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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**

Course Code: 22EE3PCTIM **Max Marks: 100**

Course: Transformers & Induction Machines

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Briefly explain the construction, principle of operation and Derive e.m.f equation of a single phase transformer.	CO1	PO2	**10**
	b)	With neat circuit diagram and equations, explain open and short circuit Test.	CO1	PO2	**10**
		OR			
2	a)	With neat circuit diagram and equations, explain sumpner's Test.	CO1	PO2	**10**
	b)	Derive an expression for the saving of copper effected by using an auto transformer instead of a two winding transformer.	CO1	PO2	**10**
		UNIT - II			
3	a)	With neat circuit diagram and equation, explain parallel operation of a single phase transformer with necessary conditions for equal voltage ratio.	CO2	PO2	**10**
	b)	A three phase step down transformer is connected to 6600 volts mains and takes 10A. Determine the secondary line voltage, Line current and output for the following connections. i) Delta – Delta ii) Star – Star. Take turns ratio as 12.	CO2	PO2	**10**
		OR			
4	a)	With circuit diagram and phasor diagram explain open delta connection. Obtain the relationship between power transferred by V-V connected with that of Δ- Δ connected transformers	CO2	PO2	**10**
	b)	With the help of circuit and Phasor diagram, explain how 2-phase supply can be obtained from 3-phase supply using Scott connection?	CO2	PO2	**10**
		UNIT - III			
5	a)	Draw and explain the phasor diagram and equivalent circuit of three phase induction motor.	CO3	PO2	**10**

		b)	A 6 pole, three phase, 50Hz induction motor running on full load with 4% slip develops a torque of 149.3Nm, at its pulley rim. The friction and windage losses are 200W and stator copper and iron losses equal to 1620W. Determine i) output power ii) Gross torque iii) Rotor copper loss iv) Efficiency.	*CO3*	*PO2*	**10**
			OR			
	6	a)	Derive the torque equation of a three phase induction motor.	*CO3*	*PO2*	**07**
		b)	A three phase, 400V, 50Hz, 4 pole induction motor has star connected stator winding. The rotor resistance and reactance are 0.1 Ω and 1 Ω respectively. The full load speed is 1440 rpm. Determine the torque developed on full load by the motor. Assume stator to rotor ratio as 2:1.	*CO3*	*PO2*	**07**
		c)	Derive the condition for maximum torque.	*CO3*	*PO2*	**06**
			UNIT - IV			
	7	a)	With neat circuit diagram, explain the necessity of conducting No-load and blocked rotor test on three phase induction motor. Also mention the mathematical relation.	*CO3*	*PO2*	**10**
		b)	What is the necessity of starter in a three-phase induction motor? With neat circuit diagram explain star-delta starter.	*CO3*	*PO2*	**10**
			OR			
	8	a)	Explain the following 1. speed control of 3-phase Induction motor by changing poles 2. DOL starter to start 3-phase Induction motor	*CO3*	*PO2*	**10**
		b)	Draw the connection diagram of the star-delta starter for a three-phase induction motor. Give an expression for the ratio of starting torque to full load torque with star delta starter.	*CO3*	*PO2*	**06**
		c)	What are the parameters on which speed of a three-phase induction motor depends upon? List different methods of speed control of three phase induction motors	*CO3*	*PO2*	**04**
			UNIT - V			
	9	a)	Why single-phase induction motor is not self-starting. Explain double revolving theory of single-phase induction motor.	*CO4*	*PO2*	**10**
		b)	With neat sketch, explain working of single-phase capacitor start and capacitor run induction motor.	*CO4*	*PO2*	**10**
			OR			
	10	a)	Explain the principle of operation of a single-phase IM using double revolving field theory.	*CO4*	*PO2*	**10**
		b)	With a neat diagram, explain the working of shaded pole and Reluctance start single phase IM.	*CO4*	*PO2*	**10**

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