

310607/310507

Roll No. _____

Total No. of Pages: 3

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B. Tech. III - Sem. (Main) Exam., (Academic Session 2021- 2022)

Electrical Engineering

3EE4 – 07 Electrical Machine - I

Common EE/EEE

Time: 2½ Hours

Maximum Marks: 120
Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 6×3 marks = 18 marks.
Candidates have to answer six questions out of ten

Part – B: Analytical/Problem solving questions 3×10 marks = 30 marks.
Candidates have to answer three questions out of seven.

Part – C: Descriptive/Analytical/Problem Solving questions 3×24 marks = 72 marks.
Candidates have to answer three questions out of five.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

PART – A

- ✓ Q.1 What is the importance of electromagnetic in machine? → 11-1 टि
- ✓ Q.2 Define relative permeability.
- ✓ Q.3 What are the different types of magnetic losses? How can they be minimized?
- Q.4 What is the use of interpole in DC machine?
- ✓ Q.5 Compare Lap winding and wave winding.

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- Q.6 Write the application of DC series motor.
- Q.7 A 4 pole DC generator with wave wound armature has 21 slots containing 20 conductors in each slot. The induced emf is 357 volts and the speed is 8500 rpm. Find the flux per pole.
- Q.8 What is meant by armature reaction?
- Q.9 Why transformer rating is expressed in KVA?
- Q.10 Does a transformer draw any current when secondary is open? Justify your answer.

PART – B

- Q.1 Compare electric & magnetic circuits.
- Q.2 Derive the equations for torque developed in DC motor.
- ✓ Q.3 State and prove the condition of maximum efficiency of a transformer.
- Q.4 Write short note on commutation in DC machine. Discuss the method of improving commutation. <https://www.btubikaner.com>
- ✓ Q.5 With the help of neat circuit diagram, explain the Scott connection of transformer.
- Q.6 4 pole shunt type DC generator with a wave wound armature having 390 conductors has to supply a load of 1000 lamps each of 50 watt at 250 volt, allowing 10 volt for voltage drop in the connecting leads between the generator and the load and brush drop of 2 volt. Find the speed at which the generator should be driven. The flux per pole is 30 mWb and the value of armature resistance is 0.05Ω and field resistance is 65Ω .
- Q.7 A 125 kVA transformer having primary voltage of 2000 volt at 50 Hz has 182 primary and 40 secondary turns. Neglecting losses, calculate –
- The full load primary & secondary current.
 - The no load secondary induced EMF.
 - The maximum flux in the core.

PART – C

- Q.1 (a) Explain Ampere's law & Biot Savart's law.
(b) Show the magnetic field produced by a bar magnet and by a current carrying coil. Clearly mention the difference between the two.
- Q.2 (a) With the help of neat connection diagram explain the method for speed control of DC motor for below and above rated speed and derive an expression for the same.
(b) Justify the statement that the DC series motor are never started at no load.
- ✓Q.3 (a) Explain the speed-current and torque current and speed torque characteristics of a DC series motor.
(b) Derive expression for the EMF equation of DC machine.
- ✓Q.4 (a) Write short notes on inrush of magnetizing current in poly phase transformers.
(b) Derive expression for the EMF equation of transformer.
- ✓Q.5 Derive an expression for saving in conductor material in auto transformer over two winding transformer of equal rating. State the advantage and disadvantage of auto-transformer over two winding transformers.
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