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Question Paper Code : 80554

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Sixth/Seventh/Eighth Semester

Electrical and Electronics Engineering

EE 8015 – ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the key properties of a good lighting scheme?

2. List the different types of lamps used in lighting schemes.

3. List the properties of energy efficient motors.

4. What is meant by "motor life cycle"?

5. List few applications of dielectric heating.

6. Compare DC welding and AC welding.

7. Mention the different types of traction systems.

8. Draw the speed torque characteristics of an ideal traction system drives.

9. Give any four induction – based appliances.

10. How does online UPS work?

PART B — (5 × 13 = 65 marks)

11. (a) Describe the principle involved in photometry and its significance in lighting design. (13)

Or

(b) Design the lighting requirements for a commercial office space, taking into account energy efficiency. (13)

12. (a) Compare the different types of air-conditioning systems and their applications. (13)

Or

(b) Calculate the annuity energy saving and simple payback period by replacing the existing standard motor with premium efficiency motor. The data for the above application is as follows: (13)

- Capacity of Existing - 20 HP
- Proposed Capacity - 20 HP
- Operating Hours per year - 7200 Hours
- Load factor - 80%
- Cost per unit of Energy - Rs.8.50 Per kWh
- Existing standard motor efficiency - 85%
- Proposed Premium motor efficiency - 92%
- Cost for Premium Efficiency motor - Rs.60,000

13. (a) Analyse the efficiency of a high frequency induction furnace which takes 10 minutes to melt 1.815Kg of Aluminium. The input to the furnace being 5kW and the initial temperature is 15°C.Take specific heat of Aluminium is 0.212 kcal/kg°C, melting point of Aluminium is 660°C and latent heat of fusion of Aluminium is 76.8 Kcal/Kg. (13)

Or

(b) (i) Explain the various types of electric arc welding. (6)

(ii) Explain the principle and working of welding transformer. (7)

14. (a) 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 kmphs and 1.8 kmphps respectively. Calculate the maximum speed of the train assuming a trapezoidal speed time curve. (13)

Or

(b) Compare different types of traction motors and their control methods. (13)

15. (a) Explain with neat diagram different types of the house wiring. (13)

Or

(b) Explain the different types of earthing used in domestic, industrial, and substation. (13)

16. (a) A drawing hall 30×15×5 m is to be provided with a general illumination of 300 Lux. Taking coefficient of utilization as 0.5, depreciation factor as 1.4, Design the number of fluorescent tubes required, their spacing height, mounting height and total wattage. Take luminous efficiency of fluorescent tubes as 100 Lumen/Watt for 36 Watts tube. (15)

Or

(b) A 250 tonnes train with 10% rotational inertia effect is started with uniform acceleration and reaches a speed of 50 kmphps in 25 seconds on level road. Calculate the specific energy consumption if the journey is to be made according to trapezoidal speed- time curve. (15)

- Acceleration 2 kmphps;

- Tracking retardation = 3 kmphps;

- Distance between the stations 2.4 km;

- Efficiency = 0.9;

- Track resistarice = 5 kg/tones