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Question Paper Code : 21518

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Eighth Semester

Electrical and Electronics Engineering

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

(Regulations 2008/2010)

(Common to PTEE 2451/10133 EE 801 — Electric Energy Generation, Utilization and Conservation for B.E. (Part – Time) Seventh Semester – EEE Regulations 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the importance of economizer and super heater in steam power plant?

2. How are costs allocated in cogeneration systems?

3. Define load curve and load duration curve.

4. How can energy conservation be promoted in small scale industries?

5. Define the term "luminous flux".

6. State the different types of electrical lamps used for illumination?

7. Define squeeze time.

8. In electric arc welding what types of electrodes are used in DC supply and AC supply.

9. Three phase systems could not become popular for traction purposes. Why?

10. Draw the Speed - Time Curve for a suburban railway system.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe with a neat sketch, the construction and principle of operation of a nuclear power plant. (10)

(ii) Explain the working of hydroelectric power plant. (6)

Or

(b) (i) Explain the working of a geothermal power plant with neat layout. (8)

(ii) Explain the working principle of a bio-mass plant. (8)

12. (a) (i) A system has a straight line annual load duration curve with maximum and minimim demands of 15MW and 5MW respectively. The annual cost characteristics of base load and peak load station are respectively given by

C_1 = (Rs. 1,00,000 + Rs. 100/kW + 6 p/kWhr)

C_2 = (Rs. 80,000 + Rs. 60/kW + 8 p/kWhr)

Determine the operating schedule of peak load station for minimum annual cost. Hence determine the overall cost per kWhr. (8)

(ii) Discuss the effects of load factor and diversity factor on the cost of generation of electrical energy. (8)

Or

(b) (i) Explain 'maximum energy efficiency principle' and 'minimum cost effectiveness in energy use'. (8)

(ii) Explain the importance of energy auditing. (8)

13. (a) (i) List the properties of good lighting . (6)

(ii) An illumination of 75 lux is to be provided in workshop hall measuring 40 m × 10 m. Determine the number of rating of lamps when 7 stresses are provided at mutual spacing of 5 meters. Assume depreciation factor as 0.8, coefficient of utilisation as 0.4 and efficiency of lamps as 15 lumen/W. (10)

Or

(b) (i) With a neat diagram explain the construction and working of sodium vapour lamp. (8)

(ii) Explain the various steps followed in calculation of illumination for designing the flood lighting in sports ground. (8)

14. (a) (i) Draw a neat sketch of vertical induction core type furnace and explain its working. (6)

(ii) A 15kW, 220V, single phase resistance over employs circular nickel-chromium wire for its heating element. The wire temperature is not to exceed 1230'C and the temperature of the charge to be 500'C. Calculate the size and length of the wire. Assume radiating efficiency = 0.6, Emissivity = 0.9, Specific resistance of nickel-chrome wire = $101.6 \times 10^{-6} \Omega$ cm. (10)

Or

(b) (i) With the neat sketches, explain the functioning of carbon arc welding and shielded metal arc welding. (8)

(ii) Explain the characteristics of a welding generator. (8)

15. (a) (i) Explain about the types of supply system used in traction system. (8)

(ii) A 250 tonnes train with 10% rotational inertia effect is started with uniform acceleration and reaches a speed of 50 kmphps in 265 seconds on level road. Find the specific energy consumption if the journey is to be made according to trapezoidal speed – time curve. Acceleration = 2 Kmphps ; Tracking retardation = 3 Kmphps ; Distance between the stations = 2.4 Km ; Efficiency = 0.9 ; Track resistance = 5 Kg/tones. (8)

Or

(b) (i) With the aid of transmission of tractive effort, describe the mechanism of train movement. (8)

(ii) Explain clearly regenerative braking when used for DC series traction motors. Also discuss the requirements for ideal traction. (8)
