

Faculty of Engineering and Technology
Radha Govind University
Chandausi, Sambhal (U.P.)



Evaluation Scheme & Syllabus for
Department of Electrical Engg.
DIPLOMA –ELECTRICAL ENGINEERING
III Year (5th & 6th Semester)
(Effective from session _____)

DIPLOMA - ELECTRICAL ENGG. STUDY AND EVALUATION SCHEME

3rd Year, 5th Semester

SUBJEC CODE	SUBJECT SNAME	STUDY SCHEM E Periods /Wee k			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMEN T			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DEE 501	Switch Gear & Protection	3	1	-	4	30	-	30	70	-	70	100
DEE 502	Energy Conservation And Audit	2	-	4	4	30	-	30	70	-	70	100
DEE 503	Electrical Estimation And Contracting	2	-	4	4	30	-	30	70	-	70	100
DEE 504	Program Elective-III	3	-	-	3	30	-	30	70	-	70	100
DEE 505	Program Elective- IV	1	-	4	3	30	-	30	70	-	70	100
DEE 506	Electrical Estimation And Contracting Lab	-	-	4	2	-	25	25	-	25	25	50
DEE 507	Program Elective –IV Lab	-	-	4	2	-	25	25	-	25	25	50
DEE 508	Summer Internship (4-6 weeks) ***	-	-	-	2	-	-	-	-	50	50	50
Total					24	150	75	225	350	75	425	650

For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.

Note: -1 Students will present a seminar/viva on their summer internship along with certificate, project and report.

2. Students will submit the certificate.

DEE 504 Program Elective-III	DEE 505 Program Elective-IV
1. Solar Power Technologies 2. Electric Testing	1. Electrical Testing & Commissioning 2. Illumination Practices

DIPLOMA -ELECTRICAL ENGG. STUDY AND EVALUATION SCHEME												
3 rd Year, 6 th Semester												
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						INTERNAL ASSESSMENT			EXTERNAL ASSESSMEN T			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DEE 601	Building Electrification	2	-	4	4	30	-	30	70	-	70	100
DEE 602	Entrepreneurship And Start- Up*	2	-	-	2	30	-	30	70	-	70	100
DEE 603	Project Works	04	-	16	12	-	240	240	-	160	160	400
DEE 604	Building Electrification Lab	-	-	4	2	-	25	25	-	25	25	50
Total					20	60	256	325	140	185	325	650
For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.												

Note: *Common Course with other diploma programmes . "Entrepreneurship and Start-up” course is also mandatory in Industrial internship/training mode.

DEE 501 SWITCH GEAR AND PROTECTION

L	T	P
3	1	-

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Maintain switchgear and protection schemes used in electrical power systems.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Explain the necessity, functions, and characteristics of protective switchgear, and analyze types of faults in power systems.

CO2: Describe the construction, working principles, and selection criteria of switchgear elements and arc extinction methods used.

CO3: Classify and evaluate the operation of various types of protective relays.

CO4: Analyze faults and apply appropriate protection schemes for various power system components.

CO5: Assess protection techniques for bus bars and transmission lines, and explain the concept, need, and methods of neutral grounding in electrical systems.

COURSE CONTENTS

Unit – I: Basics of Protection & Fundamental quality requirements (10 Periods)

Necessity, purpose and functions of protective switchgear; Characteristics of a protection system, Normal and abnormal conditions. Types of faults, their causes and effects. Protection zones and backup protection, Need of current limiting reactors and their arrangements.

Unit – II: Circuit Interruption Devices Isolators (11 Periods)

Vertical break, Horizontal break and Pantograph type. HRC fuses – Construction, working, characteristics and applications. Arc formation process, methods of arc extinction (High resistance and Low resistance), Arc voltage, Recovery voltage, Re-striking voltage, RRRV. HT circuit breakers (Sulphur-hexa Fluoride (SF₆), Vacuum circuit breaker) - Working, construction. L.T. circuit breaker (Air circuit breakers (ACB), Miniature circuit breakers (MCB)) - Working and applications. Selection of LT and HT circuit breakers (ratings). Gas insulated switchgear.

Unit – III: Protective Relays (13 Periods)

Basic relay terminology- Protective relay, Relay time, Breaker time, Fault Clearing time, Pick-up, reset value, current setting, plug setting multiplier, Time setting multiplier, burden, reach.

Protective relays: Classification, principle of working, construction and operation of – Electromagnetic, Induction type relays. Block diagram and working of Static relays.

Over current relay-Time current characteristics, principle of operation of - Non directional Over Current relay, Induction type Directional Power Relay, Directional Induction type Over Current relay. Introduction to Microprocessor based over current relays.

Distance relaying- Principle, operation and classification of distance relays.

differential relay-operation of current balance and voltage balance differential relays.

Unit – IV: Protection of Alternator, Transformer and Motors (11 Periods)

Alternator Protection: Faults, Differential protection Over current, earth fault, overheating protection.

Transformer Protection: Faults, Differential, over current, earth fault, over heating protection, Limitations of

differential protection. Buchholz relay: Construction, operation.

Motor Protection: Short circuit protection, Overload protection (through thermal Relay), Single phase preventer.

Unit – V: Protection of Busbar, Transmission Line and Concept of Neutral Grounding (11 Periods)

Faults on Bus bar and Transmission Lines.

Bus bar protection: Differential and Fault bus protection.

Transmission line protection: Over current, Distance and Pilot wire protection.

Grounding (equipment and system), Ungrounded Neutral system, Need of neutral grounded, Methods of Neutral Grounding.

INSTRUCTIONAL STRATEGY

Engage students in demonstrate and illustrate principles of switch gear and protection incorporate case studies and examples from everyday life to study the importance of switch gear in electrical utilities.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance

- Sessional Test

RECOMMENDED BOOKS:

1. Mehta V. K; Rohit Mehta, Principles of Power System, S. Chand and Co., New Delhi., ISBN: 978-81-2192 496-2.
2. Rao, Sunil S., Switchgear and Protection, Khanna Publishers, New Delhi, ISBN: 978-81 7409-232-3.
3. Singh, R. P., Switchgear and Power System Protection, PHI Learning, New Delhi, ISBN: 978 81-203-3660-5.
4. Gupta. J. B., Switchgear and Protection, S. K. Kataria and Sons, New Delhi, ISBN: 978-93-5014- 372-8.
5. Veerapan, N., Krishnamurty, S. R., Switchgear and Protection, S. Chand and Co., New Delhi. ISBN: 978-81 2193-212-7.
6. Ram, Badri; Vishwakarma D. N., Power System Protection and Switchgear, McGraw-Hill, New Delhi. ISBN: 978-07-107774-X
7. Dr. T. D. Bisht, Ashish Sahoo, Pooja Yadav , Switch Gear & Protection, Asian Publishers, Muzaffarnagar, ISBN No. 978-93-91541-62-0

L	T	P
2	-	4

DEE 502 ENERGY CONSERVATION AND AUDIT

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Undertake energy conservation and energy audit.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Explain the national energy scenario, key provisions of the Energy Conservation Act 2001, and assess the role of BEE.

CO2: Apply energy-saving techniques in induction motors and transformers and evaluate the performance of energy efficient equipment.

CO3: Analyze energy-saving opportunities in various applications using efficiency metrics and modern control technologies

CO4: Evaluate cogeneration technologies and tariff structures to optimize energy usage.

CO5: Conduct a basic energy audit using appropriate instruments and procedures and prepare a report.

COURSE CONTENTS

Unit – I: Energy Conservation (02 Periods)

Basics Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario. Energy conservation and Energy audit; concepts and difference Indian Electricity Conservation Act 2001 and its latest amendments; relevant clauses of energy conservation BEE and its Roles. Star Labeling: Need and its benefits.

Unit – II: Energy Conservation in Electrical Machines (06 Periods)

Need for energy conservation in induction motor and transformer.

Energy conservation techniques in induction motor by: Improving Power quality. Motor survey Matching motor with loading. Operating in star mode. Replacement by energy efficient motor.

Energy conservation techniques in Transformer. Replacement by energy efficient transformers.

Energy Conservation Equipment: Soft starters, Automatic star delta convertor, Variable Frequency Drives, Automatic p.f. controller (APFC), Intelligent p. f. controller (IPFC) Energy efficient motor; significant features, advantages, applications and limitations.

Unit – III: Energy conservation in Electrical Installation systems

(06 Periods)

Energy Conservation in HVAC and Refrigeration System: Introduction, Concept of Energy Efficiency Ratio (EER), Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems Energy Conservation in Lighting System a) Replacing Lamp sources. b) Using energy efficient luminaries. c) Using light-controlled gears. d) Installation of separate transformer / servo stabilizer for lighting. Energy Conservation techniques in fans, electronic regulators.

Unit– IV: Energy conservation through Cogeneration and Tariff

(08 Periods)

Co-generation : concept, significance for energy conservation, Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration). Factors governing the selection of cogeneration system. Advantages of cogeneration.

Tariff: Types of tariff structure, Transformers Tariff structure, Special tariffs; Time-off-day tariff, Peak-off-day tariff, Power factor tariff, Maximum Demand tariff, Load factor tariff. Application of tariff system to reduce energy bill. Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC).

Unit– V: Energy Audit of Electrical System

(06 Periods)

Energy audit (definition as per Energy Conservation Act) Energy audit instruments and their use. Questionnaire for energy audit projects. Energy flow diagram (Sankey diagram) Simple payback period, Energy Audit procedure (walk through audit and detailed audit). Energy Audit report format.

INSTRUCTIONAL STRATEGY

Engage students in experiments and demonstrate that illustrate principles of Energy Conservation, incorporate case studies and examples from everyday life to demonstrate the importance of Energy Conservation.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test
- Practical Tasks
- Presentation/Seminar

RECOMMENDED BOOKS:

1. Guidebooks No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (A Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
2. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
3. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978-0195606539
4. Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
5. Sharma, K. V., Venkateshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298
6. Mehta, V. K., Principles of Power System, S. Chand & Co. New Delhi, 2016, ISBN 9788121905947
7. Singh, Sanjeev; Rathore, Umesh, Energy Management, S K Kataria & Sons, New Delhi ISBN-13: 9789350141014.

DEE 503 Electrical Estimation And Contracting

L	T	P
2	-	4

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Design electrical installation with costing for tendering.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Apply the provisions of National Electric Code (NEC) 2023 and safety practices (Permit to Work, PPE) to electrical installation projects.

CO2: Prepare and compare commercial documents including tenders, quotations, comparative statements, and purchase orders for project execution.

CO3: Design and estimate the cost of electrical installations for non-industrial buildings (Residential, Commercial, Cinema Halls) including earthing.

CO4: Plan and design industrial wiring schemes for factories, agricultural pumps, and flour mills, including motor wiring and multiple earthing systems.

CO5: Select materials and estimate costs for HT/LT distribution lines (Overhead/Underground) and 11kV Substations (Indoor/Outdoor).

COURSE CONTENTS

Unit – I: Electric Installation and Safety

(04 Periods)

Scope and features of National electric code 2023 Types of electrical installation Fundamental principles for electrical installation Permit to work, safety instructions and safety practices Purpose of estimating and costing.

Unit – II: Estimation and Costing

(08 Periods)

Meaning and purpose of- rough estimate, detailed estimate, supplementary estimate, annual maintenance estimate and revised estimate. Factors to be considered while preparation of detailed estimate and economical execution of work.

Contracts- Concepts of contracts, types of contracts, contractor, role of contractor.

Tenders and Quotations- Type of tender, tender notice, preparation of tender document, and method of opening of tender. Quotation, quotation format, comparison between tender and quotation.

Comparative statement, format comparative statement. Order format, placing of purchasing order. Principles of execution of works, planning, organizing and completion of work, Billing of work.

Unit– III: Non-Industrial Installations

(06 Periods)

Types of non-industrial installations- Office buildings, shopping and commercial centre, residential installation, Electric service and supply. Design consideration of electrical installation in commercial buildings. Design procedure of installation- steps involved in detail, Estimating and costing of unit Earthing of commercial installation. Design electrical installation scheme of commercial complex.

Unit– IV: Industrial Installation

(04 Periods)

Classification of industrial buildings Classification based on power consumption, Drawing of wiring diagram and single line diagram for single phase and three phase Motors.

Design consideration in industrial installations Design procedure of installation-detailed steps

Design electrical installation scheme of factory/ small industrial unit, Preparation of material schedule and detailed estimation. Installation and estimation of agricultural pump and flourmill.

Unit– V: Distribution Lines and LT Substation

(06 Periods)

Introduction to overhead and underground distribution line.

Materials used for distribution line HT and LV.

Cables used for distribution line, factors determining selection of LT/ HT power Cables, cable laying and cable termination method according to IS.

Design, estimation and costing of HT LT overhead line and underground cabling.

Estimation of load, Load factor, diversity factor and determination of rating of distribution.

Transformer. Design, estimation and costing of outdoor and indoor 11 KV substation.

INSTRUCTIONAL STRATEGY

Teach Electrical Estimation and Contracting using hands-on simulations and real-world projects. Break down cost estimation, material selection, and contract drafting through case studies. Use software tools for practical learning. Encourage group discussions on standards and safety. Incorporate site visits and expert talks to enhance understanding and application.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance

- Sessional Test
- Practical Tasks
- Presentation/Seminar

RECOMMENDED BOOKS:

1. Raina, K.B.; Dr. S. K. Bhattacharya New Age International Publisher First, Reprint 2010, Electrical Design Estimating and Costing ISBN: 978-81-224-0363-3.
2. Allagappan, N. S. Ekambarram, Tata Mc-Graw Hill Publishing Co. Ltd, Electrical Estimating and Costing, ISBN 13: 9780074624784.
3. Singh, Surjit Ravi Deep Singh, Dhanpat Rai and Sons, Electrical Estimating and Costing, ISBN13:1234567150995.
4. Gupta, J.B. S.K. Kataria and Sons Reprint Edition, A Course in Electrical Installation Estimating and Costing ISBN 10: 935014279113: 978-9350142790.
5. Bureau of Indian Standard. IS: 732-1989, Code of Practice for Electrical Wiring Installation.
6. Bureau of Indian Standard. SP-30:2011, National Electrical Code 2011.
7. Dr. T. D. Bisht, Ashish Sahoo, Dinesh Kumar Gautam, Electrical Design, Drawing & Estimating -I , ISBN No. 978-93-5502-015-4
8. Dr. T. D. Bisht, Ashish Sahoo, Electrical Design, Drawing & Estimating -II , ISBN No. 978-93-5502-194-6

Electrical Estimation And Contracting Lab

LIST OF PRACTICAL ;-

1. To understand the objective of safety in Electric installation.
2. List out all the personal protective equipment's PPE's available in industry.
3. Prepare an estimate of institute/College for electrical connection and costing of equipment's used.
4. Prepare a tender notice for purchasing a transformer of 100 KVA for commercial installation.
5. Prepare a quotation for purchasing different electrical material required.
6. Prepare a comparative statement for above material Prepare purchase order for the same.
7. Estimate with a proposal of the electrical Installation of streetlight scheme for small premises after designing.
8. Estimate with a proposal of the L.T. line installation. Prepare report and draw sheet.
9. Prepare Electrical Estimation for Residential and Industrial wirings.
10. Design drawing, estimating and costing of hall / cinema theatre / commercial installation Prepare report and draw sheet.
11. Design electrical installation scheme for any one factory / small industrial unit. Draw detailed wiring diagram. Prepare material schedule and detailed estimate. Prepare report and draw sheet.
12. To plan multiple earthing system for industrial installation.
13. To measure the earth resistance of various equipment installed in institute/college.
14. List out the various bus schemes in substation.
15. Estimate with a proposal of the electrical Installation of streetlight scheme for small premises after designing.
16. Estimate with a proposal of the L.T. line installation. Prepare report and draw sheet.
17. Estimate with a proposal of the 500 KVA, 11/0.433 KV outdoor substation and prepare a report.
18. Identify indoor and outdoor switch gear system.

L	T	P
3	0	0

DEE 504 Program Elective-III

i) Solar Power Technologies

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Maintain the efficient operation of various types of solar power technologies

COURSE OUTCOMES (CO):

The theory and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Explain the solar energy potential in India and describe the solar water heaters, solar cookers, heating systems, and solar lighting technologies.

CO2: Analyze the working principles, specifications, and configurations of various concentrated solar power systems.

CO3: Describe solar PV panels and explain the layout and operation of various PV systems.

CO4: Evaluate the function and specifications of solar charge controllers, batteries, inverters, and signal conditioning systems.

CO5: Compare off-grid and grid-tied solar PV systems.

COURSE CONTENTS

Unit – I: Solar Energy (06 Periods)

Solar Map of India: Global solar power radiation Different types of Solar water heaters: working and installation Solar Heating systems, Different types of Solar cookers, Solar lighting.

Unit – II: Concentrated Solar Power (CSP) (08 Periods)

Concentrated Solar Power (CSP) plants or solar thermal electric systems Parabolic Trough: working and specifications Parabolic Dish: Construction, working and specifications Power Tower, Fresnel Reflectors: Construction, working and specifications Solar Stirling engines.

Unit – III: Solar PV Panel and Installation (10 Periods)

Types construction, working, Typical specifications of solar cells Solar PV working principle: Series and parallel connections of solar modules Solar Photovoltaic (PV) system: components layout and working. Solar modules, arrays and their standard specifications Roof top and streetlight solar PV systems. Solar water pumping application.

Unit – IV: Solar PV Electronics (10 Periods)

Solar Charge controllers: working and specifications, switchgear and cables Batteries: Different types for solar PV systems, Solar Inverters: working Signal conditioning systems: working, Solar Power tracking: construction, working, I-V, P-V characteristics.

Unit – V: Solar PV Off-grid and Grid Tied Systems (08 Periods)

Solar off grid systems : Layout Solar Grid tied (on grid) systems: Working principle of grid-tied dc-ac inverter, grid synchronization and active power export Net metering: main features and working.

INSTRUCTIONAL STRATEGY

Engage students in understanding fundamental of solar energy and identify and describe solar PV system and also install and maintain small scale solar PV. Student study design basic roof top and off grid solar PV system.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test

RECOMMENDED BOOKS:

1. Solanki, Chetan Singh, - Solar Photovoltaics: Fundamentals, Technologies and Applications, PHI Learning, New Delhi, ISBN: 9788120351110
2. Kothari, D.P. et al: Renewable Energy Sources and Emerging Technologies, PHI
3. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, - Renewable Energy Systems, Pearson Education New Delhi, ISBN: 9789332586826

4. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning

5. O.P. Gupta, Energy Technology, Khanna Publishing House, ISBN: 978-93
86173-683.

DEE 504 Program Elective-III

L	T	P
3	0	0

ii) Electric Traction

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Maintain electric traction systems.

COURSE OUTCOMES (CO):

The theory and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Compare different traction systems (Electric, Diesel, Battery) and analyze the technical problems and remedies associated with AC traction.

CO2: Explain the layout of Traction Substations (TSS) and identify the function of various protective equipment used for transformers and catenary.

CO3: Describe the constructional details of Overhead Equipment (OHE), including catenary, cantilever assembly, and current collectors (Pantograph).

CO4: Interpret the block diagrams and power circuit connections of AC Electric Locomotives and list the auxiliary equipment.

CO5: Select suitable traction motors based on characteristics and apply methods of speed control and electric braking (Regenerative/Rheostatic).

CO6 : Discuss the requirements of Railway Signalling, Supervisory Control (SCADA) networks, and power supply schemes for Metro Rail systems.

COURSE CONTENTS

Unit – I: Basics of Traction

(06 Periods)

General description of Electrical Traction system in India.

Advantages and Disadvantages of Electric Drive, Diesel Electric Drive, Battery Drive Problems associated with AC traction System and remedies for it.

Unit – II: Power Supply Arrangements (08 Periods)

Traction Substation: layout, list of equipment and their functions.

Miscellaneous equipment at control post or Switching station.

Protection system for traction transformer and 25 kV centenary construction.

Unit – III: Overhead Equipment (07 Periods)

Different types of overhead equipments

Pentagonal OHE Centenary Construction

OHE Supporting Structure, Cantilever assembly diagram

Overhead system- Trolley collector, Bow collector, Pantograph Collector

Types and construction of pantograph

Unit – IV: Electric Locomotive (07 Periods)

Classification and Nomenclature of Electric Locomotive

Block diagram of AC locomotive

Power Circuit of AC Locomotive

Equipment (List and Function only) used in auxiliary circuit of AC Locomotive.

Unit – V: Traction Motors and Train Lighting (08 Periods)

Desirable characteristics of traction motor.

Types of motors used for traction with their characteristics and features

Control of motors used for traction and methods to control

Requirements of braking, types of braking

Electric braking, Regenerative braking

brief idea of train lighting system.

Unit – VI: Signalling and Supervisory Control (06 Periods)

Requirements of signalling systems

Types of signals, track circuits

Advantages of remote control

Systems of remote control, equipment and network

Metro rail-supply systems, advantages, schemes in India

INSTRUCTIONAL STRATEGY

Understanding the Principles and grasp the basic concepts of electric traction, its components, and the technologies involved. Analyze Electric Traction Systems: Understand how different electric traction systems (e.g., DC, AC, and hybrid) operate. Design and Apply Solutions: Evaluate energy efficiency, system design, and troubleshooting in electric traction systems. Recognize Global Practices: Compare electric traction practices in different countries and understand their advantages and challenges.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test

RECOMMENDED BOOKS:

1. G.C. Garg, Utilization of Electric Power & Electric Traction, Khanna Book Publishing Co., New
2. Delhi (ISBN: 978-93-86173-355) Revised Ed. 2018
3. Gupta J.B., S.K. Kataria and Son, Utilization of Electric power and traction
4. Partab H., Dhanpat Rai and Co, Art and Science of Utilization of Electrical Energy
5. Partab H., Dhanpat Rai and Co, Modern Electric Traction
6. Suryanarayana N.V., New Age International Publishers, Reprint 2010
7. Open Shaw Taylor, Orient Longman ltd., Utilization of electrical energy.

DEE 505 (PROGRAM –IV)

i) ELECTRICAL TESTING AND COMMISSIONING

L	T	P
1	-	4

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Follow standard safety procedures in testing and commissioning of electrical equipment.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Apply electrical safety practices and insulation testing methods to assess and maintain the condition of electrical equipment and insulating materials.

CO2: Demonstrate the procedures and safety requirements for installing and aligning electrical machinery.

CO3: Conduct routine and special tests on electrical machines and interpret results.

CO4: Identify diagnostic tools for mechanical, electrical, and magnetic faults.

CO5: Develop and implement preventive maintenance schedules for electrical machines.

COURSE CONTENTS

Unit – I: Electrical Safety and Insulation (03 Periods)

Do's and don'ts regarding safety in domestic electrical appliances as well for substation/ power station operators' Electrical safety in industry/power stations/ substations at the time of operation/ control/ maintenance. Fire detection alarm, fire-fighting equipment's, measuring insulation resistance by different methods such as i) Polarization, ii) Dielectric absorption, iii) Megger and to predict the condition of insulation Reconditioning of insulation, insulating oil - properties of insulating oil, causes of deterioration of oil.

Unit – II: Installation & Erection Concept of foundation for installation of machinery (02 Periods)

Requirements of foundation for static and rotating electrical machinery. Concept of leveling and aligning Procedure for leveling and aligning alignment of direct coupled drive, effects of mis-alignment Installation of transformer and procedure of installation of transformer, Requirements

of installation of pole mounted transformer Devices and tools required for loading, unloading, lifting, and carrying heavy equipment and precautions to be taken while handling them.

Unit– III: Testing and Commissioning (03 Periods)

Concept of testing and Objective of testing. Roles of I.S.S. in testing of electrical equipment, Types of tests and concepts: Routine tests, supplementary test, special tests, Methods of testing - Direct/Indirect/Regenerative testing. Tolerances for the various items for equipment – transformer, induction motor, dc motor, synchronous machines Commissioning, Tests before Commissioning for transformer, induction motor, alternator 1962 Testing of three-phase Induction motor as per I.S.325 -. Testing of single-phase induction motor Testing of synchronous machines and D.C. machines

Unit– IV: Troubleshooting Plans (03 Periods)

Internal and external causes for failure / abnormal operation of equipment. List of mechanical faults, electrical faults and magnetic faults in the electrical equipment remedies, applications Use of tools like bearing puller filler gauges, dial indicator. Common troubles in electrical equipments and machines. Preparation of trouble shooting charts for D.C. Machines, AC Machines and transformers.

Unit– V: Maintenance (03 Periods)

Concept of maintenance, types of maintenance, Routine, preventive and breakdown maintenance. Causes of failure of electrical machines Preventive maintenance-procedure or developing maintenance schedules for electrical machines. Factors affecting preventive maintenance schedule)

- (a) Distribution transformer
- b) Single phase and three phase Induction motors
- c) Batteries.

INSTRUCTIONAL STRATEGY

Focus on the theoretical foundations of electrical testing and commissioning, emphasizing key concepts like safety protocols, testing procedures, and industry standards. Incorporate practical sessions where students can perform actual testing on electrical systems, such as insulation resistance, earth resistance, and continuity tests, using industry-grade equipment. Use real-world case studies to help students analyze common commissioning issues and develop troubleshooting skills, fostering critical thinking and problem-solving abilities in the field.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test
- Practical Tasks
- Presentation/Seminar

RECOMMENDED BOOKS:

1. Deshpande, M. V. PHI Learning Pvt. Ltd., 2010, Design and Testing of Electrical Machines ISBN No 8120336453, 9788120336452.
2. Rao, B V S Asia Club House, First Reprint, 2011, Operation and Maintenance of Electrical Equipment Vol-I, ISBN No 8185099022
3. Rosenberg. Mc GRAW-HILL, 1st Edition, May 2003, Maintenance and Repairs, ISBN No 9780071396035
4. Sharotri, S.K. Glencoe/ Mcgraw- Hill; 2nd Edition, June 1969; Preventive Maintenance of Electrical Apparatus, ISBN No 10: 007030839X 13: 978-0070308398.

PROGRAM ELECTIVE-4 LAB

ELECTRICAL TESTING AND COMMISSIONING LAB

LIST OF PRACTICAL ;-

1. Determine breakdown strength of transformer oil.
2. Perform insulation resistance test on any one motor/transformer using Megger.
3. Evaluating the parts of an Alternator and testing an assembled alternator same on a test bench for proper operation.
4. Evaluating the parts of a Transformer assembled Transformer same on a test bench for proper operation.
5. Find regulation and efficiency of single-phase transformer by direct loading and back-to-back connection method and compare the results.
6. Determine efficiency of D.C. machine by Swinburne's test.
7. Determine efficiency of D.C. machine by Hopkinson's test.
8. Prepare trouble shooting charts for electrical machines such as Transformer, D.C. machines, Induction motor, and Synchronous machines.
9. Use of tools like bearing puller, filler gauges, dial indicator.
10. Prepare the preventive maintenance schedule of Distribution transformer.
11. Prepare the preventive maintenance schedule of induction motor
12. Prepare the preventive maintenance schedule of batteries.

DEE 505 (PROGRAM –IV)

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II) ILLUMINATION PRACTICES

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching experiences:

- Design illumination schemes and associated electrification of buildings.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Apply basic illumination principles and photometric laws to perform lighting calculations.

CO2: Identify and compare various types of lamps.

CO3: Design and implement lighting control circuits.

CO4: Develop illumination schemes for residential and commercial.

CO5: Analyze lighting requirements in street lighting, industrial lighting, and decorative or functional lighting environments.

COURSE CONTENTS

Unit – I Fundamentals of illumination

(2 Periods)

Basic illumination, Terminology, Laws of illumination, Concept of Photometry, Measurement of illumination. Lighting calculation methods, Watt /m² method, Lumens or light flux method, Point to point method.

Unit – II Types of lamps

(3 Periods)

Incandescent lamp, ARC lamps – AC and DC arc lamps, fluorescent lamp Types of other lamps: Mercury vapour lamp, HPMV lamp, Mercury iodide lamp, Sodium vapour lamp, Halogen Lamps, Ultraviolet Lamps, Neon Lamps. Neon Sign Tubes. Metal halides, HID and Arc lamps, LED lamps, CFL

Unit– III Illumination Control and Control Circuits

(4 Periods)

Purpose of lighting control and Dimmer, Dimmer Transformer, Auto transformer dimmer, Two winding transformer dimmer Electronic Dimmer: working principle and operation

1. Thyristor operated dimmer
2. Triac operated dimmer

Control of Enhance Lighting, Methods used for light control, Control circuits for lamps (re- fer): ON/OFF control Control circuits for lamps: single lamp controlled by single switch, two switches.

Unit– IV Illumination for Interior Applications (2 Periods)

Standard for various locations of Interior Illumination

Design considerations for Interior location of residence premises (1/2 BHK)

Illumination scheme for different Interior locations of Commercial, industrial unit.

Unit– V Illumination for Other Applications (3 Periods)

Factory Lighting, Street Lighting (Latest Technology), Flood Lighting, Railway Lighting Brief idea: Lighting for advertisement /Hoardings/sports lighting, Agriculture and Horticulture lighting, Health Care Centers / Hospitals, Decorating Purposes, Stage Lighting, Aquariums and Ship- yards

INSTRUCTIONAL STRATEGY

Effective illumination practices enhance learning environments. Use bright, natural light to boost focus and mood. Incorporate adjustable lighting for varied tasks, minimizing glare and shadows. Ensure even light distribution to reduce eye strain. Integrate smart controls for energy efficiency and adaptability, creating optimal conditions for engagement and productivity.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test
- Practical Tasks
- Presentation/Seminar

RECOMMENDED BOOKS:

1. Lindsey, Jack L., Applied Illumination Engineering, The Fairmont Press Inc.
2. Simons, R. H., Bean, Robert; Lighting Engineering: Applied Calculations, Architectural Press. ISBN: 0750650516.
3. Casimer M Decusatis, Handbook of Applied Photometry, Springer, ISBN 1563964163.
4. Butterworths, Lyons Stanley, Handbook of Industrial Lighting, Butterworths
5. Simpson Robert S, Lighting Control Technology and Applications, Focal Press.

PROGRAM ELECTIVE-4 LAB
ILLUMINATION PRACTICES LAB

LIST OF PRACTICAL :-

1. Conduct illumination level assessment in workplace using lux meter.
2. Measure illumination level with and without reflectors used in the various Luminaries.
3. Fit the given lamp in the selected mounting.
4. Estimate and compare luminous efficiency of incandescent and compact fluorescent lamps.
5. Prepare light dimmer arrangement using the relevant dimmer type of transformer
6. Build an electronic dimmer – Part I
7. Build another type of electronic dimmer – Part II
8. Measure the illumination output of different lamps (Incandescent, Fluorescent, CFL,LED, HPSV, HPMV) and compare it with their wattage.
9. Build a single lamp control by single switch.
10. Build a single lamp control by two switches.

DEE 508 SUMMER INTERSHIP

(INDUSTRIAL TRAINING)

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It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of 4 weeks duration to be organized during the semester break starting after second year i.e. after 4th semester examinations.

The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An external assessment of 50 marks has been provided in the study and evaluation scheme of 5th Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4th semester for further details. The teacher along with field supervisors will conduct performance assessment of students. The

components of evaluation will include the following:

Punctuality and regularity 15%

Initiative in learning new things 15%

Presentation and VIVA 15%

Industrial training report 55%

DEE 601

(Building Electrification)

L	T	P
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COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Design electrical installation systems in building complexes.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Select appropriate wiring tools, switches, holders, and accessories based on their construction and application for specific electrical tasks.

CO2: Classify electrical wires and cables (LT/HT/EHT) and demonstrate methods of jointing, laying, and selecting suitable cable sizes.

CO3: Design and construct wiring circuits for domestic applications (Staircase, Godown, Master Switch) using PVC Casing-Capping or Conduit systems.

CO4: Prepare electrical plans, load assessments, and cost estimates for residential buildings (up to 5kW) adhering to NEC 2023 and BIS standards.

CO5: Test wiring installations for insulation/polarity and measure earth resistance while explaining the working of protective devices (MCB, ELCB, RCCB).

COURSE CONTENTS

Unit – I: Wiring Tools and Accessories Various tools required for wiring (04 Periods)

Application, care & maintenance of tools: Screwdrivers, pliers, Try square, saws, hacksaw, chisel, hammers, mallet, rawal punch, hand drill machine, portable drilling machine, files, plumb bob, line thread, electricians' knife, test lamp, tester.

Switch – Their types according to construction such as surface switch, flush switch, and pull switch, rotary switch, knife switch, pendent switch, Main-switch (ICDP, ICTP). Their types according to working such as single pole, double pole, two-way, two-way centre off, intermediate, series parallel switch

Holders- Their types such as bayonet cap lamp holder, pendent holder, batten lamp holder, angle holder, bracket holder, tube light holder, screw type Edison and goliath Edison lamp holder, swivel lamp holder.

Socket outlets and plugs- two pin, three-pin, multi pin sockets, two-pin and three-pin plug.

Others- Iron connector, adaptor, and ceiling rose, distribution box, neutral link, bus-bar chamber. Wooden/ mica boards, Moulded/ MS Concealed boxes of different sizes. Modular accessories. BIS symbols of various electrical accessories.

Unit – II: Electrical Wires and Underground Cables Conductors (06 Periods)

Wire, cable, bus bar, stranded conductor, cable, armoured cable, flexible cable, solid conductor, PVC wires, CTS wire, LC wire, FR (Fire retardant) wire. Tools used for measurement of wire size, Wire jointing methods.

Classification of cables, low tension, high tension, and extra high-tension cables, solid, oil filled and gas filled type Cable insulation materials –Polyvinyl chloride (PVC), cross linked polythene (XLPE) Selection of suitable cable size and type from standard data Cable jointing methods Cable laying methods. Factors determining selection of electric cables.

Unit – III: Wiring Methods and wiring layout Factors determining the selection of wiring methods (06 Periods)

Classification of wiring methods. PVC casing-capping wiring- wiring rules according to IS: 732-2019 Conduit wiring Types of conduit, types of conduit wiring (Surface/Concealed). Conduit wiring accessories. Comparison of various wiring systems. General BIS rules for domestic installations. Design, working and drawing of following electrical circuits: Simple light and fan circuits, Staircase wiring, Go-down wiring circuit, Bedroom lighting circuit, Corridor lighting circuit, Series parallel circuit, Master switch control circuit,

Different lighting circuit using - Intermediate switch, Call bell circuit using bell indicator, Design of wiring circuits according to user's requirement.

Unit – IV: Residential Building Electrification Domestic Dwellings/Residential Buildings (08 Periods)

Reading of Civil Engineering building drawing, Interpretation of electrical installation plan and electrical diagrams, electrical symbols as per IS: 732:2019.

Electrical installation for residential building as per NEC 2023.

Difference between residential and industrial load, rules/requirements related to lighting load followed in electrical installations, Positioning of equipment. Lighting and power circuits: Light and fan circuit, Power circuit wiring and circuit Schematic diagram according to IS: 2042(Part-I)-1962: multiline and single line representation Load assessment: Selection of size of conductors, Selection of rating of main switch and protective switch gear. Design and drawing,

estimation and costing of a residential installation having maximum 5 KW load; Sequence to be followed for preparing estimate.

Calculation of length of wire and other materials, labour cost Testing of wiring installation as per IS: 732-2019:

Insulation resistance - between earth and conductors, between conductors, polarity test of single pole switches. Testing of earth continuity path. Residential building Service

Connection- types Underground and overhead. Calculation of Material required for service connection.

Unit – V: Protective Devices and Earthing for Electrical Installation (04 Periods)

Miniature circuit Breaker (MCB), Construction, Principle, rating and uses, MCCB- Construction, Principal rating and uses, Earth Leakage Circuit Breaker (ELCB)-Construction, Principle, rating and uses.

Residual Current Circuit Breaker (RCCB)- Construction, Principle rating and uses.

System and equipment earthing and its requirements, Measurement of earth resistance using earth tester, Methods of reducing earth resistance, Methods of earthing and their procedure- Driven pipe, pipe and plate earthing, modern methods of earthing.

INSTRUCTIONAL STRATEGY

Building electrification includes conduct an energy audit, engage stakeholders, prioritize energy efficiency upgrades, develop an electrification plan, secure incentives, phase implementation with project milestones, provide workforce training, and monitor progress to optimize energy use and achieve decarbonization goals.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test
- Practical Tasks

RECOMMENDED BOOKS:

1. Raina, K.B. and S.K. Bhattacharya, Electrical Design Estimating and Costing, New Age International Ltd., New Delhi, ISBN 978-81-224-0363-3
2. Allagappan, N., S. Ekambarram, Electrical Estimating and Costing, New Delhi, ISBN-13: 9780074624784

3. Singh, Surjit, Electrical Estimating and Costing, Dhanpat Rai and Co. New Delhi, ISBN: 1234567150995
4. Gupta, J B: A Course in Electrical Installation Estimating and Costing, S K Kataria and Sons, New Delhi, ISBN:978-93-5014-279-0
5. Bureau of Indian Standard, IS: 732-2019, Code of practice for electrical wiring installation
6. Bureau of Indian Standard, SP 30 National Electrical Code 2023
7. Bureau of Indian Standard, SP 72 National Lighting Codes 2010

Building Electrification LAB

LIST OF PRACTICAL –

1. Prepare the chart of electrical accessories with their symbols.
2. Select the electric wire using measuring and testing instruments for particular applications.
3. Identify cables of different current ratings.
4. Prepare wiring installation on a board showing control of one lamp, one fan and one socket from one switch board in PVC surface conduit wiring system.
5. Control one lamp from two different places using PVC surface conduit wiring system.
6. Prepare wiring installation on a board. Control one lamp from three different places using PVC surface conduit wiring system.
7. Measurement of Earth Resistance by using Earth tester.
8. Dismantling of MCB and identify various parts.
9. Design 2 BHK residential installation scheme and estimate the material required. And draw the details required for installation on A4 size sheet.
10. Perform go-down wiring for three blocks using PVC casing capping.
11. Test wiring installation using megger.

DEE 602

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Entrepreneurship And Start-UP

COURSE OBJECTIVES:

To foster an entrepreneurial mind set by equipping students with the skills to identify business opportunities, formulate comprehensive business plans, understand management functions, and navigate the financial and legal landscapes of starting and sustaining a venture.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Explain the concept of entrepreneurship, classify business structures, and distinguish between the roles of an entrepreneur and manager.

CO2: Identify feasible business ideas using activity maps and develop a preliminary Business Plan based on case study analysis.

CO3: Analyze market strategies using STP and SWOT analysis, and formulate the Vision, Mission, and Objectives for a start-up.

CO4: Discuss the fundamental functions of management, organizational structures, and the processes of recruitment, selection, and training.

CO5: Select appropriate financing methods (Govt schemes, Venture Capital) and apply Intellectual Property Rights (IPR) concepts to protect business ideas.

CO6: Describe the strategies for business succession, harvesting, and the legal types of dissolution.

COURSE CONTENTS

Unit – I: Introduction to Entrepreneurship and Start – Ups (05 Periods)

Definitions, Classification of Entrepreneur Traits of an Entrepreneur, Entrepreneurship, Motivation Types of Business Structures- On the Basis of size and on the basis of ownership Similarities/differences between entrepreneurs and managers

Unit – II: Business Ideas and their implementation (04 Periods)

Discovering ideas and visualizing the business

Activity map

Business Plan (Case Study)

Unit – III: Ideas to Start-up**(08 Periods)**

Marketing and Accounting- Definition and Importance. Market Analysis – STP (Segmentation, Targeting, Positioning) Competition evaluation and Strategy Development – Vision, Mission, Goal, Objectives. Risk analysis- SWOT Analysis.

Unit – IV: Management**(06 Periods)**

Definition Concept and Functions of Management Company's Organization Structure- Concept and Classification Recruitment and Selection- Definition, Training and Development- Importance.

Unit – V: Financing and Protection of Ideas**(03 Periods)**

Financing methods available for Entrepreneurship/ Startups in India (Government Scheme, Banking, NBFCs, SHG and Micro Financing). Intellectual Property Rights- Overview of - Copyrights, Trademark, Geographical Indicators, Patenting and Licenses Communication of Ideas to potential investors – Investor Pitch.

Unit – VI: Succession, Dissolution and Harvesting strategy (02 Periods)

Ways of succession

Types of Dissolution

INSTRUCTIONAL STRATEGY

Entrepreneurship and start-ups includes: use experiential learning, integrate real-world projects, provide mentorship, foster interdisciplinary collaboration, partner with businesses, invite industry professionals for lectures, organize business plan competitions, offer practical consulting opportunities, and help students launch real ventures to build entrepreneurial skills and mindsets.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Model/Proto type making.

RECOMMENDED BOOKS:

1. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company – Steve Blank and Bob Dorf, K & S Ranch, ISBN: 978-0984999392
2. Entrepreneurship Development (A New Venture Creation) – Vasant Desai, Himalaya Publishing House
3. Entrepreneurship Development – S.S. Khanka, S. Chand & Company Ltd., New Delhi

4. Entrepreneurship Development – Gupta and Srinivasan, S. Chand & Company Ltd., New Delhi
5. Demand: Creating What People Love Before They Know They Want It – Adrian J. Slywotzky with Karl Weber, Headline Book Publishing, ISBN: 978-0755388974
6. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses – Eric Ries, Penguin UK, ISBN: 978-0670921607

DEE 603

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PROJECT WORKS

Some of the project activities are given below:

- Projects related to designing small electrical equipment / instruments.
- Projects related to increasing productivity in electrical manufacturing areas.
- Projects related to quality assurance.
- Projects connected with repair and maintenance of plant and equipment.
- Projects related to design of PCBs.
- Projects related to design of small oscillators and amplifier circuits.
- Projects related to design, fabrication, testing and application of simple digital circuits and components.
- Projects related to microprocessor/microcontroller based circuits/ instruments.

A suggestive list of project is given below:-

1. Design and fabrication of control panel for various applications in the field of electrical engineering.
2. Rewinding of a single phase/three phase induction motor
3. Fabrication of working model of a solar thermal power plant.
4. Design and fabrication of automated car parking system.
5. Design and fabrication of automated gate control of railway crossing.
6. Design and fabrication of electrical resistive/inductive/capacitive loads.
7. Design and fabrication of remote control of various domestic electrical appliances.
8. Design and fabrication of microcontroller based DC drive system.
9. Design and fabrication of automatic water level control system.
10. Design and fabrication of automatic solar battery charger.
11. Fabrication of automatic star-delta starter.
12. Fabrication of working model of hydroelectric power plant.
13. Fabrication of sine wave inverter up to 500VA.

14. Fabrication of water level indicator.
15. Fabrication of rain/fire/ smoke/burglar detector.
16. Fabrication of automatic solar panel based street lights.
17. Fabrication of automatic solar panel based traffic lights
18. Fabrication of automatic voltage stabilizer up to 1 KVA.
19. Fabrication of working model of wind power plant.
20. Fabrication of heat convector blower with humidifier.
21. Fabrication of oil based radiation type room heater.
22. Fabrication of small 1- phase transformer up to 1KVA.
23. Fabrication of UPS up to 500VA.
24. Fabrication of a distribution board as per requirement.
25. Fabrication of Direct-On-Line (DOL) starter.
26. Fabrication of solar tracking system.
27. Fabrication of automatic power factor corrector.
28. Fabrication of desert cooler/ room cooler.
29. Fabrication of electric/solar water heater.
30. Erection, installation & commissioning of electrical equipment.
31. Fault detection & repair of electrical/ electronic instruments.
32. Drawing, estimating and costing of electrical installation of the institution from supplier's pole to the institution distribution board.
33. Drawing, estimating and costing of electrical installation of a workshop having a given number of electrically operated appliances/machines.
34. To study the laying out of underground distribution cable for a small colony starting from main distribution pole.
35. To study the erection of a 5 pole span overhead line for a small distance for distribution of electrical energy and to prepare list of material required.
36. Energy audit for the workshop of your institution & to suggest remedies to reduce electricity bills.
37. Estimate the material required to provide a service connection to a consumer's premises for domestic purposes.

38. To survey the load of a given area in a village, small colony, calculate the effective load and find out the sizes of cables/conductors for the proposed distribution system.
39. Designing of light and fan scheme for an institutional or commercial building.
40. To study and estimate the material required during augmentation of a nearby pole mounted sub-station.
41. To study and estimate the material required during augmentation of a nearby in door sub-station.
42. To study and estimate the material required for a solar power station up to 100KW after visiting the actual site
43. To prepare a proposal for substation of your nstitution calculating the total load (estimating and costing)
44. Installation of home security system
45. Detection of electricity theft control system with wireless indication system
46. Fabrication of cyclo-converter (frequency changer)
47. Design and fabrication of panel for automatic switching of DG set with supply system
48. Design and fabrication of wireless AC Power transmission.

Design and fabrication of solar energy bored projects like solar cooker, solar dryer, solar street light, solar inverter, solar pump, solar emergency light etc

NOTE: The project should be preferably undertaken by a group of students depending upon cost and time involved.

There is no binding to take up the above projects as it is only a suggestive list of projects.