Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2152001 **Date:17/12/ 2015**

Subject Name: Electro Mechanical Energy Conversion

Time:10:30am to 1:00pm **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)**	What is electromagnetic energy conversion? Define (1)Magnetic flux (2) Magnetic flux density (3) Self inductance (4) Mutual Inductance (5) Generated EMF (6) Induced EMF	**07**
	(b)	Derive the dynamical equation of electro mechanical system.	**07**
Q.2	**(a)**	The stator of a 3-phase, 8-pole alternator has 144 slots and are 2 conductors per slot connected in two layers and conductors of each phase are connected in series. If speed is 750 rpm, calculate EMF induced per phase flux in the air-gap is 20 mWb/pole sinusoidally distributed. Assume coil span 150° electrical.	**07**
	(b)	Define: Magnetization. Explain the methods of analysis of ferromagnetic circuits.	**07**
		OR	
	(b)	Explain with usual expression Faraday's and Lenz's law.	**07**
Q.3	**(a)**	Explain the working principle of DC generator. Also derive EMF equation of DC generator.	**07**
	(b)	The star-connected rotor of an induction motor has a standstill impedance of (0.2+j2) ohm per phase and the rheostat impedance per phase is (3+j) ohm. The motor has an induced EMF of 40 V between slip rings at standstill when connected to its normal supply voltage. Find: (1) The rotor current and power factor at standstill when the rheostat in the circuit. (2) The rotor current and power factor when the slip rings are short-circuited and the motor is running with a slip of 3%	**07**
		OR	
Q.3	**(a)**	Explain the basic principle of DC motor. Derive its torque equation.	**07**
	(b)	Explain with the help of suitable diagrams, how rotating magnetic field is produced in 3-phase induction motor.	**07**
Q.4	**(a)**	Define: Hysteresis, Hysteresis loop and eddy current. Explain the hysteresis and eddy current losses.	**07**
	(b)	Drawing suitable diagram and explain doubly excited magnetic field system.	**07**
		OR	
Q.4	**(a)**	Explain the methods of starting of synchronous motor.	**07**
	(b)	Explain the universal motor and repulsion motor.	**07**
Q.5	**(a)**	Explain AC and DC servo motors.	**07**
	(b)	Why single phase induction motor not self starting? Explain double field revolving theory.	**07**
		OR	
Q.5	**(a)**	List out the starting methods of single phase induction motor. Explain the shaded pole motor with its application.	**07**
	(b)	Explain the operating principle and construction of stepper motor also list out its types.	**07**

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