Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Third Semester

Electrical and Electronics Engineering

EE3303 - Electrical Machines - I

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Discuss the reason for torque production inside an electromechanical system.	L2	1	2
2.	Indicate the relationship among flux, MMF, and reluctance in a magnetic path.	L2	1	2
3.	Mention the essential parts involved in the construction of a DC generator.	L1	2	2
4.	State the reason for using compensating winding during armature reaction.	L1	2	2
5.	Recall the function of a starter during initial energization of a DC motor.	L1	3	2
6.	List the types of speed control methods commonly used in DC motors.	L1	3	2
7.	Indicate the EMF relationship connecting the turns ratio and voltage ratio of a transformer.	L2	4	2
8.	Draw an equivalent circuit of a single-phase transformer.	L1	4	2
9.	Compare the constructional differences between auto transformer and two-winding transformer.	L2	5	2
10.	Indicate the role of star and delta configurations in voltage transformation.	L2	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		Explain the relationship among magnetic energy, co-energy, and torque development in singly-excited magnetic systems using conceptual reasoning and neat sketches.	L2	1	16
			Or			
	b		Illustrate the energy balance principle of an electromechanical system, showing mechanical output, electrical input, and field losses.	L2	1	16
12.	a	i	Apply the EMF equation to determine generated voltage for a lap-wound generator given the speed, flux, and number of conductors.	L3	2	8
		ii	Apply the concept of armature reaction in DC generator operation in detail.	L3	2	8
			Or			
	b		Employ open-circuit characteristics to estimate residual magnetism and critical speed for self-excitation of a shunt generator and mention its importance.	L3	2	16

13.	a		Compare the performance of DC series and shunt motors with respect to torque-speed characteristics and their suitability for traction applications.	L4	3	16
			Or			
	b		Analyze the effect of sudden load increase on armature current, back emf, and developed torque, assuming constant field excitation in a DC motor, in detail.	L4	3	16
14.	a	i	Determine voltage regulation for a 5 kVA, 230/115 V transformer having R = 0.2 Ω, X = 0.5 Ω at 0.8 power factor lagging.	L3	4	8
		ii	Examine the effect of harmonics in supply voltage on core excitation current and the resulting deterioration in efficiency.	L4	4	8
			Or			
	b	i	Analyse daily energy output to determine all-day efficiency using given load curve data for a distribution transformer.	L4	4	8
		ii	Determine the all-day efficiency of a 10 kVA distribution transformer operating 6 hours at full load, 10 hours at half load, and 8 hours at no load, given iron loss = 200 W and full-load copper loss = 300 W.	L3	4	8
15.	a		Analyze the copper saving percentage achieved by an autotransformer compared with an equivalent two-winding transformer using ratio-based derivation with necessary diagrams.	L4	5	16
			Or			
	b		Compare the advantages and drawbacks of using an autotransformer in distribution and laboratory applications, emphasizing voltage stability and isolation.	L4	5	16