Scheme – G

Sample Question Paper

Course Name : Diploma in Electrical Engineering Group

Course Code : EE/EP **17507**

Semester : Fifth

Subject Title : Industry Electrical System-II

Marks : 100 **Time: 3 hrs**

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. Preferably, write the answers in sequential order.

Q1. (A) Attempt any THREE **(3X4=12)**

(a) State the various types of indirect drive and mention at least one industrial application of each.

(b) State the principle of dielectric heating. State the nature of electric supply used for dielectric heating.

(c) Describe through illustrations the following types of lighting scheme: (i) Semi-direct (ii) Semi-indirect.

(d) State with reasons, best location of power factor improvement apparatus from consumer and electrical supply company point of view.

Q1. (B) Attempt any ONE **(1X6=06)**

(a) Describe the conditions for regenerative braking of DC series motors with the help of suitable diagram.

(b) State the various types of resistance welding. Describe with neat sketch the operation of any one type of resistance welding.

Q2. Attempt any FOUR **(4X4=16)**

(a) Enlist any two advantages and two disadvantages of group drives.

(b) State any two applications of each for the following types of electric heating

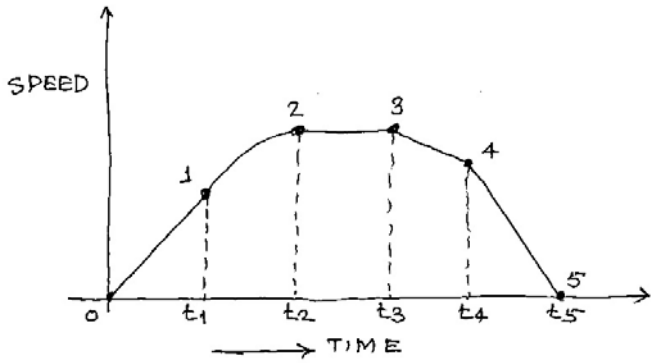
(i) Direct resistance heating

(ii) Indirect induction heating

(iii) Direct arc heating

(iv) Dielectric heating.

(c) Typical speed time curve of train running on main line is shown in Figure:



Redraw the diagram and name the given time periods:

(i) 0- t_1 (ii) t_1 - t_2 (iii) $t_2 - t_3$ (iv) $t_3 - t_4$

(d) Describe with schematic diagrams the steps involved in series parallel control of traction motors.

(e) Describe the steps involved in bridge transition method with suitable diagram.

Q3. Attempt any TWO **(2X8)=16**

(a) Describe the concept of following load cycle with their graphical representation:

(i) Continuous loading (ii) Short time loading (iii) Long time (intermittent) loading (iv) Continuous operation with short time loads.

(b) A 30 kW three phase, 400 V, resistance oven has nichrome strips 0.0254 mm thick for three, star connected heating elements. If wire temperature is to be 1100^0 C and that of charge to be 700^0C. Estimate suitable width for strip. Assume emissivity = 0.9 and radiating efficiency to be 0.5. Take specific resistance = 101.6×10^{-8} ohm-meter.

(c) State the types of enclosures to be used for electric drives in following industrial locations:

(i) Chemical plant (non explosive atmosphere)

(ii) Metal working machinery (non explosive)

(iii) Mines or other hazardous location

(iv) Outdoor installations

Justify your answers with suitable example.

Q4. (A) Attempt any THREE **(3X4=12)**

a) State the principle of arc welding and state any four applications of the same.

b) Define the following terms related to illumination systems:

i. Utilization factor

ii. Depreciation factor

iii. Space to height ratio

iv. Absorption factor

c) State the suitable tariff for following types of consumer:

i. Domestic consumer with single- phase upto load of 5 kW

ii. Commercial consumer with three-phase supply for load above 5 kW

iii. Agriculture consumer with three-phase supply upto 20 kW load for irrigation purpose.

iv. Large industrial consumers with load exceeding 100 kW

d) "Static capacitor is used for power factor improvement" Justify the statement with appropriate vector diagram.

Q4. (B) Attempt any ONE **(1X6=06)**

(i) State the factors to be considered while selecting the welding systems for a particular job. What are the ways and means of avoiding weld defects?

(ii) An industrial consumer having maximum demand of 100 kW maintains a load factor of 60%. The tariff rates are Rs. 1000/- per kVA of maximum demand per annum plus Rs.5/- per kWh of energy consumed. If the average power factor is 0.8 lagging. Calculate the total energy consumed per annum and annual electricity bill.

Q5. Attempt any FOUR **(4X4=16)**

(a) State any four salient features of sodium vapour lamp.

(b) "The arc has negative resistance characteristics" Justify the statement.

(c) Draw a neat labelled block diagram of AC electric locomotive. State the function of any four parts.

(d) Compare single-phase, 25kV, AC and 1500 V DC track electrification on the following basis:

(i) No. of substations and spacing between substations

(ii) Weight of overhead equipments

(iii) Erection and maintenance of overhead equipments

(iv) Capacity of substation.

(v) Inteference with communication lined.

(vi) Speed control of fraction motors.

(vii) Regenerative braking

(viii) Cost

(e) State why DC series motor is preferred for traction purpose. Justify your answer with characteristics.

Q6. Attempt any TWO (2X8=16)

(a) Describe with neat labeled diagram the working principle of Ajax Wyatt furnace. State its drawbacks.

(b) The trapezoidal time curve of train consists of: (i) Uniform acceleration of 6kmphps for 25 seconds. (ii) Free running for 10 minutes (iii) Uniform deceleration of 6kmphps to stop the train (iv) A stop time of 5 minutes.

Find the distance between the stations, average and scheduled speed.

(c) Derive the equation for most economical power factor. Find the most economical power factor when the tariff is Rs.100/- per kVA of maximum demand plus a flat rate per kWh. Assume additional cost of condensers of Rs.70/- per kvar. The rate interest and depreciation is together to be taken 11%.