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

Question Paper Code : X 20500

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
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 advantages of electric traction.
2. Mention the need for speed-time curve.
3. Define beam factor.
4. Define utilization factor.
5. Compare DC welding and AC welding.
6. Specify the causes for failure of heating elements.
7. The specifications for a solar cell are $V_m = 0.54V$, $V_{OC} = 0.62V$, $I_m = 0.024$ A and $I_{SC} = 0.025$ A. Determine the fill factor.
8. Enumerate the merits of solar energy.
9. List, what are the features prefer for the wind turbine site.
10. Write down the types of wind mills.

PART – B **(5×13=65 Marks)**

11. a) i) List the requirements of electric traction system. **(6)**

ii) Define specific energy consumption and discuss the factors that affects the specific energy consumption of trains operation at a given schedule speed. **(7)**

(OR)

b) The distance between two stations is 1.6 km and the average speed of the train is 40 kmph. The acceleration is 2 kmphps, retardation during coasting is 0.16 kmphps and braking is 3.2 kmphps respectively. Assuming a simplified quadrilateral speed time curve, determine duration of acceleration, coasting and barking periods and distance covered during braking period. **(13)**

12. a) Explain the various factors to be taken into account for designing schemes for

i) Street lighting **(5)**

ii) Flood lighting and for **(5)**

iii) High way lighting. **(3)**

(OR)

b) i) A lamp of uniform intensity of 200 C. P. is enclosed dins glass globe. 25% of light emitted by lamp is absorbed by the globe. Determine the brightness of globe, C.P. of globe if diameter of globe is 30 cm. **(8)**

ii) Discuss the working of high pressure mercury vapor lamp with a neat sketch. **(5)**

13. a) Determine the efficiency of a high frequency induction furnace which takes 10 minutes to melt 1.815 kg of aluminium. The input to the furnace being 5 kW and the initial temperature 15 degree centigrade, Specific heat of aluminium is – 0.212 K Cal/Kg°C. Melting point-660 degree centigrade, Latent heat of fusion of aluminium is –76.8 K Cal/Kg. **(13)**

(OR)

b) i) Explicate the working of coreless induction furnace and list its merits. **(6)**

ii) Describe the method of controlling temperature in resistance heating. **(7)**

14. a) i) Derive the energy balance equation and also the expression for the collector efficiency of a solar collector. **(6)**

ii) Brief on the different types of solar collectors. **(7)**

(OR)

b) i) Write a brief note on feed in inverters. **(6)**

ii) How do you estimate the average solar radiation ? **(7)**

15. a) Wind at 1 standard atmospheric pressure and 15°C temperature has a velocity of 10 m/s. The turbine has diameter of 120 m and its operating speed in 40 rpm at maximum efficiency. Calculate :

i) The total power density in the wind stream. **(3)**

ii) The maximum obtainable power density assuming η = 40%. **(3)**

iii) The total power produced in kW. **(3)**

iv) The torque and axial thrust. **(4)**

(OR)

b) With the help of block diagram, describe the functions of various blocks of a WECS.

PART – C **(1×15=15 Marks)**

16. a) A 2000 square metre shop floor area of an engineering industry is to be illuminated with a light level of 200 lux with 250 watts metal halide lamp fittings. The coefficient of light utilisation is 0.6 and depreciation is 1.2. Calculate the no. of lamp fittings required and total lighting power required Luminous efficacy of metal halide lamps is 90 lumens per watt. **(15)**

(OR)

b) i) Explain the process of dielectric heating and derive the expression for total heat energy. **(10)**

ii) A piece of insulting 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. **(5)**

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