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B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Eighth Semester

Electrical and Electronics Engineering

EE 6801 – ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

(Regulations 2013)

(Common to PTEE 6801 – Electric Energy Generation, Utilization and Conservation for B.E. Part-Time – Seventh Semester – Electrical and Electronics Engineering – Regulations 2014)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Highlight the merits of electric traction.
2. Describe tractive effort.
3. Define space height ratio.
4. What is stroboscopic effect of fluorescent tubes ?
5. Enumerate the causes for failure of heating elements.
6. Write down the different types of resistance welding.
7. List any four applications of solar collectors.
8. Define transmissivity.
9. Determine the power in the wind if the wind speed is 20 m/s and blade length is 50 m. Assume $\rho = 1.23$ kg/m.
10. List the factors responsible for distribution of wind energy on the surface of earth.

PART – B **(5×13=65 Marks)**

11. a) The distance between two stations is 1.6 kms and the average speed of the train is 40 km/h. The acceleration, retardation during coasting and braking are 2 km/h/s, 0.16 km/h/s and 3.2 km/h/s respectively. Assume quadrilateral approximation of speed time curve. Determine the duration of the accelerating, coasting and braking periods and distance covered during these periods. **(13)**

(OR)

b) i) Define specific energy consumption and discuss the factors which affect the specific energy consumptions of trains operating at a given scheduled speed. **(7)**

ii) A motor coach bogie having two series motors is accelerated uniformly to a speed of 45 km/h in 25 sec. with the help of a series-parallel controller. If the average tractive effort per motor is 12750 N, calculate the approximate loss of energy in the starting rheostats. **(6)**

12. a) i) Draw and explain the working of LED lamp. **(6)**

ii) A filament lamp of 500 W is suspended at a height of 4.5 m above the working plane and gives uniform illumination over an area of 6 m diameter. Assuming an efficiency of the reflector as 70% and efficiency of lamp as 0.8 watt per candle power, determine the illumination on the working plane. **(7)**

(OR)

b) i) State the laws of illumination. **(4)**

ii) It is desired to illuminate a drawing hall with an average illumination of about 250 lux. The area of the hall is 30 m × 20 m. The lamps are to be fitted at 5 m height. Find out the number and size of incandescent lamps required for an efficiency of 12 lumens/watt. Utilization factor = 0.4 and maintenance factor = 0.85. **(9)**

13. a) A 20 kW single phase, 220 V resistance oven employs circular nichrome wire for its heating element. If the wire temperature is not to exceed 1127°C and the temperature of the charge is to be 427°C, calculate the size and length of the wire required. Assume e = 0.9 and the radiation efficiency K = 0.6. What would be the temperature of wire when the charge is cold ? **(13)**

(OR)

b) i) Explain the process of dielectric heating and mention its applications. **(6)**

ii) List the methods for arc welding and explain any one method in detail. **(7)**

14. a) i) Describe the energy balance equation and collector efficiency for a flat plate collector. **(7)**

ii) Discuss in brief on solar radiation geometry. **(6)**

(OR)

b) i) Mention the merits and demerits of concentrating collectors. **(6)**

ii) Write a brief note on cylindrical-parabolic concentrating collector. **(7)**

15. a) With the neat diagram, explain in detail about the construction and the working principle of a horizontal axis wind turbine. **(13)**

(OR)

b) Present a detailed analysis on the aerodynamic forces acting on a blade. **(13)**

PART – C **(1×15=15 Marks)**

16. a) A piece of insulating material is to be heated by dielectric heating. The size is 10 × 10 × 3 cm. A frequency of 20 MHz is used and power absorbed is 400 W. Calculate the voltage necessary for heating and current that flows in the material. The material has relative permittivity of 5 and p.f is 0.05. **(15)**

(OR)

b) A building frontage 50 m × 16 m is to illuminated by flood lighting projectors situated 25 m away. If the illumination is 100 lux, coefficient of utilization is 0.5, depreciation factor 1.5, waste light factor 1.2. Estimate the number and size of projectors. Sketch the projectors recommended indicating the usual adjustments provided. **(15)**