Hall Ticket Number:

Code No. : 14347

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

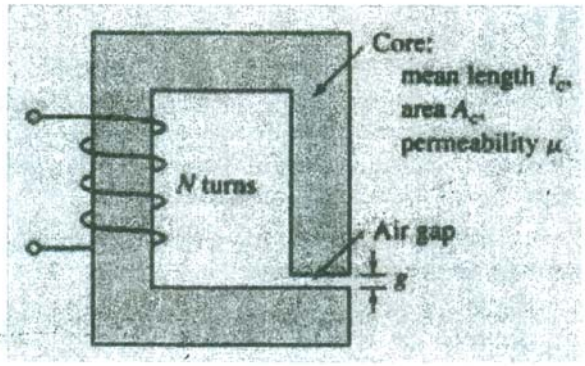
B.E. (E.E.E.) IV-Semester Main & Backlog Examinations, July-2022

DC Machines & 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.	What is hysteresis loss? Mention the method to minimize the hysteresis loss?	2	1	1	1,2
2.	Define Co-energy and energy in electromechanical system?	2	1	1	1,2
3.	Distinguish between progressive and retrogressive winding?	2	4	2	1,2
4.	Show that EMF generated in cumulative compound generator is higher in long shunt than short shunt for same terminal voltage.	2	2	2	1,2
5.	Distinguish between armature resistance control and field resistance control while controlling the speed of dc shunt motor?	2	4	3	1,2
6.	Why is the starting current in dc motor very high?	2	1	3	1,2
7.	Define All day efficiency and how it differ from the normal efficiency of the transformer.	2	1	4	1,2
8.	What is voltage regulation of transformer and draw phasor diagram for leading load operation on ideal transformer?	2	1	4	1,2
9.	Compare between auto-transformer and two winding transformer?	2	1	5	1,2
10.	Explain the concept of on-load tap changer.	2	2	5	1,2
	Part-B (5 × 8 = 40 Marks)				
11. a)	Define the following (a) Magnetic flux density and MMF (b) Reluctant and Permeance.	4	1	1	1,2
b)	A magnetic circuit with a single air gap is shown in the figure 1. The core dimensions are: Cross-sectional area $A_c = 1.8 \times 10^{-3}$ m^2, Mean core length lc = 0.6 m, Gap length g = 2.3 x 10^{-3} m, N = 83 turn. Assume that the core is of infinite permeability and neglect the effects of fringing fields at the air gap and leakage flux.  Figure 1 Calculate (a) Reluctance of the core Re and that of the gap Rg. For a current of i = 1.5 A. (b) Total flux ϕ	4	4	1	1,2

Contd... 2

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12. a)	Give the detail classification of DC machine and draw the cross sectional view of the DC machine.	3	2	2	1,2
b)	A six pole DC generator has 150 slots and each slot has 8 conductor with resistance of each conductor is .015Ω. The armature current is 20A. Calculate current per conductor and drop in armature for wave and lap winding connection?	5	4	2	1,2
13. a)	With a neat sketch explain about 4-point starter for starting of DC shunt motor.	4	2	3	1,2
b)	A 250V DC shunt motor running at 750 rpm takes armature current of 45A. The armature resistance is 0.3Ω. What resistance must be placed in series with armature to reduce the speed to 600 rpm, assume the torque remain constant.	4	4	3	1,2
14. a)	Explain the working principle of transformer and derive the expression for EMF generated in a transformer winding.	3	2	4	1,2
b)	The OC and SC test data of 5 KVA, 250/500V single phase transformer when supplying full load at 0.8 lagging p.f is given below. OC test: 250V, 0.8A, 70W(HV open circuit) SC test: 20V, 10A, 60W (L V short circuit) calculate efficiency at (a) full load (b) half load (c) voltage regulation at full load	5	4	4	1,2
15. a)	Explain how the Auto-transformer makes effective saving on copper and copper losses, when its transformation ratio is less than 2?	4	2	5	1,2
b)	A 25kVA, 2000/200 V, 2-winding transformer is to be used as an autotransformer with constant source voltage of 2000 V. at full load of unity power factor, calculate the auto transformer output power, power transferred by conduction and induction. If the efficiency of the 2-winding transformer at 0.8 power factor is 95%, find the efficiency of the auto transformer at same load and same power factor.	4	4	5	1,2
16. a)	Derive an expression for self-Inductance and mutual Inductance?	4	2	1	1,2
b)	A four pole Lap wound shunt generator supplies 60 lamps of 100W, 240V each, the field and armature resistance 55 ohm and 0.18 ohm respectively. If the brush drop is 1V in each brush. Find armature current and generated EMF?	4	4	2	1,2
17.	Answer any ***two*** of the following:				
a)	A DC series motor is running with the speed of 1000 RPM draws a current of 40 A from a 250 V supply. If the load is changed such that the current drawn by the motor is increased to 70 A, calculate the speed of a motor on new load. The armature and series field winding resistance are 0.25ohms and 0.35ohms respectively. Assume the flux produced is proportional to the current.	4	4	3	1,2
b)	Explain parallel operation of single phase transformer and write the necessary conditions for the parallel operation of the transformers.	4	2	4	1,2
c)	Draw and explain the significance of Y-Y, Y-delta, Delta-Y, and Delta-Delta connection in 3-phase transformers?	4	2	5	1,2

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

i)	Blooms Taxonomy Level – 1	20
ii)	Blooms Taxonomy Level – 2	40
iii)	Blooms Taxonomy Level – 3 & 4	40

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