Roll No. _____

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310607

B. Tech. III - Sem. (Main) Exam., February - 2021
Electrical Engineering
3EE4-07 Electrical Machine - 1
Common EE/EEE

Time: 3 Hours

Maximum Marks: 120

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All ten questions are compulsory.

Part – B: Analytical/Problem Solving questions (up to 100 words) 5 × 8 marks = 40 marks. Candidates have to answer five questions out of seven.

Part – C: Descriptive/Analytical/Problem Solving questions 4 × 15 marks = 60 marks. Candidates have to answer four 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 materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART - A

Q.1 Explain Magnetic Flux and Flux Density in detail.

Q.2 State and explain Ampere's Circuital Law in point form.

Q.3 Explain electromagnetic force and torque.

Q.4 Write down the applications of D.C motors.

Q.5 Explain the principle of transformer.

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Q.6 Draw the Equivalent Circuit of 1 - φ transformer.

Q.7 Write down the losses in D.C. Machines.

Q.8 Draw the characteristics of D.C. Motors.

Q.9 Differentiate between lap winding and Wave winding.

Q.10 Why we need cooling of transformers? Write suitable reasons.

PART – B

Q.1 The length of air – core is 25cm and has a cross sectional area of 4cm². The coil is wound by 65 turns. Determine the inductance of the coil. https://www.btubikaner.com

Q.2 Derive the expression for generated emf in a d.c. generator.

Q.3 How do Hysteresis, eddy current friction and windage losses depend upon the motor speed?

Q.4 Write the short note on types of enclosures of machine.

Q.5 Explain Swinburne's methods of testing of DC Machines.

Q.6 In what way a practical transformer differs from an ideal transformer? Develop an equivalent circuit for the practical transformer.

Q.7 Write short notes on voltage regulation of Single phase transformer and Auto transformer.

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PART – C

Q.1 Describe the principle of energy conversion. Show that the reaction of coupling magnetic field on the electrical or mechanical system is essential for the electro-mechanical energy conversion.

Q.2 In an 110V compound generator, the armature shunt and series winding resistance are 0.06Ω, 25Ω and 0.04Ω respectively. The load consists of 200 Lamps each rated 55W, 110V connected on parallel. Find the total emf and armature current. When the machine is connected for –

(i) Long shunt

(ii) Short shunt

Ignore the armature reaction and brush drop.

Q.3 Draw and explain the torque-speed characteristics of the following types of DC motors,

5(i) Shunt motor **5**

5(ii) Series motor **2**

5(iii) Commutative compound motor

Q.4 Explain the process of finding the efficiency of a transformer by Sumpner's test. And also explain effect of non-linear B-H curve of magnetic core materials

Q.5 What are the various types of losses in the transformer? On what factors do they depend? Derive the condition for maximum efficiency of the transformer.