# DEE 401 : ELECTRICAL MACHINES - I

**Credits: 4** **Semester IV**

| Module No. | Contents | Teaching Hours |
|---|---|---|
| UNIT-1 | **Introduction to Electrical Machines**<br>Definition of motor and generator, concept of torque<br>Torque development due to alignment of two fields and the concept of torque angle<br>Electro-magnetically induced emf<br>Elementary concept of an electrical machine<br>Comparison of generator and motor<br>**DC Machines**<br>Main constructional features, Types of armature winding<br>Function of the commutator for motoring and generation<br>starter<br>Applications of DC motors<br>Losses in a DC machine | |
| Unit-ii | **RESONANCE:** Series Resonance in R-L-C circuits General aspects – Impedance & phase angle of series resonant circuit – Voltages & current in series resonant circuit<br><br>**Transformers (single phase)**<br>Introduction<br>Constructional features of a transformer and parts of transformer<br>Working principle of a transformer<br>EMF equation<br>Equivalent circuit<br>Relation between induced emf and terminal voltage, regulation of a transformer mathematical relation<br>Losses in a transformer<br>Auto transformer construction, saving of copper, working and applications<br>Different types of transformers including dry type Transformer. | |
| Unit - III | **Transformers three phase**<br>Construction of three phase transformers and accessories of Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star | |

**RECOMMENDED 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.

## DEE 402: ENERGY SOURCES AND MANAGEMENT OF ELECTRICAL ENERGY

**Credits: 4** **Semester IV**

| Module No. | Contents | Teaching Hours |
|---|---|---|
| Unit – I | **Introduction :**<br>Various energy sources, importance of non-conventional sources of energy, present scenario, future prospects and economic criteria<br>**Solar Energy :**<br>Principle of conversion of solar radiation into heat, photo voltaic cell, electricity generation, application of solar energy like solar water heaters, solar furnaces, solar cookers, solar lighting , | 11 |
| Unit – II | **Bio-energy :**<br>Bio-mass conversion technologies- wet and dry processes. Methods For obtaining energy from biomass.<br>**Wind Energy:**<br>Wind energy conversion, windmills, electricity generation<br>**Geo-thermal and Tidal Energy** | 10 |
| Unit - III | **Energy Conservation and Management**<br>a) Need for energy conservation with brief description of oil and coal crisis.<br>b) Environmental aspects<br>c) Energy efficiency- its significance<br>d) Energy efficient technology an overview<br>e) Energy conservation in Domestic sector- Lighting, home appliances<br>f) Need for energy efficient devices<br>g) Energy conservation in Industrial sector- Motors, Industrial lighting, Distribution system, Pumps, Fans, Blowers etc., | 12 |

**RECOMMENDED 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.

# DEC 401 : ELECTRONICS - II

**Credits: 4** **Semester IV**

| Module No. | Contents | Teaching Hours |
|---|---|---|
| Unit – I | **Transistor Audio Power Amplifier**<br>Difference between voltage and power amplifier<br>Important terms in Power Amplifier, collector efficiency, distortion and dissipation capability<br>Classification of power amplifier class A, B and C<br>Class A single-ended power amplifier, its working and collector efficiency<br>Impedance matching in a power amplifier using transformer<br>Heat sinks in power amplifiers<br>Push-pull amplifier: circuit details, working and advantages (no mathematical derivations)<br>Principles of the working of complementary symmetry push-pull amplifier | 12 |
| | **UNIT 2**<br><br>**Feedback in Amplifiers**<br>Feedback and its importance, positive and negative feedback and their need<br><br>Voltage gain of an amplifier with negative feedback<br>Effect of negative feedback on voltage gain, stability, distortion, band width, output and input impedance of an amplifier (No mathematical derivation)<br><br>**Sinusoidal Oscillators**<br>Sinusoidal Oscillators – positive feedback in amplifiers<br>Circuit details and working of R -L-C oscillator circuits, and Wein bridge oscillator circuits<br>Introduction to piezoelectric crystal and crystal oscillator circuit<br><br>UNIT-III<br><br>Operational Amplifier<br><br>The basic operational amplifier. The differential amplifier. The emitter coupled differential amplifier. Offset even voltages and currents<br><br>Basic operational amplifier applications, integrator and differentiator, summer, subtractor<br><br>Familiarization with specifications and pin configuration of IC 741 Block diagram | |

**RECOMMENDED 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

# DEE 403: INSTRUMENTATION

**Credits: 4** **Semester IV**

| Module No. | Contents | Teaching Hours |
|---|---|---|
| UNIT-1 | **Measurements:**<br>Importance of measurement, basic measuring systems, advantages and limitations of each measuring systems and display devices<br>**Transducers:**<br>Theory, construction and use of various transducers resistance, inductance, capacitance, electromagnetic, piezo electric type<br><br>Electronic Equipments:<br>Block diagram explanation of function generator and regulated power supply, Basic working principles of switched mode power supply and uniterrupted power supply, Instrumentation amplifiers<br>. | |
| Unit – II | **Force Measurement:**<br>Different types of force measuring devices and their principles, load measurements by using elastic transducers<br><br>**Pressure Measurement:**<br>Diaphragm Bourdon pressure gauges, electrical pressure pick ups And their principle, construction and applications. Use of pressure cells force Balance, Bellows, Pressure Transmitters | 12 |
| | **Measurement of Temperature:**<br>Bimetallic thermometer, thermoelectric thermometers, resistance thermometers, thermocouple,<br><br>**RECOMMENDED BOOKS**<br>1. Electronic Measurement and Instrumentation by Dr Rajendra Prasad<br>2. Electronic Measurement and Instrumentation by JB Gupta, SK Kataria and Sons, New Delhi<br>3. Electrical and Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Co., New Delhi | |

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| | 4. Electronic Instrumentation and Measurement Techniques by WD Cooper, AD Helfrick Prentice Hall of India Pvt. Ltd. New Delhi<br>5. Industrial Instrumentation by Umesh Rathore, SK Kataria and Sons, New Delhi | |

# DEE 404: ESTIMATING AND COSTING IN ELECTRICAL ENGINEERING

**Credits: 4** **Semester IV**

| Module No. | Contents | Teaching Hours |
|---|---|---|
| Unit – I | **Introduction**<br>Purpose of estimating and costing, Performa for making estimates,<br>preparation of materials schedule, costing, price list, preparation of tender document, net price list, market survey,<br>overhead charges, labor charges, electrical point method and fixed percentage method, contingency, profit, purchase system, enquiries, comparative statements, orders for supply, payment of bills. Tenders – its constituents, finalization, specimen tender.<br>**Types of wiring**<br>Cleat, batten, casing capping and conduit wiring, comparison of different wiring systems, selection and design of wiring schemes for particular situation (domestic and Industrial). Selection of wires and cables, wiring accessories and use of protective devices i.e. MCB, ELCB etc. Use of wire-gauge and tables (to be prepared/arranged) | 16 |
| Unit – II | **Estimating and Costing**<br>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).<br>Industrial installations; relevant IE rules and IS standard practices,<br>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<br>workshop with singe-phase, 3-phase motor load and the light load | 16 |
| Unit - III | **Estimating the material required for**<br>Transmission and distribution lines (overhead and underground) planning and designing of lines with different fixtures, earthling based on unit cost calculations<br>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 66 KV/11KV and 11 KV/0.4 KV Substation. Single line diagram, layout sketching of outdoor, indoor 11kV sub-station or 33kV substation | 16 |

**RECOMMENDED 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

## DEE 452: ELECTRICAL MACHINES - I Lab

**Credits: 2** **Semester IV**

**LIST OF PRACTICALS**

| Module No. | Contents | Teaching Hours |
|---|---|---|
| 1 | Measurement of the angular displacement of the rotor of a slip-ring 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 | |

# DEC 451: ELECTRONICS II Lab

**Credits: 2** **Semester IV**

**LIST OF PRACTICALS**

| Module No. | Contents | Teaching Hours |
|---|---|---|
| 1 | To Steady Op-Amp Amplifier (IC-741) | |
| 2 | To Steady gain of Inverting Amplifier. | |
| 3 | To Steady gain of Non Inverting Amplifier. | |
| 4 | To steady op-amp as a summer amplifier. | |
| 5 | To steady op-amp as a subtractor amplifier | |
| 6 | To steady op-amp as an integrator. | |
| 7 | To steady op-amp as a differentiator. | |
| 8 | To steady op-amp as a buffer amplifier. | |

# DEE 453: INSTRUMENTATION Lab

**Credits: 2** **Semester IV**

## LIST OF PRACTICALS

| Module No. | Contents | Teaching Hours |
|---|---|---|
| 1 | To measure the level of a liquid using a transducer | 24 |
| 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. | |