

**DR. A P J ABDUL KALAM UNIVERSITY,  
INDORE**

**SYLLABUS**  
**For**  
**DIPLOMA in ELECTRICAL ENGINEERING**  
**(PART TIME)**  
**(4<sup>th</sup> YEAR, 7<sup>th</sup> SEM)**

**College of Polytechnic Engineering**

**Dr. A P J Abdul Kalam University, Indore**

# **DR. A P J ABDUL KALAM UNIVERSITY, INDORE**

## **Syllabus for Diploma in Electrical Engineering (Part Time)**

### **List of Subject (4<sup>th</sup> Year, 7<sup>th</sup> Sem)**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject name</b>	<b>Page No.</b>
<b>1</b>	<b>PTEED 701</b>	<b>UTILIZATION OF ELECTRICAL POWER</b>	<b>3</b>
<b>2</b>	<b>PTEED 702</b>	<b>ESTIMATING &amp; COSTING</b>	<b>5</b>
<b>3</b>	<b>PTEED 703</b>	<b>INSTALLATION, MAINTENANCE AND TESTING</b>	<b>6</b>
<b>4</b>	<b>PTDC 9999</b>	<b>PROFESSIONAL ACTIVITIES</b>	<b>8</b>

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**UNIT 1 Electric drives**

Merits and demerits of electric drives, factors governing selection of motors, drive requirements. Group and individual drive, starting and running characteristics of various motors. Selection of starters, hand operated and contactor type starters, liquid resistor type starter. Speed control of motors, load equalization, use of fly wheel. Motor enclosures, selection of motors for particular service, size and rating of motors.

**UNIT 2 Electric heating**

Advantages and disadvantages of electric heating, methods of electric heating. Principle of electric heating. Resistance heating, heating elements and alloys. Causes of failures of heating elements. Arc furnaces, principle, construction, working and uses.

Induction heating principle, construction and use of Ajax Wyatt (core type) and coreless type. L.F. and H.F. induction furnaces. Dielectric heating principles and uses.

**UNIT 3 Electric welding**

Definition, classification of electrical welding, principle of arc welding. Qualities of a good weld. Welding defects.

Resistance welding, advantages, classification, principle and working, comparison of resistance and arc welding process, A.C. & D.C. arc welding.

**UNIT 4 Illumination**

Electromagnetic wave spectrum, solid and plane angle, definition of electrical terms in use, sensitivity of human eye. Luminous efficiency, horizontal and vertical laws of illumination, definition of terms used in lighting, lighting scheme, various types of lamps, their use and fittings.

**UNIT 5 Power factor improvements**

Causes of low P.F., effects of low P.F., methods of improvement of P.F. and its economics.

**UNIT 6 Electro-chemical processes and storage batteries**

Electro deposition and faraday's laws of electrolysis, various electro-chemical processes like electroplating, electro-extraction, regions.

Storage batteries, classification, construction. Battery maintenance, battery charging, circuit diagram. Application of storage batteries.

**Reference**

1. Gupta, J.B., Utilization of Elect. Energy ,Katariya and sons, New Delhi.
2. Garg, G.C., Utilization of Elect. Power and Elect. Traction.
3. N V Suryanarayan, Utilization of Elect. Power including Electric Drives and Elect. Traction, New Age International.
4. Mehrdad,Ehsani,Yimin Gao,Sabastien.E. Gay,Ali Emadi, "Modern electric, hybrid electric and fuel cell vehicles", CRC Press.

## List of Experiments

- [1]Speed control of slip ring induction motor by variation of rotor resistance.
- [2]To verify the change in power factor by changing load parameters and its improvement using capacitance.
- [3]To draw 'V' curves of synchronous motor.
- [4]Study and operation of resistance oven and to control its temperature.
- [5]Study of dielectric / induction heating.
- [6]Measurement of luminous efficiency of lamps by Flux meter.
- [7]Study and operation of various types of lamps.
- [8]Study of arc welding.
- [9]Report on visit/ video demonstration on heating system. Report on visit/video film on welding system

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**UNIT 1 Elements of Estimating**

Principles of estimating, purchase procedure, cost of materials, various charges like labor, stores, overhead tools, contingency etc.

**UNIT 2 Domestic and Industrial Wiring**

Various types of wiring systems including P.V.C. pipe, their merits and demerits. Calculation of total load & selection of wire, preparation of estimates for a small residential building, big institution or office building. Estimate for single store yard, multistory building. Estimate for a small workshop and industrial installation, agricultural pump, domestic pump, floor mills etc. Estimation of total cost.

**UNIT 3 Service connections**

For a single storey and multistoried building, single phase and three phase service connections, various methods of service connections. Distribution of circuits for light and power load. (Guidance may be taken by the M.P. Electricity Boards estimates).

**UNIT 4 Substations**

Various types of sub-stations, pole-mounted in-door and out-door substations. Estimating quantity and cost for a substation of a given specification.

**UNIT 5 Overhead lines : H.T. & H.T. lines**

Preparation of estimate and costing of 11KV or 33KV line. Selection of routes. Estimates for distribution lines- Location of poles for a given situation or locality. Providing street lights, necessary hardware, stay arrangements, underground cables, providing services lines using underground cables

**UNIT 6 Estimating and costing for repair/maintenance of electrical devices/equipments**

Estimates for repairing electrical equipment e.g. Rewinding, assembling and testing of polyphase induction motor. Repairing of 3 phase starters. Repairing of single phase transformers. Repairing of devices like hot plate, press, mixer fan etc.

**UNIT-1 Installation testing and maintenance** - Types of heavy Electrical equipment, unloading accessories precautions for unloading, installation of small and large machines of both static and rotating type. Installation of pole mounted transformer. Instruments used for measuring insulation resistance, reasons for deterioration of insulation resistance, improving insulation resistance, drying of insulation, Measurement of internal temperature of winding, vacuum impregnation / filtering of insulating oil, testing of insulating oil.

**UNIT-2 Commissioning** - Tests required before commissioning procedure to be adopted for commissioning the electrical equipment in respect of -Mechanical fixture and alignment. Electrical tests. Initial precautions for starting.

**UNIT-3 Earthing** - Reasons of earthing, earthing system, earth lead and its size, permissible earth resistance for different installations, improvement of earth resistance, double earthing, earth resistance measurement, rules for earthing.

**UNIT-4 Preventive maintenance and environmental pollution prevention** – Concepts of preventive maintenance, advantages, preventive maintenance schedule for transformer, induction motor, transmission line, circuit breaker and underground cable. Preventive measures to control environmental pollution results due to production of smokes gases flow of waste material and automatic reactions in research stations, plants, electrical and electronic equipments and accessories.

**UNIT-5 Trouble Shooting** - Normal performance of equipment, trouble shooting internal and external faults, instruments and accessories for trouble shooting, trouble shooting charts. **Electrical Accidents and Safety Measures** - Electrical accidents, Safety regulations, treatment of shock, fire extinguishers.

**UNIT-6 Testing and maintenance of Relays and Circuit Breakers** - Testing of Relays Factory test, commissioning test and preventive periodic maintenance test. Testing of circuit breakers, voltage test, type test, preventive maintenance of circuit breaker.

**Hot Line Maintenance** - Meaning and advantages, special types of non-conducting Materials used for tools for hot line maintenance.

**References:-**

1. Electrical Installations work by T.G. Ffancist. E.L.B.S (Vth metric edition)
2. Electrical Installations Maintenance & fault location work book by T.T.T.I.(W.R.) Bhopal
3. Preventive maintenance Electrical equipment by Charies J Hurburt.
4. Commission of Electrical plant by RCH Richardson.

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5. Operation and maintenance of Electrical Equipments Vol. I & Vol.I by B.V.S. Rao, Asia Publishing or Media Promoter Publishers Pvt. Bombay.
6. Electrical Maintenance & Repair by J.I. Watts. Mc Millars London.
7. Troubles in Electrical Equipments by N.E. Stafford. McGraw Hills Pub.
8. A Text Book of Electrical installation work Vol.2. by R.A. Mee., Macdonald London.
9. Electrical Maintenance & Repairs by P.P.Gupta., Dhanpat Rai & Sons Pub.
10. Estimating Commissioning and maintenance of Electrical equipment by S. Rao, Khanna Pub.
11. Fundamentals of maintenance of Electrical Equipment by Bhatia Khanna Pub.

#### **List of Experiments**

- [1] To Study and Maintenance of Overhead Lines.
- [2] To Study and Maintenance of switchgear OCB.
- [3] To Study and Maintenance of distribution transformer in distribution system.
- [4] To Study and Routine / Preventive maintenance of induction motor in textile mills / industrial establishments.
- 5( a) Shut down and energizing procedure.
  - (b) Accident report writing.
  - (c) Permit to work.
  - (d) Fire extinguisher.
- [6] Insulation oil testing.
- [7] To Study of Earth resistance testing.
- [8] To Study of Test report of electrical installation.
- [9] To Study of Maintenance schedule.
- [10] To Study and analysis of Trouble shooting.
- [11] Report on hot line maintenance.

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**OBJECTIVES:**

THE STUDENTS WILL BE ABLE TO:

1. Developing working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Face interview without fear
10. Follow moral and ethics
11. Convince people to avoid frustration

**1 Social Skills**

SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY

**2 Swot Analysis** – Concept, How to make use of SWOT

**3 Inter personal Relation-** Sources of conflict, Resolution of conflict, Ways to enhance interpersonal relations.

**4 Problem Solving**

**I) STEPS IN PROBLEM SOLVING-** identify and clarify the problem, information gathering related to problem, evaluate the evidence, consider alternative solutions and their implications, choose and implement the best alternative, review

**II) Problem solving technique.**(any one technique may be considered)

- 1) Trial and error, 2) Brain storming, 3) Lateral thinking

**5 Presentation Skills**

Body language -- Dress like the audience, Posture, Gestures, Eye contact and facial expression.

Presentation Skill- Stage Fright, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board

**6 Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. **TWO** industrial visits may be arranged in the following areas / industries :

- i) Manufacturing organizations for observing various manufacturing processes including heat treatment ii) Material testing laboratories in industries or reputed organizations iii) Auto workshop / Garage iv) Plastic material processing unit v) ST workshop / City transport workshop
- ii)

**7 Lectures by Professional / Industrial Expert be organized from Any**

Three of the following areas : i) Use of a plastics in automobiles. ii) Nonferrous Metals and alloys for engineering applications iii) Surface Treatment Processes like electroplating, powder coating etc. iv) Selection of electric motors. v) Computer aided drafting. vi) Industrial hygiene. vii) Composite Materials. viii) Heat treatment processes. ix) Ceramics



## 8 Individual Assignments :

Any two from the list suggested

a) Process sequence of any two machine components. b) Write material specifications for any two composite jobs. c) Collection of samples of different plastic material or cutting tools with properties , specifications and applications. d) Preparing models using development of surfaces. e) Assignments on bending moment , shear forces , deflection of beams and torsion chapters of strength of material. f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable. g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes. h) List the various properties and applications of following materials – a.Ceramics b. fiber reinforcement plastics c. thermo plastic plastics d. thermo setting plastics e. rubbers.

OR

Conduct **ANY ONE** of the following activities through active participation of students and write report

- i) Rally for energy conservation / tree plantation. ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc. iii) Conduct aptitude , general knowledge test , IQ test iv) Arrange **any one** training in the following areas : a) Yoga. B) Use of fire fighting equipment and First aid Maintenance of Domestic appliances.

**9 Group discussion and Interview technique** – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are - i) Sports ii) Current news items iii) Discipline and House Keeping iv) Current topics related to Electrical engineering field.

**Interview Technique** Necessity, Tips for Handling Common Questions

## 10 Working in Teams

Understand And Work Within The Dynamics of A Groups. Tips to Work Effectively In Teams, Establish Good Rapport, Interest with others and work, Effectively with Them to Meet Common objectives, Tips to Provide and Accept Feedback in A Constructive and Considerate Way, Leadership In Teams, Handling Frustrations in Group.

**11 Task Management** -Introduction, Task identification, Task planning, organizing and execution, Closing the task

**Assignment:** (Any Eight Assignments)

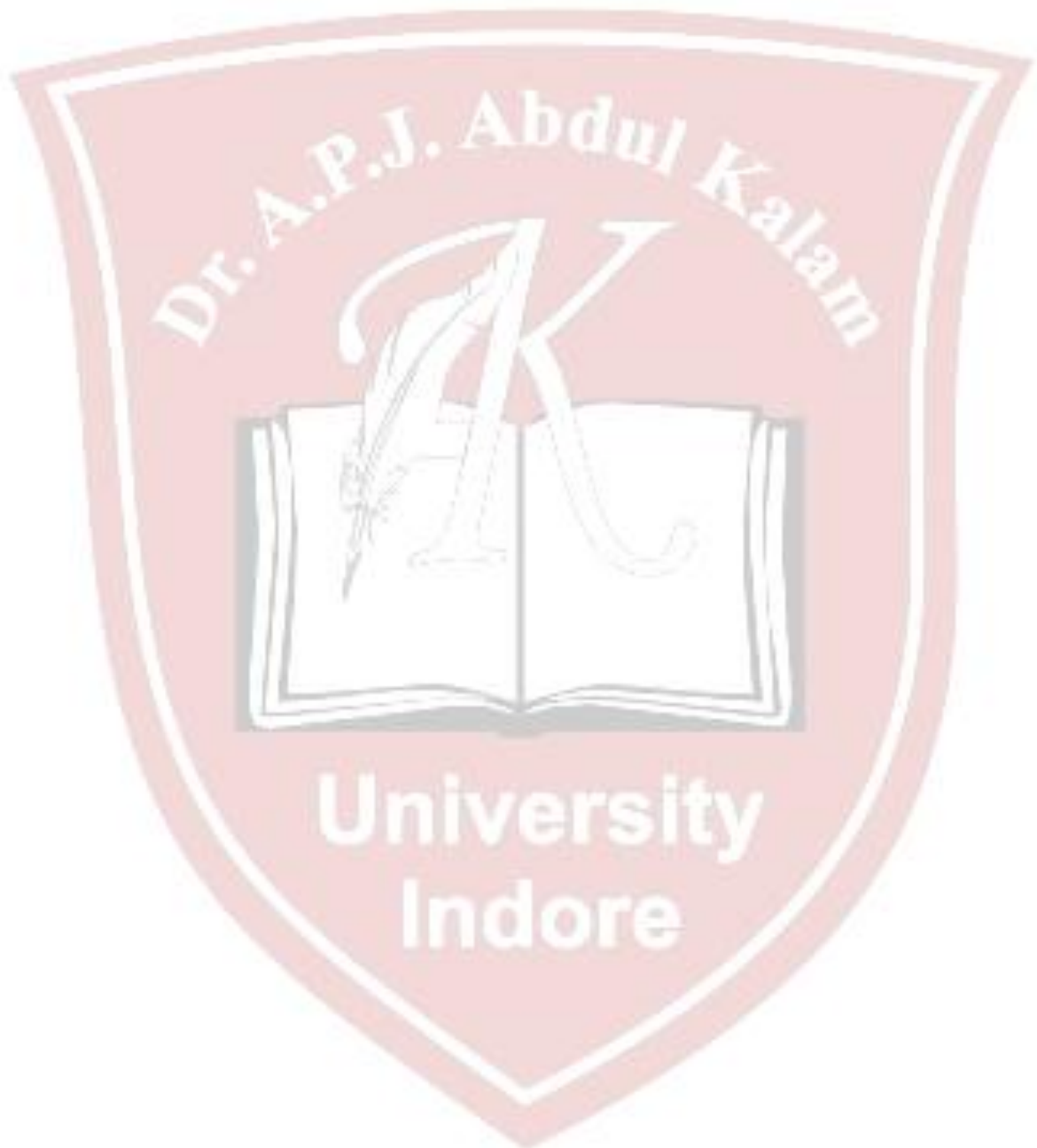
1) SWOT analysis: - Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT. a) Your past experiences, b) Achievements, c) Failures, d) Feedback from others etc. 2) undergo a test on reading skill/memory skill administered by your teacher. 3) Solve the puzzles. 4) Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.( One activity per group) 5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher. 6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme.##### 7) Conduct an interview of a personality and write a report on it. 8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed 9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the

topic given by your teacher.

**Note:** - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

**MINI PROJECT ON** - task management. Decide any task to be complete

Stipulated time with the help of teacher. Write a report considering various steps in Task management.



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