Total No. of Questions : 12] **SEAT No. :**

P1407 **[Total No. of Pages : 3**

[4858] - 170

T.E. (Electrical) (Semester - II)

UTILIZATION OF ELECTRICAL ENERGY

(2008 Pattern)

Time :3 Hours] ***[Max. Marks :100***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Draw equivalent circuit of arc furnace. Derive the expression for power factor at maximum power. **[9]**

b) State the detail classification of electric heating. Describe each type in brief. **[9]**

OR

Q2) a) A single phase 2.5kW, 240 volt resistance oven uses nichrome wire as resistance heating element. The wire temperature is to be 1500ºC and that of charge is to be 450ºC. Calculate the length and diameter of wire. The resistivity of nichrome wire is 42.5 $\mu\Omega$ cm. Assume radiating efficiency as 1 and emissivity as 0.9. **[9]**

b) With suitable diagram explain ultrasonic welding. State its applications. **[9]**

Q3) a) With suitable diagram explain electroplating on non conducting materials. **[8]**

b) With suitable diagram explain reverse-forward operation of 3 phase induction motor using suitable control devices. **[8]**

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OR

Q4) a) Explain construction and working of pressure switch, thermostat. **[8]**

b) With suitable diagram explain electric circuit used in water cooler. **[8]**

Q5) a) Define following terms in case of illumination. **[8]**

i) Space to height ratio

ii) Depreciation factor

iii) Coefficient of utilization

iv) Solid angle

b) With suitable diagram explain construction and working of mercury vapour lamp. State its applications. **[8]**

OR

Q6) a) Give comparison between - Incamdescent lamp and gas discharge lamps. (minimum 4 points). **[8]**

b) A drawing hall of 30m × 13m is to be illuminated using 80 watt flourocent tubes. The luminuous efficiency of flourocent tube is 40 lumens/watt. The ceiling height is 5 meters. The required illumination is 120 lux. The coefficient of utilization is 0.5 and depreciation factor is 1.4. Find total number of flourocent tubes required and show their disposition in the plan. **[8]**

SECTION - II

Q7) a) Describe any two systems of track electrification. **[8]**

b) What is overhead catenary system? With suitable diagram explain construction of compound catenary system. **[8]**

OR

Q8) a) Compare steam engine drive and electric drive (minimum 8 points). **[8]**

b) With suitable diagram explain - side contact type and bottom contact type third rail system of current collection. **[8]**

Q9) a) With usual notations derive the expression for energy output from driving axle. **[8]**

b) A schedule speed of 45 kmph is required between two stops 1.5 km apart. Find the maximum speed over the run if the stop is of 20 second duration. The value of acceleration is 2.4 kmph ps and retardation is 3.2 kmph ps Assume trapezoidal speed time curve. **[8]**

OR

Q10) a) Draw trapezoidal speed-time curve and derive the expression for maximum speed in terms of total time of run, acceleration, retardation, maximum and average speed. **[8]**

b) Compare - urban, suburban, mainline traction service and draw speed-time curve for these type of services. **[8]**

Q11) a) With speed torque characteristics of DC series motor & DC shunt motor explain how DC series motor is best suited for parallel running. **[6]**

b) Explain any one electric circuit used for detecting track occupancy of train. **[6]**

c) Describe how AC series motor is suitable for traction work. **[6]**

OR

Q12) a) Explain regenerative braking in case of DC series motor. Describe clearly the modifications made in the circuit. **[6]**

b) State the importance of route relay inter lock. How it is achieved? **[6]**

c) With suitable diagram explain series-parallel control of two DC series motors. **[6]**