22626

21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define the following terms –

(i) Solid angle

(ii) Waste light factor

b) State the various types of reflectors used in industrial lighting fittings.

c) State the classification of electric heating.

d) Enlist the various types of electric drives used in Industry.

e) Draw the speed - time characterstics of suburban services.

f) State the various devices used for power factor improvement.

g) Suggest the type of tariff for -

(i) Domestic consumer

(ii) HT Industrial consumer

P.T.O.

Marks

2. Attempt any THREE of the following: **12**

a) Compare fluorescent lamp and LED lamp on the basis of quality of light; lamp efficiency; Life of lamp and voltage regulation.

b) Explain with neat sketch; the working principle of Dielelctric heating.

c) Recommend relevant motor for the following application with justification.

(i) Rolling mill drives

(ii) Air compressor

d) Draw the block diagram of 25 KV; 1ϕ; 50 Hz A.C. locomotive used for traction system. State the function of each part.

3. Attempt any THREE of the following: **12**

a) A small assembly shop of 16 m long, 10 m wide and 3 m upto trusses is to be illuminated to a level of 200 Lux. The utilization and maintenance factors are 0.74 and 0.8 respectively. Calculate the no. of lamps required to illuminate the whole area if the lumen output of lamp selected is 3000 lumens.

b) Describe with neat sketch; the working principle of spot welding and state its application.

c) Explain with neat sketch, Rheostatic braking for D.C. series motor.

d) An industry has a maximum demand of 200 kW at a power factor of 0.8 lagging and is charged at Rs. 720 per kVA per Annum. If the phase advancing equipment costs Rs. 1200 per KVAR. Determine the most economical power factor at which the industry should operate. Interest and depreciation total 10% of capital investment on the phase advancing equipment.

Marks

4. Attempt any THREE of the following: **12**

a) Explain with neat sketch; the construction and operation of indirect arc furnace.

b) A motor used for mines has following type of Duty cycle :-

(i) Power demand increases from zero to 100 H.P. in 4 minutes.

(ii) Constant running for 50 H.P. for 6 minutes.

(iii) Remains at rest for another 5 minutes.

Estimate the size of motor.

c) Explain with neat sketch; the construction and working of pantograph collector ?

d) Compare D.C. and A.C. system of Railway electrication from the point of main line and suburban line railway service.

e) It is desired that the correct power factor of 0.95 by means of static condensors is connected to each phase of a 3-phase, 400 volt, 50 Hz motor having a maximum load of 50 kVA at a P.f. of 0.75. Determine the capacity of each delta connected condensor.

5. Attempt any TWO of the following: **12**

a) A 20 kW single phase 220 V resistance oven has Nichrome wire heating elements. The wire is designed for maximum temperature of 1150°C and temperature of charge to be 600°C. If radiating efficiency is 0.55; Emissivity is 0.9 and specific resistance is 1.09×10^{-6} ohm-m. Estimate the diameter and length of wire.

b) Enumerate the factors governing selection of Electric drives for a particular service / application.

c) An electric train is to have acceleration and braking retardation of 1.2 Km/hr/sec and 4.8 Km/hr/sec respectively. If the ratio of maximum to average speed is 1.6 and time for stops 35 seconds. Find schedule speed for a run of 3 Km. Assume simplified trapezoidal speed-time curve.

Marks

6. Attempt any TWO of the following: **12**

a) Compare resistance welding and arc welding on the basis of –

(i) Supply requirement

(ii) Voltage

(iii) Power factor

(iv) Additional material requirement

(v) External pressure

(vi) Temperature

b) Select the type of enclosures for the electric drives used in following places with justification.

(i) Drives used in petroleum station / chemical plants.

(ii) Electric drives used in damp situation

(iii) Electric drives used in coal handling plants.

c) Draw speed-time curve and label its various parts for the following services.

(i) main line service

(ii) urban line service

and describe the main features of above train services.

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