Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem. – II[nd] - Examination – June/July- 2011

Subject code: 1720711

Subject Name: Electrical Power Utilization

Date:01/07/2011 **Time: 10:30 am – 01:00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** What are the various methods of resistance heating? Describe each of them with sketches. **07**

(b) Explain working of a coreless type induction furnace. Mention the advantages of coreless induction furnace. **07**

Q.2 **(a)** Explain dielectric heating and its applications. **07**

(b) A 10 kW single phase 200 volt resistance oven has a circular nickel chrome wire for its heating elements. The final temperature is to be limited to 927^{o}C and temperature of the charge is to be 327^{o}C.Determine the length and size of the wire required. Assume (i) radiating efficiency 0.8 (ii) emissivity 0.9(iii) specific resistance of nickel chrome 100×10^{-6}ohm-cm. **07**

OR

(b) What is resistance welding? Explain butt welding with necessary diagrams. **07**

Q.3 **(a)** Discuss the merits and demerits of 25kV a.c. System over d.c.system. **07**

(b) A train with an electric locomotive weighing 400 tonnes is to be accelerated up a gradient of 1 in 100 at an acceleration of 1kmphps.If the train resistance is 75 Nw per tonne, Calculate Tractive effort produced by locomotive. Rotational inertia is 15% of the dead weight of the train. **07**

OR

Q.3 **(a)** Derive the relevant formulas of Quadrilateral speed-time curve of a traction system. **07**

(b) A train runs at an average speed of 50km/hr between stations situated 2.5 km apart. The train accelerates at 2 kmphps and retards at 3 kmphps. Find its maximum speed assuming a trapezoidal speed time curve. **07**

Q.4 **(a)** What do you mean by energy conservation? Explain working of a CFL with necessary diagram. **07**

(b) A 500 W lamp having MSCP of 800 is suspended 3 m above the working plane, Determine : **07**

(i) Illumination directly below the lamp at the working plane.

(ii) Illumination at a point 2.4 m away on the horizontal plane from vertically below the lamp.

OR

Q.4 **(a)** Discuss the working of filament type bulb with neat sketch. **07**

(b) It is required to provide an illumination of 100 m candle in a factory hall 40 m × 10 m. Assume that the depreciation factor is 0.8, co-efficient of utilization is 0.4 and efficiency of lamp is 14 lumens per watt. Calculate the number of lamps and their deposition. Assume 300 watt lamps are used. **07**

Q.5 **(a)** Explain working of a microwave oven in detail. **07**

(b) State and explain faraday's law of electrolysis. **07**

OR

Q.5 **(a)** Explain construction and working of vacuum cleaner. **07**

(b) What do you mean by air conditioning system? What are the main parts of air conditioning systems? Explain function of each part in brief. **07**

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