QP Code:RD22BTECH051 | Reg. No | | | | | | | | | | | AY 22

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Third Semester Regular) Examinations, December – 2023

22BELPC23001/ 22BEEPC23001– Electrical Machines - I

(EE & EEE)

Time: 3 hrs | Maximum: 70 Marks

Answer all questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Mention and explain the various causes for the failure of the generator to build up.	CO1	K3
b. What is the commutator pitch of a 4-pole d.c. armature having 49 commutator bars?	CO1	K2
c. What will happen if a shunt motor is directly connected to the supply line ?	CO2	K2
d. How is magnetic leakage reduced to a minimum in commercial transformers?	CO3	K2
e. In Transformers, Why the Low Voltage Winding is Placed Near The Core?	CO4	K3

PART – B **(15 x 4 = 60 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. A long shunt d.c. compound generator delivers 110 kW at 220 V. If ra = 0.01 ohm, rse = 0.002 ohm, and shunt field has a resistance of 110 ohms, calculate the value of the induced e.m.f.	8	CO1	K3
b. Explain magnetization characteristics of a DC shunt generator?	7	CO1	K2
(OR)			
c. A 10 kW, 250 V, d.c., 6-pole shunt generator runs at 1000 r.p.m. when delivering full-load. The armature has 534 lap-connected conductors. Full-load Cu loss is 0.64 kW. The total brush drop is 1 volt. Determine the flux per pole. Neglect shunt current.	8	CO1	K3
d. Explain the OCC of self-excited DC generator. Discuss he procedure to determine Rc and Nc from the OCC.	7	CO1	K2
3.a. Explain brake test and find out the efficiency of dc machine	7	CO2	K3
b. A 500 V shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. The resistance of the armature is 0.12 ohm. Calculate the speed when a resistance is inserted in the field reducing the shunt field to 80% of normal value and armature current is 100 A.	8	CO2	K3
(OR)			
c. A 220 V shunt motor takes a total current of 80 A and runs at 800 rpm. Shunt field resistance and armature resistance are 50 ohms, and 0.1 ohm respectively. If iron and friction losses amount to1600 W, find (i) copper losses (ii) armature torque (iii) shaft torque (iv) efficiency	7	CO2	K3
d. Explain phasor diagram of transformer with (i) Inductive (ii) capacitive loaded condition by considering winding resistances and leakage reactance	8	CO2	K3
4.a. What is the leakage flux in a transformer? Why is it modeled in a transformer equivalent circuit as an inductor?	7	CO3	K2

b.	A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50-Hz supply. Find the full-load primary and secondary currents, the secondary e.m.f. and the maximum flux in the core. Neglect leakage drops and no-load primary current	8	CO3	K3
	(OR)			
c.	Why does the short-circuit test essentially show only i^2R losses and not excitation losses in a transformer?	7	CO3	K2
d.	In no-load test of single-phase transformer, the following test data were obtained: Primary voltage: 220 V Secondary voltage: 110 V Primary current: 0.5 A Power input: 30 W. Find the following: (i) The turns ratio (ii) the magnetising component of no-load current (iii) its working (or loss) component (iv) the iron loss. Resistance of the primary winding = 0.6 ohm.	8	CO3	K3
5.a.	What types of connections can be used? What are their advantages and disadvantages?	7	CO4	K2
b.	Explain why the open-delta transformer connection is limited to supplying 57.7 percent of a normal delta-delta transformer bank's load.	8	CO4	K3
	(OR)			
c.	What happens to a transformer when it is first connected to a power line? Can anything be done to mitigate this problem?	8	CO4	K2
d.	Write the various types of connections associated with three phase transformers.	7	CO4	K3

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