Hall Ticket Number:

Code No. : 14367 AS N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.E.E.) IV-Semester Advanced Suppl. Examinations, Aug./Sept.-2023

DC Machines and Transformers

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Draw the B-H curve for different magnetic materials.	2	3	1	1,2,3
2.	What is a doubly-excited magnetic system? Mention two examples.	2	1	1	1,2,3
3.	Write the operating principle of DC generator and give the classification based on excitation.	2	1	2	1,2,3
4.	Derive the EMF equation of DC generator	2	1	2	1,2,3
5.	Draw the speed-torque characteristics of DC shunt and series motors.	2	3	3	1,2,3
6.	List the types of tests on DC machine to find the efficiency of it.	2	1	3	1,2,3
7.	Draw the vector diagram of an ideal transformer with RL load	2	3	4	1,2,3
8.	Write the necessary conditions for the parallel operation of the transformers.	2	1	4	1,2,3
9.	Explain the working of On-Load & Off-Load tap changing.	2	2	5	1,2,3
10.	List the different vector groups in the 3-phase transformers.	2	1	5	1,2,3
	Part-B (5 × 8 = 40 Marks)				
11. a)	Draw the magnetic field created by the permanent magnet and Electromagnet, also explain the properties of magnetic field;	4	3	1	1,2,3
b)	An iron ring mean length of 50 cm, and relative permeability 300 has an air gap of 1mm. if the ring is provided with winding of 400 turns and a current of 2.5 ampere is allowed to flow through, find the flux density across the air gap.	4	4	1	1,2,3
12. a)	Explain about the armature reaction, demagnetizing Ampere turns/pole and cross magnetizing ampere turns /pole.	4	2	2	1,2,3
b)	In a DC compound generator the armature, shunt-field winding and series field winding resistances are given by 0.6 ohm, 150 ohms and 0.3 ohms respectively. The machine is connected to a load of 15 kW, 200 V. Calculate the i) EMF generated ii) armature current iii) current in shunt field circuit and iv) power generated by armature when the machine is connected in Long shunt mode.	4	4	2	1,2,3

Contd... 2

Code No. : 14367 AS N/O

13. a)	Explain the principle of torque production in a dc motor and derive an expression for it.	4	2	3	1,2,3
b)	A 500V, DC shunt motor has a no-load speed of 1200rpm, the line current being 5A. When fully loaded, the line current is 30A. If the shunt field resistance is 250 ohms, and the armature resistance is 1.1ohms, calculate the full-load speed	4	4	3	1,2,3
14. a)	Draw the equivalent circuit of transformer without any approximations, equivalent circuit referred to primary side of 1-phase transformer also mention the terms in the equivalent circuit.	4	3	4	1,2,3
b)	A 5KVA, 1000/200 V, 50 Hz single phase transformer gave the following test results: Open circuit test (LV side): 200 V, 1.2 A, 90 W Short circuit test (HV side): 25 V, 2.5 A, 30 W Compute the parameters of approximate equivalent circuit referred to HV side, and calculate the efficiency of the transformer at full load with power factor 0.9 lagging	4	4	4	1,2,3
15. a)	With a neat circuit diagram, explain how a two-phase supply can be obtained from a three phase supply.	4	2	5	1,2,3
b)	An autotransformer is used to step down the voltage level from 230V to 200V. Find-the current in different sections of the winding when the load is 20kW at unity power factor (UPF). Neglect losses and magnetizing current	4	4	5	1,2,3
16. a)	Show that the field energy in a linear magnetic system can be given as $Wf = Li^2/2 = \varphi I/2$	4	2	1	1,2,3
b)	With a neat sketch explain the construction of DC machine.	4	2	2	1,2,3
17.	Answer any ***two*** of the following:				
a)	With a neat sketch explain the working of 3-point starter.	4	2	3	1,2,3
b)	Define the following terms of transformer: i) Efficiency ii) All-day efficiency iii) Voltage regulation iv) Turns ratio	4	1	4	1,2,3
c)	Explain Ydl1 and Dyl grouping of transformers with neat circuit and vector diagrams.	4	2	5	1,2,3

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	37.5%
iii)	Blooms Taxonomy Level – 3 & 4	42.5%

*****