

CLASS: BTECH BRANCH: EEE

SUBJECT: EE251 DC MACHINES AND TRANSFORMER

SEMESTER: IV SESSION: SP2023

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

While drawing a phasor diagram of an ideal transformer, the flux vector is drawn 90° [2] 1, 2, 2 out of phase (lagging) to the supply voltage. Why?  (b) A power transformer has 1000 primary turns and 100 secondary turns. The crosssectional 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.  Q2 (d) Even at no-load, a transformer draws current from the mains. Why?  [2] 1, 2, 2, 3, 5  (b) Explain, "The main flux in a transformer remains practically invariable under all load conditions."  Q3 When OC Test and SC Test were performed on a 50 kVA transformer, the following results were obtained:  Q6 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 the secondary terminal voltages corresponding to (i) and (ii).						
(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.  Q2 (d) Even at no-load, a transformer draws current from the mains. Why?  Explain, "The main flux in a transformer remains practically invariable under all load conditions."  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 tests: 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 the voltage regulation for power factor 0.7; (i) lagging, (ii) leading that 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?  (b) What is meant by three-phase transformer groups? What are the possible connections for a 3-phase transformer bank?  Q5 (d) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q6 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q7 (a) What is a connected in parallel. The equivalent impedances of the two transformers, referred to the secondary sides, are (2 + 13) ohm and (2.5 + 15) ohm, respectively. Calculate the current and kVA supplied by each transformer and the	Q1	1(21)	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]		BL 2
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.  The voltage regulation for power factor 0.7: (i) lagging, (ii) leading with the secondary terminal voltages corresponding to (i) and (ii).  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?  (b) What is meant by three-phase transformer groups? What are the possible connections for a 3-phase transformer bank?  Q5 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q6 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q7 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q8 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What are the conditions for satisfactor		(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	[3]	3, 4,	4
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.  The voltage regulation for power factor 0.7: (i) lagging, (ii) leading of 10.7 power factor.  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?  (b) What is meant by three-phase transformer groups? What are the possible connections for a 3-phase transformer bank?  Q5 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q6 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q7 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q8 (a) What are the conditions for satisfactory parallel. The equivalent impedances of the 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	Q2	-Ja)	Even at no-load, a transformer draws current from the mains. Why?	[2]		2
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.  The voltage regulation for power factor 0.7: (i) lagging, (ii) leading  The secondary terminal voltages corresponding to (i) and (ii).  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?  (b) What is meant by three-phase transformer groups? What are the possible connections for a 3-phase transformer bank?  Q5 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q6 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q7 (a) What is meant by three-phase transformer groups? What are the possible connections for a 3-phase transformer bank?  Q8 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  Q9 (a) What is the difference between a 3-phase transformer?  Q9 (b) What is the difference between a 3-phase transformer?  Q1 1, 2, 1  Q2 (a) What is the difference between a 3-phase transformer?  Q9 (b) What is the difference between a 3-phase transformer?  Q9 (b) What is the difference between a 3-phase transformer?  Q9 (a) What is the difference between a 3-phase transformer  Q9 (b) What is the difference between a 3-phase transformer  Q9 (c) The voltage regulation for power factor 0.7: (i) lagging, (ii) leading  Q9 (ii		(61)		[3]		2
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. The voltage regulation for power factor 0.7: (i) lagging, (ii) leading The secondary terminal voltages corresponding to (i) and (ii).  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? (b) What is meant by three-phase transformer groups? What are the possible connections for a 3-phase transformer bank?  Q5 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  [2] 1, 2, 2  3, 5  Q5 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  [2] 1, 2, 1  [3] 1, 2, 1  [4] 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	Q3			[5]		4
Q4 (a) What is the difference between a 3-phase transformer bank and a 3-phase transformer [2] 1, 2, 2 unit? What are the advantages of a three-phase unit transformer over three single-phase transformer bank of the same kVA rating?  (b) What is meant by three-phase transformer groups? What are the possible connections [3] 1, 2, 1 for a 3-phase transformer bank?  Q5 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  [2] 1, 2, 1			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			
unit? What are the advantages of a three-phase unit transformer over three single-phase transformer bank of the same kVA rating?  (b) What is meant by three-phase transformer groups? What are the possible connections [3] 1, 2, 1 for a 3-phase transformer bank?  (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  (b) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  (c) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  (d) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  (d) What are the conditions for satisfactory parallel operation of a 3-phase transformer?  (d) 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			(i) The secondary terminal voltages corresponding to (i) and (ii).			
(b) What is meant by three-phase transformer groups? What are the possible connections [3] 1, 2, 1 for a 3-phase transformer bank? 3, 5  Q5 (a) What are the conditions for satisfactory parallel operation of a 3-phase transformer? [2] 1, 2, 1 5  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	Q4	(8)	unit? What are the advantages of a three-phase unit transformer over three single-	[2]		2
A load of 500 A, at 0.8 power (lagging), at a terminal voltage of 400 V, is supplied by [3] 1, 2, 4 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		(b)	What is meant by three-phase transformer groups? What are the possible connections	[3]		1
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	Q5	10)	What are the conditions for satisfactory parallel operation of a 3-phase transformer?	[2]	200000000000000000000000000000000000000	1
		(2)	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	[3]	1, 2, 3, 4,	4

:::::21/02/2023:::::M