Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III(NEW) EXAMINATION – WINTER 2022

Subject Code:3132407 Date:27-02-2023

Subject Name:Electrical Machines and Applications

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	(a)	Explain the basic principle of operation of synchronous motor.	**03**
	(b)	Derive EMF equation of single-phase transformer.	**04**
	(c)	Explain double-field revolving theory of single-phase induction motor with necessary diagrams.	**07**
Q.2	(a)	Discuss function of yoke, pole core & pole shoes and commutator in DC generator.	**03**
	(b)	Explain the torque-slip characteristics of three-phase induction motor.	**04**
	(c)	Explain three-point starter for DC shunt motor with neat sketch.	**07**
		OR	
	(c)	Explain characteristics of separately excited DC generator.	**07**
Q.3	(a)	Explain characteristics of DC series motor.	**03**
	(b)	Derive EMF equation of DC generator.	**04**
	(c)	Explain open circuit and short circuit test of single-phase transformer with necessary diagrams.	**07**
		OR	
Q.3	(a)	Explain the phenomena of armature reaction in DC generator.	**03**
	(b)	Derive the equation of armature torque for DC motor.	**04**
	(c)	Discuss the Scott connection of transformers.	**07**
Q.4	(a)	Draw the vector diagram of single-phase transformer with R, L and C load considering effect of armature resistance but no magnetic leakage.	**03**
	(b)	Prove that the core losses in the transformer remains constant under all load conditions.	**04**
	(c)	Define voltage regulation of an alternator. Explain the Rothert's MMF method for determining voltage regulation of an alternator.	**07**
		OR	
Q.4	(a)	Explain working of auto-transformer with necessary diagram.	**03**
	(b)	List and explain the conditions for parallel operation of single-phase transformer.	**04**
	(c)	Define voltage regulation of an alternator. Explain the ZPF method for determining voltage regulation of an alternator.	**07**
Q.5	(a)	List advantages and disadvantages of polyphase induction motor.	**03**
	(b)	Derive equation for starting torque of three-phase induction motor.	**04**
	(c)	Write technical note on: Stepper motor.	**07**
		OR	
Q.5	(a)	Explain DOL starter of three-phase induction motor.	**03**
	(b)	Determine the condition of maximum torque under running conditions for three-phase induction motor.	**04**
	(c)	Write technical note on: Linear Induction Motor.	**07**

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