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Question Paper Code : 50519

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

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.   Define Luminous Efficacy.

2.   What is the CRI level required for kitchen and bathroom?

3.   Name any two eco-friendly refrigerants.

4.   Define efficiency evaluation factor.

5.   List the properties of heating element materials.

6.   List the various types of resistance welding.

7.   What are the different types of traction systems?

8.   Name the traction motors used in Indian railways.

9.   Give any four examples of nonlinear loads.

10. Define voltage swell.

PART B — (5 × 13 = 65 marks)

11. (a)   Compare the luminous performance characteristics of GLS, Halogen lamp, Mercury vapour lamp, Sodium vapour lamp, CFL and LED lamps.
                                                                                        (13)

Or

     (b)   Design a lighting scheme for 100m × 40m size industry to compete the properties of good lighting scheme. Draw the necessary sketch.   (13)

12. (a) Explain the various types of air-conditioning system and their applications. (13)

Or

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

Capacity of Existing	–	20HP
Proposed Capacity	–	20HP
Operating Hours per year	–	7,200 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) With neat diagram explain the working of Ajax-Wyatt induction furnace. (13)

Or

(b) Express the process of dielectric heating and derive the expression for power consumption. (13)

14. (a) With the help of trapezoidal speed-time curve derive an expression for the maximum speed. (13)

Or

(b) Derive an expression for the tractive effort for propelling a train on a gradient starting from rest. (13)

15. (a) (i) An industrial consumer has a maximum demand of 120 kVA and maintains a load factor of 80%. The tariff in force is Rs. 350 per kVA of maximum demand plus Rs. 8 per unit. Calculate the total energy consumed per annum and the annual bill. Assume power factor = 1. (7)

(ii) A shopping mall has the following daily load cycle: (6)

Time(Hours)	0-6	6-10	10-12	12-16	16-20	20-24
Load(kW)	20	25	30	25	35	20

Draw the load curve and calculate:

(1) Maximum demand

(2) Units generated per day

(3) Average load

(4) Load factor

Or

(b) Explain the working principle of Online and Offline UPS with neat diagrams. (13)

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16. (a) (i) An illumination of 100 Lux is to be provided in a factory hall 40m × 10m and efficiency of lamp is 14 Lumens/Watt. Depreciation factor is 0.8 and utilization factor is 0.4. Calculate the number of lamps and rating and their position when trusses are provided at mutual distance of 5m. (8)

(ii) A 22 kW, single phase 220 V resistance oven employs circular Nichrome wire for its heating element. The wire temperature is not to exceed 1230°C and the temperature of the charge is 500°C. Calculate the size and length of the wire required. Assume radiating efficiency (K) is 0.6, emissivity (ε) is 0.9 and specific resistance of the wire (ρ) is 101×10^{-6} cm. (7)

Or

(b) (i) A lamp giving 300 CP in all directions below the horizontal is suspended 2 m above the centre of a square working table of 1 m side 1 in a hosiery industry. Calculate the maximum and minimum illumination on the surface of the table. (8)

(ii) A train has schedule speed 60 km/hr. The distance between the stations is 6 km. The values of acceleration and retardation are 2 km/hr/sec and 3 km/hr/sec. Calculate the crest speed of the train by assuming trapezoidal speed-time curve. The duration of stop is 60 seconds. (7)