Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: 150906 **Date: 08-12-2014**

Subject Name: Electrical Power Utilization and Traction

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)**	A 250 volt D.C. shunt motor has armature resistance of 0.25 ohm, on load it takes an armature current of 50 Amp and runs at 750 r.p.m. If the flux of motor is reduced by 10% without changing the load torque, find the new speed of the motor.	**07**
	(b)	What do you understand by load equalization? Derive the expression for motor torque when load increases and decreases.	**07**
Q.2	**(a)**	What is electroplating? Explain factors governing electroplating. Write three applications of electroplating.	**07**
	(b)	State and explain Faraday's laws of electrolysis. Explain power supply for electrolytic processes.	**07**
		OR	
	(b)	Explain in brief various methods of electrical braking used for induction motor.	**07**
Q.3	**(a)**	Explain principle and working of vertical core type furnace with diagram.	**07**
	(b)	A 30 KW, 400 volts resistance oven is to employ nickel chrome strip 0.025 cm thick for 3-Ø star connected heating elements. If wire temperature is 1100^0 C and that of charge is 700^0 C. Estimate suitable width for the strip. Assume emissivity (ϵ) = 0.9, radiating efficiency (η) = 0.6, Specific resistance of nickel chrome alloy is 1.03×10^{-6} Ω-m	**07**
		OR	
Q.3	**(a)**	Explain principle of electric arc welding. Write its types. Explain any two.	**07**
	(b)	What are the advantages of electrically produced heat?	**05**
		Explain principle of dielectric heating.	**02**
Q.4	**(a)**	Deduce the expression for the total tractive effort for propulsion of train considering acceleration, up and down the gradient, to overcome resistance.	**07**
	(b)	An electric train is to have acceleration and braking retardation of 0.8 km/h/s and 3.2 km/h/s respectively. If time for stops 26 sec. and ratio of maximum to average speed is 1.3, find schedule speed for a run of 1.5 km. Assume trapezoidal speed-time curve.	**07**
		OR	
Q.4	**(a)**	Explain different methods of speed control for DC series motor used as a traction motor.	**07**
	(b)	An electric train weighing 200 tonne has eight motors geared to driving wheel, each wheel is of 90 cm in diameter. Determine the torque developed by each motor to accelerate the train to a speed of 48 kmph in 30 seconds up a gradient of 1 in 200. The tractive resistance is of 5 newtons per tonne, the effect of rotational inertia is 10% of train weight, the gear ratio is 4 to 1 and gearing efficiency is 80%.	**07**

Q.5	**(a)**	Define crest speed and schedule speed.	**02**
		Discuss the factors which affect schedule speed of a train.	**05**
	(b)	State and explain laws of illumination.	**07**

OR

Q.5	**(a)**	Explain the principle of operation of HPMV (High pressure mercury vapour) lamp giving its neat sketch.	**07**
	(b)	Write different steps for design lighting scheme considering various parameters.	**07**

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