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

Question Paper Code : 42513

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Eighth Semester

Electrical and Electronics Engineering

EE2451 – ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

(Regulations 2008)

(Common to PTEE 2451 – Electric Energy Generation, Utilization and Conservation for B.E. (Part-Time) Seventh Semester – EEE – Regulations 2009)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. Mention various factors that affects the selection of site for a thermal power plant.
2. What are solar concentrators ? List its advantages.
3. Define Hopkinson demand rate and Wright demand rate.
4. Give two advantages of improved power factor.
5. List two requirements of a good lighting scheme.
6. A lamp rated 230V gives an illumination of 6000 lux and takes 1.5A from mains. Find the efficacy of the lamp and the MSCP.
7. Mention the different methods of induction heating. Give its applications.
8. List a few applications of dielectric heating.
9. Justify why electrical locomotive run faster at curved route as compared to steam locomotive.
10. Draw the Speed – Time Curve for a suburban railway system.

PART – B (5×16=80 Marks)

11. a) i) Describe with neat sketch the construction and principle of operation of a Pumped Storage Hydel power plant. (10)

ii) Discuss the operations of a Reactor in Nuclear power plant. (6)

(OR)

b) i) Explain the working of a geothermal power plant for power generation. (8)

ii) Explain the effect of DG on system operation. (8)

12. a) i) An industrial organization having a maximum demand of 200 KW at a pf of 0.707 lagging, is charged on a tariff of Rs. 100 per KVA per year + paise 10 per unit. Determine the most economic p.f. in terms of maximum saving in installing a phase advancing equipment, when the cost of phase advancing equipment is Rs. 200 per KVA. Interest depreciation, maintenance and cost of losses amount to 20 % of capital cost per year. (8)

ii) A power station has to supply load as follows :

Time in hours :	0 – 6	6 – 12	12 – 14	14 – 18	18 – 24
Load in MW :	45	135	90	150	75

Draw the load curve and load duration curve. Calculate the load factor and the plant capacity factor. (8)

(OR)

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

C_1 = (Rs. 1,000,00 + 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. (16)

13. a) i) State and prove laws of illumination. (8)

ii) A drawing hall 30 × 15 × 5 m is to be provided with a general illumination of 120 Lux. Taking coefficient of utilization as 0.5, depreciation factor as 1.4, determine the number of fluorescent tubes required, their spacing height, mounting height and total wattage. Take luminous efficacy of fluorescent tubes as 40 Lumen/Watt for 80 watts tube. (8)

(OR)

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

ii) Write a note on Flood lighting. (8)

14. a) i) Draw a neat sketch of Ajax-Wyatt induction furnace and describe its working. (8)

ii) A 15kW, 220V, single phase resistance oven 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 = 101.6×10^{-6} Ωcm. (8)

(OR)

b) i) An insulating material 2 cm thick and 200 sq.cm. in area is to be heated by dielectric heating. The material has permittivity of 5 and p.f. as 0.05. Power required is 400 watts and frequency of 40 MHz. Determine the voltage and the current that will flow through the material. If the voltage were limited to 700 V what will the frequency to get the same loss. (8)

ii) Explain the various types of resistance welding. (8)

15. a) i) Discuss and compare various arrangements of current collection used in traction. (8)

ii) A sub-urban electric train has a maximum speed of 65 kmph. The schedule speed including a station stop of 30 seconds is 43.5 kmph. If the acceleration is 1.3 kmphps, find the value of retardation when the distance between stops is 3 k.m. (8)

(OR)

b) i) Explain why regenerative braking is used for DC series traction motors. (8)

ii) A 250 tonnes train with 10 % rotational inertia effect is started with uniform acceleration and reaches a speed of 60 kmphps in 30 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, braking retardation = 3 kmphps; Distance between the stations = 2.5 Km; Efficiency = 0.9; Track resistance = 5 Kg/tonne. (8)
