Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. - SEMESTER – VIII EXAMINATION – OCTOBER 2012

Subject code: 180902 **Date: 29/10/2012**

Subject Name: Electrical Power Utilization

Time: 02.30pm - 05.00pm **Total Marks: 70**

Instructions:

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

Q.1 **(a)** State the methods of speed control of three phase induction motor and explain any one method in detail. **07**

(b) A motor fitted with a flywheel supplies a load of torque 900 N-m for 2 seconds. During no-load period the flywheel regains its original speed. The motor torque is required to be limited to 450 N-m. Determine the moment of inertia of flywheel. The no-load speed of the motor is 500 r.p.m. and its full load slip is 10% **07**

Q.2 **(a)** Explain operation of an electrical drive in all the four quadrants **07**

(b) Explain Ward-Leonard system of speed control with diagram. Also state the advantages & disadvantages of this method **07**

OR

(b) Derive the following equation determining the radius of gyration of the flywheel used for the purpose of load equalization **07**

$$J = \frac{Tr}{w_0 - w_r} * \frac{t_h}{\log_e\left(\frac{T_{Lh} - T_{\min}}{T_{Lh} - T_{\max}}\right)}$$

Q.3 **(a)** Discuss 25KV AC traction drive employing transformer with Tap changer **07**

(b) A train is required to run between two stations 2 km apart at an average speed of 40 kmph. The run is to make to simplified quadrilateral speed-time curve. If the maximum speed is to be limited to 60 kmph, acceleration to 2 kmphps and coasting and braking retardations to 0.15 kmphps and 3 kmphps respectively, determine the duration of acceleration, coasting and braking periods. **07**

OR

Q.3 **(a)** Define average speed ,crest speed and schedule speed and discuss the factors which affect schedule speed of a train **07**

(b) A 220 tonne motor coach driven by four motors takes 18 seconds to attain a speed of 40kmph, starting from rest on an ascending gradient of 1 in 75.The gear ratio is 3.2, gear efficiency 90 %, wheel diameter 92 cm, train resistance 45 N/t and rotational inertia 8 % of the dead weight. Find the torque developed by each motor. **07**

Q.4 **(a)** Discuss the process of electric arc welding. **07**

(b) Explain dielectric heating **07**

OR

Q.4	**(a)**	Explain typical speed time curves related to traction	**07**
Q.4	**(b)**	Explain principle and working of a indirect core type furnace	**07**
Q.5	**(a)**	Compare incandescent lamp with gas discharge lamp.	**07**
	(b)	State and explain square law of illumination	**07**
		OR	
Q.5	**(a)**	Explain faraday's laws of electrolysis. Also explain current efficiency and energy efficiency	**07**
	(b)	The illumination of drawing office 30 m × 20 m is to have a value of 250 lux. If the utilization factor is 0.4 and depreciation factor is 0.85, determine the number and size of incandescent lams required. The efficiency of each lamp is 12 lumens per watt. The lamps are to be fitted at 5 m height.	**07**

****