tomorrow; Maheshwar Dayal; Publications Division, Ministry of Information and Broadcasting, Govt. of India, New Delhi.
7. Energy Technology (non-conventional, renewable and conventional) by S Rao and BB Parulekar, Khanna Publishers, New Delhi
8. Manual on Energy Efficiency at Design Stage, CII Energy Management Cell.
9. Energy Conservation-case studies in ceramic industry, sugar industry, fertiliser industry, cement industry. CII, Energy Management Cell etc

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (Hrs.)	Marks Allocation (%)
1	Introduction	6	05
2	Solar Energy	12	15
3	Bio Energy	8	10
4	Wind Energy	8	10
5	Geo-thermal and Tidal Energy	12	15
6	Magneto Hydro Dynamic Power Generation	4	05
7	Chemical Energy Sources	10	10
8	Energy Conservation and Management	20	30
	Total	80	100



Detailed Contents

Unit No.1 Measurement

- Topic No.1: Importance of measurement
- Topic No.2: Basic measuring systems
- Topic No.3: Advantages and limitations of each measuring systems
- Topic No.4: Display devices

Unit No.2 Transducers

- Topic No.5: Resistance, Inductance type transducer
- Topic No.6: Capacitance, Electromagnetic type transducer
- Topic No.7: Piezoelectric type transducer

Unit No.3 Measurement of Displacement and Strain

- Topic No. 8: Wire wound potentiometer
- Topic No. 9: LVDT
- Topic No. 10: Strain gauges and their different types such as inductance type, resistive type, wire and foil type
- Topic No. 11: Gauge factor
- Topic No. 12: Gauge materials and their selections
- Topic No. 13: Use of electrical strain gauges
- Topic No. 14: Strain gauge bridges and amplifiers.

Unit No.4 Force and Torque Measurement

- Topic No. 15: Load measurements by using elastic transducers
- Topic No.16: Electrical strain gauges
- Topic No.17: Load cells
- Topic No.18: Measurements of torque by brake, dynamometer
- Topic No.19: Speed measurements; different methods, devices

Unit No.5 Pressure Measurement

- Topic No.20: Bourdon pressure gauges
- Topic No.21: Electrical pressure pickups and their principle, construction and applications
- Topic No.22: Use of pressure cells

Unit No.6 Flow Measurement

- Topic No.23: Basic principles of magnetic and ultrasonic flow meters

Unit No.7 Measurement of Temperature

- Topic No.24: Bimetallic thermometer
- Topic No.25: Thermoelectric thermometers
- Topic No.26: Resistance thermometers, thermocouple
- Topic No.27: Thermistors and pyrometer
- Topic No.28: Temperature recorders

Unit No.8 Measurement of other non electrical quantities

- Topic No.29: Humidity
- Topic No.30: Ph, level and vibrations

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment			External Assessment(Examination)			
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
3	-	-	25	-	100	3	-	-	125

REFERENCE BOOKS:

1. Electronic Measurement and Instrumentation by Dr Rajendra Prasad
2. Electronic Measurement and Instrumentation by JB Gupta, SK Kataria and Sons, New Delhi
3. Electrical and Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Co., New Delhi
4. Electronic Instrumentation and Measurement Techniques by WD Cooper, AD Helfrick Prentice Hall of India Pvt. Ltd. New Delhi



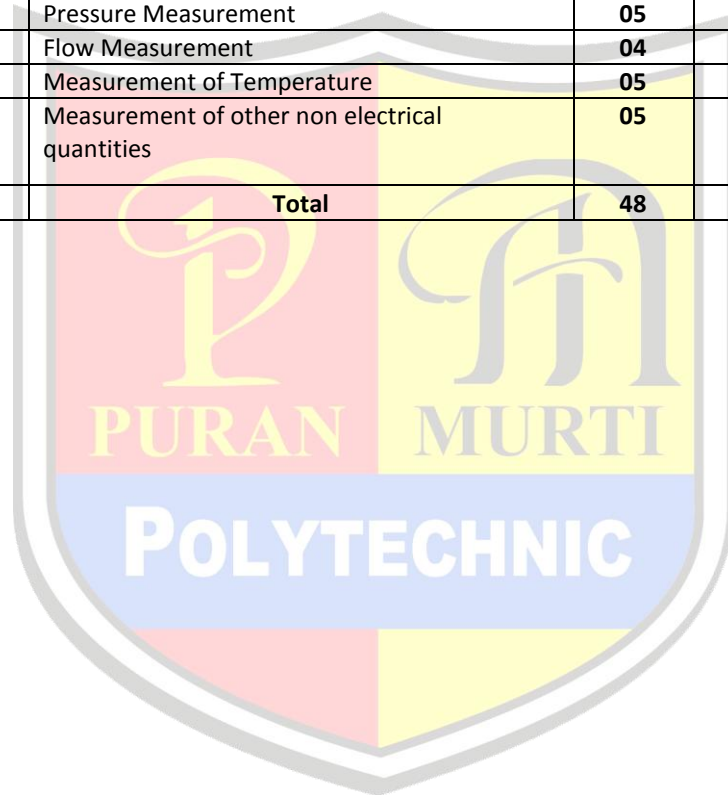
PM
POLYTECHNIC

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Affiliated to State Board of Technical Education, Panchkula, Haryana

5. Industrial Instrumentation by Umesh Rathore, SK Kataria and Sons, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (Hrs.)	Marks Allocation (%)
1	Measurements	03	06
2	Transducers	06	12
3	Measurement of Displacement and Strain	10	20
4	Force and Torque Measurement	10	20
5	Pressure Measurement	05	12
6	Flow Measurement	04	08
7	Measurement of Temperature	05	12
8	Measurement of other non electrical quantities	05	10
	Total	48	100





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A Unit of Puran Murti Educational Society
Approved by AICTE, Ministry of HRD, Govt. of India,
Affiliated to State Board of Technical Education, Panchkula, Haryana

Subject: Instrumentation (Practical)

Subject Code: 120946(P)

Detailed Contents

LIST OF PRACTICALS

1. To measure the level of a liquid using a transducer
2. To measure temperature using a thermo-couple
3. Study and use of digital temperature controller
4. Use of themistor in ON/OFF transducer
5. Study of variable capacitive transducer
6. Draw the characteristics of a potentiometer
7. To measure linear displacement using LVDT
8. To study the use of electrical strain gauge
9. To study weighing machine using load cell
10. To study pH meter.

STUDY SCHEME		EVALUATION SCHEME							Total Marks
		Internal Assessment		External Assessment(Examination)					
Hrs/week			Theory	Practical	Written Paper		Practical		75
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	3	-	25	-	-	50	3	



Detailed Contents

Unit No.1 Transistor Audio Power Amplifier

- Topic No.1: Difference between voltage and power amplifier
- Topic No.2: Important terms in Power Amplifier, collector efficiency, distortion and Dissipation capability
- Topic No.3: Classification of power amplifier class A, B and C
- Topic No.4: Class A single-ended power amplifier, its working and collector efficiency
- Topic No.5: Impedance matching in a power amplifier using transformer
- Topic No.6: Heat sinks in power amplifiers
- Topic No.7: Push-pull amplifier: circuit details, working and advantages
- Topic No. 8: Principles of the working of complementary symmetry push-pull amplifier

Unit No.2 Tuned Voltage Amplifier

- Topic No.9: Introduction
- Topic No.10: Series and parallel resonance (No mathematical derivation)
- Topic No.11: Single and double tuned voltage amplifiers
- Topic No.12: Applications of tuned voltage amplifier

Unit No.3 Feedback in Amplifiers

- Topic No.13: Feedback and its importance, positive and negative feedback and their need A
- Topic No.14: Voltage gain of an amplifier with negative feedback $A = 1 + \frac{R_f}{R_i}$ A
- Topic No.15: Effect of negative feedback on voltage gain, stability, distortion, band width, output and input impedance of an amplifier
- Topic No.16: Typical feedback circuits
- Topic No.17: Effect of removing the emitter by-pass capacitor on a CE transistor amplifier
- Topic No.18: Emitter follower and its applications

Unit No.4 Sinusoidal Oscillator

- Topic No.19: Sinusoidal Oscillators – positive feedback in amplifiers
- Topic No.20: Difference between an oscillator and an alternator
- Topic No.21: Essentials of an oscillator
- Topic No.22: Circuit details and working of LC oscillators viz. Tuned Collector, Hartley and Colpitt's oscillators
- Topic No.23: R-C oscillator circuits, phase shift and Wein bridge oscillator circuits
- Topic No.24: Introduction to piezoelectric crystal and crystal oscillator circuit

Unit No.5 Wave-Shaping and Switching Circuits

- Topic No.25: Concept of Wave-shaping
- Topic No.26: Wave-shaping circuits
 - a. R-C differentiating and integrating circuits
 - b. Diode clipping circuits
 - c. Diode clamping circuits
 - d. Applications of wave-shaping circuits
- Topic No.27: Transistor as a switch (explanation using CE transistor characteristics)
- Topic No.28: Collector coupled a stable, monostable, bistable multivibrator circuits (explanation using wave shapes).
- Topic No.29: Working and applications of transistor inverter circuit using power transistors

Unit No.6 Power supplies

- Topic No.30: Working Principles of different types of power supplies viz. CVTs, IC voltage regulator (78 XX, 79XX)

Unit No.7 Operational Amplifier

- Topic No.31: The basic operational amplifier. The differential amplifier. The emitter coupled differential amplifier. Offset even voltages and currents



Topic No.32: Basic operational amplifier applications, integrator and differentiator summer, subtractor

Topic No.33: Familiarization with specifications and pin configuration of IC 741

Topic No.34: Block diagram and operation of 555 IC timer

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment(Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
4	-	-	25	-	100	3	-	-	125

REFERENCE BOOKS:

1. A text book of Basic Electronics and Linear Circuits by NN Bhargava and others, Tata McGraw Hill, New Delhi
2. Electronics Principles by SK Sahdev, Dhanpat Rai and Co., New Delhi
3. Electronics Principles by Albert Paul Malina, Tata McGraw Hill, New Delhi
4. Operational Amplifiers and Linear Circuits by Rama Kant and A. Gaykwad, Prentice Hall of India, New Delhi
5. Electronic Devices Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi
6. Electronic Devices and Circuits by Millman and Halkias, McGraw Hill, New Delhi
7. Analog Electronics – II by DR Arora, Ishan Publication, Ambala
8. Electronic Devices and Circuits by JC Karhara, King India Publication, New Delhi
9. Electronic Devices and Circuits-I, Eagle Prakashan, Jalandhar
10. Electronic Devices Circuits by JB Gupta, SK Kataria and Sons, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (Hrs.)	Marks Allocation (%)
1	Transistor Audio Power Amplifier	12	20
2	Tuned Voltage Amplifier	08	10
3	Feedback in Amplifiers	08	10
4	Sinusoidal Oscillators	08	10
5	Wave-Shaping and Switching Circuits	15	30
6	Power Supplies	05	10
7	Operational Amplifier 8	08	10
	10		
	Total 64	100	
	Total	64	100



LIST OF PRACTICALS

1. To study the effect of coupling capacitor on lower cut off frequency and upper cut off frequency by plotting frequency
2. To measure
 - (a) Optimum load
 - (b) Output power
 - (c) Signal handling capacity of a push –pull amplifier
3. To observe the effect of negative current feedback on the voltage gain of a single stage transistor amplifier by removing emitter by-pass capacitor.
4. To measure
 - (a) voltage gain
 - (b) input and output impedance for an emitter follower circuit
5. To measure frequency generation in (a) Hartley (b) R-C Phase Shift oscillator
6. To observe the differentiated and integrated square wave on a CRO for different values of R-C time constant
7. Clipping of both portion of sine-wave using:
 - (a) Diode and dc source
 - (b) zener diodesClamping a sine-wave to:
 - (a) Negative dc voltage
 - (b) Positive dc voltage
8. To generate square-wave using an astable multivibrator and to observe the wave form on a CRO and verify the result using p-spice software
9. To observe triggering and working of a bistable multivibrator circuit and observe its output wave form on a CRO
10. To use the op-Amp (IC 741) as inverting one and non-inverting amplifiers, adder, comparator integrator and differentiator and verify the result using p-spice software
11. To study the pin configuration and working of IC 555 and its use as monostable and a stable multivibrator
12. To realize the regulated power supply by using three terminal voltage regulator ICs such as 7805, 7905, 7915 etc. and verify the result using p-spice software

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment(Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	3	-	25	-	-	50	3	75