SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Regular & Supplementary Examinations November-2025

DC MACHINES & TRANSFORMERS
(Electrical & Electronics Engineering)

Time: 3 Hours   **Max. Marks: 70**

PART-A
(Answer all the Questions 10 x 2 = 20 Marks)

1	a	What is meant by armature reaction?	CO1	L1	2M
	b	Compare lap winding and wave winding used for DC machine armature.	CO1	L4	2M
	c	What are the losses occurring in DC motor?	CO2	L1	2M
	d	What is the significance of back emf?	CO2	L1	2M
	e	Draw the typical equivalent circuit of a single-phase transformer.	CO3	L2	2M
	f	State the losses which occur in a transformer.	CO3	L1	2M
	g	Why short circuit test on a transformer performed on HV side?	CO4	L4	2M
	h	What is Sumpner's test?	CO4	L1	2M
	i	What are the conditions for parallel operation of 3-phase transformers?	CO5	L1	2M
	j	Mention the transients in switching of on-load and off-load tap changers.	CO5	L2	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		Explain the effect of armature reaction in a DC generator. Discuss the effect of armature reaction and give the remedial measures.	CO1	L4	10M

OR

3	a	What is a back emf in dc motor? Write down the significance of Back E.M.F. in a DC motor.	CO1	L5	5M
	b	A 220V shunt motor takes a total current of 20A. The shunt field and armature resistances are 200Ω and 0.3Ω respectively. Determine (i) Value of back emf (ii) Gross mechanical power in the armature.	CO1	L4	5M

UNIT-II

4	a	Explain the characteristic of DC Compound Motor.	CO2	L2	5M
	b	A shunt generator has a full-load current of 195A at 250V. The stray losses are 750W and the shunt field resistance is 50Ω. It has a full-load efficiency of 90%. Find the armature resistance. Also find the current corresponding to maximum efficiency.	CO2	L3	5M

OR

5		What is the necessity of starter? Draw the diagram of a 3point starter and explain.	CO2	L4	10M

UNIT-III

6	a	Derive the condition for maximum efficiency of a Transformer.	CO3	L4	5M
	b	A 25kVA, 400/200V, single phase 50Hz transformer has iron loss of 300W. The copper loss is found to be 100W. Determine (i) Efficiency when delivering full-load current at 0.8 lagging pf. (ii) The % of full load when efficiency will be maximum.	CO3	L2	5M

OR

7	a	Derive the E.M.F equation of single phase transformer.	CO3	L4	5M
	b	A 500kVA, 11000V/400V, 50Hz single phase transformer has 100 turns on the secondary winding, calculate: i) The approximate no. of turns in the primary winding. ii) The approximate value of primary and secondary currents. iii) The maximum value of flux in the core.	CO3	L5	5M

UNIT-IV

8	a	Deduce an expression for the load shared by the two transformers with equal voltage ratios.	CO4	L4	5M
	b	Two single phase transformers with equal turns have impedance of (0.5+j3) ohm and (0.6+j10) ohm with respect to the secondary. If they operate in parallel determine how they will share the total load of 100KW at PF 0.8 lagging.	CO4	L3	5M

OR

9		Derive an expression for saving in conductor material in an autotransformer over two winding transformers of equal rating. State its merits and de-merits.	CO4	L4	10M

UNIT-V

10	a	Explain star-delta connection of transformer with sketch.	CO5	L2	5M
	b	A 3Phase step down transformer takes 15A when connected to 4400V mains, the turns ratio per phase is 10. Neglecting losses find the secondary line voltage, line current and output power. If the windings are connected in star-delta.	CO5	L1	5M

OR

11	a	Explain star-star connection of transformer with diagram.	CO5	L4	5M
	b	List the advantages and dis-advantages of star-star connection of transformer.	CO5	L4	5M

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