Code No: 183AT **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, February - 2024
ELECTRICAL MACHINES - I
(Electrical and Electronics Engineering)

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

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a)	Define reactance voltage.	[1]
b)	State the necessary conditions for voltage build up in a DC shunt generator.	[1]
c)	What are the drawbacks of field flux control method?	[1]
d)	Explain the function of no-volt release in a three-point starter.	[1]
e)	What is the purpose of the Brake test?	[1]
f)	What are the disadvantages of Swinburne's Test?	[1]
g)	Draw the equivalent circuit of a single-phase transformer with primary quantities referred to the secondary side.	[1]
h)	Write the applications of an Auto transformer.	[1]
i)	Why core losses are neglected in short circuit test.	[1]
j)	What are the salient features of delta-star connected three-phase transformer?	[1]

PART - B

(50 Marks)

2.a) Draw a neat diagram of a 4-pole DC machine. Label all its parts and mention the material used for each part. What are the two functions of a commutator in DC machines?

b) An 8-pole Wave wound DC generator has 480 conductors. The armature current is 200 A. Find armature reaction de magnetizing and cross magnetizing ampere turn per pole if (i) brushes are on GNA (ii) brushes are shifted 6 degrees electrical from GNA. [5+5]

OR

3.a) A 4-pole generator with 400 armature conductors has a useful flux of 0.04 Wb per pole. What is the emf produced if the machine is wave wound and runs at 1200 rpm? What must be the speed at which the machine should be driven to generate the same emf if the machine is lap wound?

b) What is commutation? What causes sparking on commutator surface? Explain one method to improve commutation. [5+5]

4.a) Explain the principle of torque production in a DC motor and derive an expression for it.

b) A 230 V DC Shunt motor takes 36 A at full load. Find the back emf on full load if the resistances of motor armature and shunt field windings are 0.26 Ω and 130 Ω respectively. [5+5]

OR

5.a) Explain why the emf generated in the armature of a DC Motor is called 'back emf'. Give its significance.

b) Discuss various losses present in DC motor. How these are minimized. [5+5]

6.a) Describe the Brake test on DC motor to determine the performance characteristics of DC motor.

b) Two identical DC shunt machines when tested by Back-to-back method gave the following test results: Field currents are 2.5 A, and 2 A. Line voltage is 220 V. Line current including both field current is 10 A. Motor armature current is 73 A. The armature resistance of each machine is 0.05 Ω. Calculate the efficiency of both machines. [5+5]

OR

7.a) Explain the need for conducting separation of losses test on DC machine.

b) Explain the procedure of conducting Swinburne's test in a laboratory. [5+5]

8.a) Draw and explain the no load phasor diagram for a single-phase transformer?

b) A 220 V, 2.8 KVA single-phase transformer has an iron loss of 120 W at 45 Hz and 70W at 35 Hz. Find the hysteresis and eddy current losses at 50 Hz. [5+5]

OR

9.a) Explain the effect of variation of supply voltage and frequency on iron losses.

b) How we can predetermine the efficiency and regulation of single phase transformers. [5+5]

10.a) Explain about the short circuit test of a single-phase transformer and give its significance.

b) Draw the connection diagrams and explain the features of Y-Y, Y-Δ, Δ-Y and Δ-Δ three-phase connections. [5+5]

OR

11.a) Write the conditions required for the parallel operation of two single phase transformers.

b) In an auto-transformer, the power transferred from primary to secondary circuit is partly by conduction and partly by induction. Explain. [5+5]

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