

**BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)**

II - B.Tech I-Semester Regular Examinations (BR23), November - 2024

DC MACHINES & TRANSFORMERS (EEE)

Time: 3 hours

Max. Marks: 70

Question Paper consists of Part-A and Part-B

*Answer ALL the question in **Part-A and Part-B***

PART-A (10X2 = 20M)

		Marks	CO	BL
1. a)	Distinguish between Lap and wave windings?	(2M)	CO1	BL4
b)	Explain the Purpose of interpole in a D.C Generator?	(2M)	CO1	BL2
c)	State and Explain Flemings Left Hand Rule?	(2M)	CO2	BL2
d)	Draw the Electrical and Mechanical Characteristics of DC motor?	(2M)	CO2	BL1
e)	Why are breathers used in transformers?	(2M)	CO3	BL1
f)	What is meant by Sumpner's test?	(2M)	CO3	BL1
g)	Why transformers are rated in KVA?	(2M)	CO4	BL1
h)	A 1100/400 V, 50 Hz single phase transformer has 100 turns on the secondary winding. Calculate the number of turns on its primary?	(2M)	CO4	BL2
i)	What is a 3-Phase Transformer?	(2M)	CO5	BL1
j)	What advantage has the star connection over the deltaconnection	(2M)	CO5	BL1

PART-B (5X10 = 50M)

2a.	What is armature reaction in DC machines? How it affects the main flux distribution and how can armature reaction be reduced?	5(M)	CO1	BL1
b.	Explain the operating characteristics of D.C Shunt Generator with relevant equations.	5(M)	CO1	BL2
(OR)				
3a.	Derive the expression for generated e.m.f in DC generator.	4(M)	CO1	BL2
b.	A long shunt compound generator supplies a load at 250V. The load consists of five motors each drawing 60A and a lighting load of 250 lamps at 100W each. The armature, series field and shunt field resistances are 0.01, 0.02 and 75Ω respectively. Find (i) load current (ii) armature current (iii) emf generated.	6(M)	CO1	BL3

4a.	Why a starter is required to start a DC motor? Explain the working of three point starter with neat sketch.	5(M)	CO2	BL1
b.	A 230 V D. C Shunt motor is taking 5 A when running at no load. The armature resistance (including brushes) is 0.2 Ω and field circuit resistance is 115 Ω. For an input current of 72 A, calculate the shaft output and efficiency. Also the armature current at which the efficiency is maximum	5(M)	CO2	BL3
(OR)				
5a.	With suitable diagram, how the Swinburne's test can be employed to predetermine the efficiency at full load condition when running as a generator.	5(M)	CO2	BL2
b.	With the help of speed-armature current characteristics, explain why the series motors	5(M)	CO2	BL2

	should not be started without any load.			
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6a.	Explain the working of a transformer on no-load and load condition.	5(M)	CO3	BL2
b.	The test results of 2.5kVA, 230/115V single-phase transformer are as follows: OC Test : 115V, 1.2A, 60W SC Test: 12V, 10.86A. 120W Find i) efficiency at 50% full load, 0.8 pf ii) regulation at 30% full load, 0.8 pf lag and lead	5(M)	CO3	BL3
(OR)				
7a.	From the fundamentals, Obtain the equivalent circuit of a single phase transformer?	5(M)	CO3	BL2
b.	A 2200/220 V, single phase transformer has maximum possible voltage regulation of 6% and it occurs at a p.f. of 0.3. Find the load voltage at full-load 0.8 p.f lead.	5(M)	CO3	BL3

8a.	Explain Sumpner's method of testing transformers. Mention its advantages.	5(M)	CO4	BL2
b.	A Single-phase transformer is connected to a 230 V, 50 Hz supply. The net cross-sectional area of the core is 60 cm ² . The number of turns in the primary is 500 and in the secondary 100. Determine: i) Transformation ratio. ii) Maximum value of flux density in the core.	5(M)	CO4	BL3
(OR)				
9a.	Define all day efficiency. How this efficiency of a transformer varies with load?	5(M)	CO4	BL1
b.	The test results of 2.5kVA, 230/115V single-phase transformer are as follows: OC Test : 115V, 1.2A, 60W SC Test: 12V, 10.86A. 120W Find i) efficiency at 50% full load, 0.8 pf ii) regulation at 30% full load, 0.8 pf lag and lead	5(M)	CO4	BL3

10a	Explain the working of Off-Load tap changing transformer with help of neat diagram.	5(M)	CO5	BL2
b.	In Scott connection prove that the 3-phase currents will be balanced if the 2- phase currents are balanced. Assume unity power factor load.	5(M)	CO5	BL2
(OR)				
11a	What are the necessary and desirable conditions for successful parallel operation of two single phase transformers?	5(M)	CO5	BL1
b.	What is vector grouping? Name the vector groups commonly used in three phase transformers?	5(M)	CO5	BL1
