Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2015

Subject Code:130904 **Date:11/06/2015**

Subject Name:Electrical Machine I

Time:02.30pm-05.00pm **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 Swineburne's test to determine efficiency of a DC machine. State its advantages as well as disadvantages.	07
	(b)	Clearly explain working principle of DC Generator and subsequently derive equation of generated emf.	07
Q.2	(a)	Explain critical resistance and critical speed with suitable diagram.	07
	(b)	A DC shunt generator delivers 190 A at a terminal voltage of 240 V. The armature resistance and shunt field resistance are 0.02 ohm and 60 ohm respectively. The core loss and mechanical losses amounts to 900 W. Calculate (A) Total cu loss (B) BHP of prime mover (C) overall, electrical and conversion efficiency.	07
		OR	
	(b)	A series motor of resistance 1 ohm between terminals runs at 900 rpm at 220 V with a current of 15 A. Find the speed at which it will run when connected in series with a 4 ohm resistance and taking a current of 10 A at the same supply voltage. Assume linear magnetism characteristics.	07
Q.3	(a)	Explain power stages with different losses and derive condition for maximum power developed for DC motor.	07
	(b)	What is meant by armature reaction? Describe its effects on the operation of DC machines and state methods to minimize it.	07
		OR	
Q.3	(a)	Derive the equivalent circuit of a single phase transformer and highlight its importance from analytical point of view.	07
	(b)	Explain short circuit and open circuit test in case of single phase transformer.	07
Q.4	(a)	Explain generation of rotating magnetic field in case of three phase induction motor.	07
	(b)	Compare cage and wound three phase induction motor with reference to construction, performance and applications.	07
		OR	
Q.4	(a)	The power input to a 3 phase, 50 Hz induction motor is 50 kW. The total stator loss is 800 W. Find the total mechanical power developed and the rotor copper losses per phase, if it is observed that the rotor emf makes 90 complete cycles per minute.	07
	(b)	Define voltage regulation of an alternator Explain the synchronous impedance method of determining regulation of an alternator.	07
Q.5	(a)	Derive EMF equation of alternator and explain coil span factor and distribution factor.	07

(b) Define Voltage regulation of alternator. State various methods to find voltage regulation and Explain any one method in detail. **07**

OR

Q.5 (a) Explain synchronization of alternators. Which conditions must be satisfied for proper synchronization of 3-phase alternators? **07**

(b) Deduce e.m.f. equation of a Transformer. **07**

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