GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. Sem. - V - Examination – June- 2011
Subject code:150906
Subject Name: Electrical Power Utilization and Traction

Date:30/06/2011   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)	Explain different methods of controlling speed of three phase induction motors.	**07**
	(b)	Draw the speed –time curves of electric train for (i)City Service (ii)Suburban service (iii)Main line service and explain their characteristics.	**07**
Q.2	(a)	What do you understand by load equalization .Derive the expression for motor torque when load increases and decreases.	**07**
	(b)	A 25H.P,500V,4 pole ,50Hz cage induction motor with delta connected stator takes full load current of 30A and has a slip of 4%.The impedance per phase is 3.5 Ω .Calculate the starting torque and starting current taken from the supply if the motor is started by (i)direct Switching (ii)a Star-delta starter (iii)An auto-transformer with 70% tap.	**07**

OR

	(b)	Explain Types of enclosures used in electric motor.	**07**
Q.3	(a)	Define average speed ,crest speed and schedule speed and discuss the factors which affect schedule speed of a train	**07**
	(b)	An electric train has a schedule speed of 25 kmph between two stations 800 meters apart. The duration of station stop is 20sec ,the maximum speed is 20% higher than the average running speed and breaking retardation is 3 Kmphps. Calculate the rate of acceleration required to operate this service .Assume trapezoidal speed-time curve.	**07**

OR

Q.3	(a)	Drive on expression for specific energy output and specific energy consumption using a simplified speed-time curve and discuss the factors affectiong specific energy consumption.	**07**
	(b)	A 500-tonne goods train is to be hauled by a locomotive up a gradient of 1 in 40 with an acceleration of 1.5 kmphps . Determine the weight of the locomotive and number of axles if the axle load is not to exceed 24 tonnes .Co-efficient of adhesion is 0.31 and track resistance is 45 N/tone .Allow 10% for rotational inertia.	**07**

Q.4 (a) Explain dielectric heating .State applications of dielectric heating. **07**

(b) A 15KW 220V single phase resistance oven employs nickel chrome wire for its heating elements. If the wire temperature is not to exceed 1000° C and the temperature of the charge is to be 600° C ,calculate the diameter and length of wire .Assume radiating efficiency as 0.6 and emissivity as 0.9 and specific resistance of nickel chrome alloy as 1.016×10^{-6} Ω -m. **07**

OR

Q. 4 (a) Explain direct and indirect heating using arc furnace .Give equivalent circuit of arc furnace. **07**

(b) Describe with help of neat sketches various types of electric arc welding in detail. **07**

Q.5 (a) State and explain laws of illumination . **04**

(b) Explain the working of fluorescent tube with the help of circuit diagram **05**

(c) Discuss various factors to be considered while designing any lighting scheme. **05**

OR

Q.5 (a) State and explain Faraday's Law of electrolysis. **04**

(b) What is electroplating .Explain process of electroplating. **05**

(c) Explain electro-deposition process. **05**

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