CLASS: BTECH
BRANCH: EEE

SEMESTER : IV
SESSION : SP2023

SUBJECT: EE251 DC MACHINES AND TRANSFORMER

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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Q1	(a)	While drawing a phasor diagram of an ideal transformer, the flux vector is drawn 90° out of phase (lagging) to the supply voltage. Why?	[2]	1, 2, 3	2
	(b)	A power transformer has 1000 primary turns and 100 secondary turns. The cross-sectional area of the core is 6 sq. cm, and the maximum flux density while in operation is 10 000 Gauss. Calculate turns per volt for the primary and secondary windings.	[3]	1, 2, 3, 4, 5	4
Q2	(a)	Even at no-load, a transformer draws current from the mains. Why?	[2]	1, 2, 3, 5	2
	(b)	Explain, "The main flux in a transformer remains practically invariable under all load conditions."	[3]	1, 2	2
Q3		When OC Test and SC Test were performed on a 50 kVA transformer, the following results were obtained: Open circuit tests: Primary voltage 3300 V, Secondary voltage 415 V, Power 430 W Short circuit test: Primary voltage 124 V, Primary current 15.3 A, Primary Power 525 W Secondary Current full load value. Calculate: (a) The efficiency at full-load and at half-load for 0.7 power factor. (b) The voltage regulation for power factor 0.7: (i) lagging, (ii) leading (c) The secondary terminal voltages corresponding to (i) and (ii).	[5]	1, 2, 3, 4, 5	4
Q4	(a)	What is the difference between a 3-phase transformer bank and a 3-phase transformer unit? What are the advantages of a three-phase unit transformer over three single-phase transformer bank of the same kVA rating?	[2]	1, 2, 3, 5	2
	(b)	What is meant by three-phase transformer groups? What are the possible connections for a 3-phase transformer bank?	[3]	1, 2, 3, 5	1
Q5	(a)	What are the conditions for satisfactory parallel operation of a 3-phase transformer?	[2]	1, 2, 5	1
	(b)	A load of 500 A, at 0·8 power (lagging), at a terminal voltage of 400 V, is supplied by two transformers that are connected in parallel. The equivalent impedances of the two transformers, referred to the secondary sides, are (2 + j3) ohm and (2.5 + j5) ohm, respectively. Calculate the current and kVA supplied by each transformer and the power factor at which they operate.	[3]	1, 2, 3, 4, 5	4

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