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Uni. Roll No. ....

MORNING

1 2 MAY 2023

Program: B.Tech. (Batch 2018 onward)

Semester: 3

Name of Subject: Electrical Machines-I (Transformer & DC Machines)

Subject Code: PCEE-103

Paper ID: 16066

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A
[Marks: 02 each]

Q1.

a) What is the importance of magnetic circuits?

b) How is magnetic leakage reduced to a minimum in transformers?

c) Identify the possible connections for a 3- phase transformer bank.

d) Define Commutation.

e) Discuss the purpose of field winding in a dc machine.

f) List the speed control methods of a dc motor.

Part – B
[Marks: 04 each]

Q2. Illustrate the back-to-back test of single-phase transformer.

Q3. Construct and describe the B-H curve of magnetic core material.

Q4. Explain armature reaction in a dc machine.

Q5. A 25 kVA, single phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500 V, 50 Hz mains. Evaluate

(i) secondary emf

(ii) primary and secondary current on full load

(iii) maximum flux in the core.

Q6. Differentiate the three-point starter and four-point starter for a DC motor.

P.T.O.

Q7. In a 25KVA, 2000/200 V power transformer the iron loss and full load copper losses are 350W and 400W respectively. Determine the efficiency at unit power factor at

    (i)   Full load

    (ii)   Half load

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Part – C   [Marks: 12 each]

Q8. Explain the construction working principle of a D.C. machine.

OR

Summarize the working principle and construction of an auto transformer. Derive the expression for saving of copper as compared to two winding transformers.

Q9. An 8-pole dc shunt generator with 778 wave-connected armature conductors and running at 500 rpm supplies a load of 12.5 ohm resistance at terminal voltage 250 V. The armature resistance is 0.24 ohm and the field resistance is 250 ohm. Evaluate the armature current, the induced emf and the flux per pole.

OR

Elaborate on load operation of single-phase transformer. Draw the equivalent circuit diagram of single-phase transformer.

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