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

Question Paper Code : X60513

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Eighth Semester
Electrical and Electronics Engineering
EE 2451/EE 81/10133 EE 801 – ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION
(Regulations 2008/2010)
(Common to 10133EE801 – Electrical Energy Generation, Utilization and Conservation for B.E. (Part-Time) Seventh Semester – EEE – Regulations 2010)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is the use of super heater in steam power plant ?
2. Define the term gust in wind energy system.
3. Define load curve and load duration curve.
4. How can energy conservation be promoted in small scale industries ?
5. Define luminous efficacy.
6. List the types of lighting system.
7. Draw the voltage versus current characteristics of welding transformer.
8. Mention the applications of dielectric heating.
9. What are the features of electric traction ?
10. Define Tractive effort.

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) 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 follows :

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) A hall 30 m long and 12 m wide is to be illuminated and the illumination required is 50 lumens/m^2. Calculate the number of fitting required, taking depreciation factors of 1.3 and utilization factor of 0.5. Given that the outputs of different types of lamp are given below : **(10)**

Watts	100	200	300	500	1000
Lumens	1615	3650	4700	9950	21500

ii) Explain the factors affecting the design of lighting system. **(6)**

(OR)

b) i) Explain the operation of fluorescent lamp in details. **(8)**

ii) A lamp of uniform intensity of 200 C.P. is enclosed in dins glass globe. 25% of the light emitted by lamp is absorbed by the globe. Determine :

1) Brightness of globe.

2) CP of globe if diameter of globe is 30 cm. **(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) List the merits of electric traction compare with conventional system. **(6)**

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 is 2.4 km; Efficiency = 0.9; Track resistance = 5 kg/tones. **(10)**

(OR)

b) i) Define specific energy consumption and discuss the factors that affects the specific energy consumption of trains operation at a given schedule speed. **(8)**

ii) Explain regenerative braking when used for dc series traction motors. How does it differ from the regenerative braking as used for shunt motors ? **(8)**

———————