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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 31412

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Eighth Semester

Electrical and Electronics Engineering

EE 2451/EE 81 — ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term Cogeneration.

2. Why Biomass Energy generation is treated as Renewable Energy?

3. List the various power quality parameters.

4. Define Load Factor.

5. Specify any four energy efficient lamps.

6. Why tungsten is selected as the filament material?

7. Draw the voltage versus current characteristics of welding transformer.

8. Mention the applications of dielectric heating.

9. Specify the few advantages of Electric Traction systems.

10. Define Tractive Effort in traction system.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw the block diagram of a standalone solar PV power generation system. Also explain the role of individual blocks. (8)

(ii) Compare the features of nuclear power plant with thermal power plant. (8)

Or

(b) (i) Discuss the effect of distributed power generation on power system operation. (8)

(ii) Explain the method of producing power from Municipal waste. (8)

12. (a) (i) Explain the design improvements in energy efficient induction motors, when compared to standard induction motor. (8)

(ii) A 4 Pole 3 Phase 300 HP Squirrel cage induction motor draws an input power of 165 kW at 0.88 power factor lagging from a 415 Volts 3 Phase power supply. Calculate the KVA rating of power factor improvement capacitor to be connected in parallel to the motor to improve the existing power factor to Unity. Also calculate the reduction in KVA demand due to power factor improvement of the motor from 0.88 lagging to Unity. (8)

Or

(b) (i) Discuss the importance of size and number of power generation units on the aspects of economy and efficiency. (8)

(ii) The monthly energy reading of a industrial consumer is as follow :

Actual Maximum Demand	Energy Consumption	Apparent Power Consumption
2600 kVA	1344408 kWh	1445600 kV/Arh

If the tariff is Rs. 300 per kVA of actual maximum demand reached and unit rate is Rs. 5.50 per kWh of consumption plus power factor penalty for every 0.01 drop in power factor below 0.95 is 1% of sum of demand and energy charges. Calculate the monthly energy bill of the above spinning mill consumer. (8)

13. (a) (i) Explain the various factors to be considered, while designing a lighting system. (8)

(ii) A 2000 Square meter shop floor area of an engineering industry is to be illuminated with a light level of 200 Lux with the 250 Watts metal halide lamp fittings. The co-efficient of light utilization is 0.6 and depreciation factor of lamp is 1.2. Calculate the number of lamp fittings required and total lighting power required for the above lighting purpose. The luminous efficacy of the metal halide lamp is 90 Lumens per watt. (8)

Or

(b) (i) Discuss the energy saving opportunities in lighting systems. (8)

(ii) A drawing hall 20 meter × 10 meter with a ceiling height of 4 meters is to be provided with general illumination of 250 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 82 lumens per watt. (8)

14. (a) (i) Explain the method of controlling temperature ,in resistance heating. (8)

(ii) Calculate the time taken to melt 2 tonnes of steel in a three phase electric arc furnace having the following data :

Current	=	9000 Amperes
Arc Voltage	=	90 V
Resistance of Transformer	=	0.002 Ω
Reactance of Transformer	=	0.004 Ω
Latent heat of Steel	=	8.89 Kcals/Kg
Specific heat of Steel	=	0.12° C
Melting point of steel	=	1370°C
Initial temperature of steel	=	30°C

Assume overall efficiency of furnace is 85%. Also calculate the energy consumed to melt 2 tonnes of steel. (8)

Or

(b) (i) What are the requirements of good welding? (8)

(ii) In a resistance oven, 4 Nos. of 120 Ω's resistance are used as heating element. Calculate the power drawn by the 4 Nos. of resistance when all are connected in series and all are connected in parallel across a 230 Volts 50 Hz power supply. (8)

15. (a) (i) Draw the Speed-Time curve of a traction system. Also explain the various periods and the actions. (8)

(ii) A train has a scheduled speed of 50 kmph over a level track, distance between stations being 1.8 Kms. Station stopping time is 30 Seconds. Assuming braking retardation of 3 Kmphps and maximum speed 50% greater than average speed, calculate acceleration to run the service. (8)

Or

(b) (i) Explain the various types of electric traction systems. (8)

(ii) A train runs with an average speed of 50 Kmph. Distance between stations is 2.5 Km. Values of acceleration and retardation are 1.8 Kmphps and 2.4 Kmphps respectively. Calculate the maximum speed of the train assuming trapezoidal speed-time curve. (8)