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Question Paper Code : 52607

B.E/B.Tech. DEGREE EXAMINATION, APRIL 2016

Eighth Semester

Electrical and Electronics Engineering

**EE 2451/EE 81/10133 EE 801 – ELECTRIC ENERGY GENERATION, UTILIZATION
AND CONSERVATION**

(Regulations 2008/2010)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

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1. Mention the various types of Solar PV Cells.
2. What is meant by Distributed Power Generation ?
3. What is meant by the term two part tariff ?
4. Specify the role of Power Capacitor in industries.
5. Define the term Luminous Efficacy.
6. Suggest suitable Lamps for Sports Ground lighting application.
7. Mention the merits of dielectric heating.
8. Specify the desirable properties of heating element materials.
9. What are the factors governing scheduled speed of a Train ?
10. Draw the speed torque characteristics of an ideal Traction system drive.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Draw the block diagram of a Coal based Thermal Power Plant. Also mention the role of individual blocks. (8)
- (ii) With a block diagram, explain the working principle of a Wind Electric Generator. (8)

OR

- (b) (i) Discuss the benefits of Non-conventional Power Generation, when compare to Conventional Power generation. (8)
- (ii) Explain the working principle of single basin and double basin type Tidal power plant. (8)
12. (a) (i) List the various energy efficient electrical equipment. Briefly explain their application and benefit. (8)
- (ii) A three phase 1000kW Induction Furnace draws an input power of 910kW at 0.72 Power factor Lagging from a 415 Volts 3 Phase Power Supply. Calculate the requirement of Capacitors to be connected in parallel in terms of kVAr rating to improve the existing power factor to Unity. Also calculate the reduction in kVA demand due to power factor improvement of the motor from 0.72 lagging to Unity. (8)

OR

- (b) (i) What are the factors governing cost of Electrical Energy ? Also explain in details. (8)
- (ii) An Engineering Industry is charged under three part tariff, based on Demand, Active Energy and Reactive energy Consumption. The monthly energy reading of the consumer is as follow :

Actual Maximum Demand	Energy Consumption	Reactive Energy Consumption
1450 kVA	723840 kWh	43430 kVArh

If the tariff is ₹ 400 per kVA of Actual maximum Demand reached, Units rate is ₹ 4.50 per kWh of consumption plus Reactive Energy rate is 30 paise per kVArh. Calculate the monthly Energy Bill of the above Engineering industry. (8)

13. (a) (i) List the various types of lamps commercially available. Also specify the energy efficient lamps for domestic and industrial lighting applications. (8)
- (ii) A workshop dimension 30 metre \times 20 metre is illuminated by 30 Nos. of 400 Watts Metal Halide lamps. The luminous efficacy of Metal Halide lamp is 90 lumens/Watt. The depreciation factor is 1.2 and utilization factor is 0.6. Calculate the illumination level of the working plane. (8)

OR

- (b) (i) Explain the various steps involved in designing of lighting System for a Workplace. (8)
- (ii) A Classroom dimension 10 metre \times 7.5 metre with a ceiling height of 4 metres is to be provided with general illumination of 300 lux. Considering a co-efficient of utilization is 0.5 and depreciation factor of 1.2. Determine the number of 36 watts fluorescent lamps required. The luminous efficacy of 36 watts fluorescent lamp is 84 lumens per watt. (8)
14. (a) (i) Draw the Voltage versus Current characteristics of a Welding transformer. How the dropping characteristic is achieved in welding transformer? (8)
- (ii) Calculate the energy required to melt 1.2 metric ton of Brass in a three phase Induction Furnace, if the time taken is 1 Hour 40 Minutes. The three phase Induction Furnace having the following data :
- Latent heat of Brass = 38 kcals / kg
- Specific heat of Brass = 0.094
- Melting point of Brass = 925°C
- Initial temperature of Brass = 25°C
- Assume overall efficiency of furnace is 84%. (8)

OR

- (b) (i) With a conceptual diagram, explain the process of induction heating. (8)
- (ii) A plywood board 120 cm \times 90 cm \times 1.5 cm is to be heated to 90°C in 30 minutes by dielectric heating technique at a frequency of 30MHz. The specific heat for wood is 0.35 and specific weight of wood is 0.56 grams/cubic cm. The ambient temperature is 30°C and relative permittivity of 5, absolute permittivity of 8.85×10^{-12} . The operating power factor is 0.05 leading. Calculate the power required for the heating process. (8)

15. (a) (i) Discuss the series-parallel control of electric traction motor. Also specify the advantages of the above control. (8)
- (ii) A train runs with an average speed of 50 kmph. Distance between stations is 4.5 km. Values of acceleration and retardation are 1.5 kmphps and 1.8 kmphps respectively. Find the maximum speed of the train assuming a trapezoidal speed time curve. (8)

OR

- (b) (i) Explain the recent trends in electric traction system. (8)
- (ii) A sub-urban traction system has a maximum speed of 60 kmph. The scheduled speed including a station stop of 60 seconds is 40 kmph. If the acceleration is 1.8 kmphps, calculate the value of retardation, when the average distance between stop is 3 km. (8)