Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

[Total No. of Questions: 09]   [Total No. of Pages: 02]

Uni. Roll No. ....

Program: **B.Tech. EE (Sem. 3rd)**
ELECTRICAL MACHINES-I (TRANSFORMER and DC MACHINES)
Subject Code: **PCEE-103**
Paper ID:**16066**
Scientific Calculator is allowed

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) Mention any **four** features of a transformer.

b) What is the role of interpoles in dc machines?

c) State difference between braking and plugging in dc motor.

d) What is the condition for maximum efficiency of a transformer?

e) What is meant by back e.m.f ? Why it is name so? Justify.

f) Which type of dc motor is preferred for following applications
   i) Locomotives
   ii) Hoists and cranes

Part – B   **[Marks: 04 each]**

Q2. Deduce any **four** differences between electric and magnetic circuits.

Q3. Derive the e.m.f equation for d.c machines.

Q4. Diagrammatically explain the armature reaction in d.c. generators.

Q5. Justify how the transformer will behave if:-
   a. DC supply is given to the primary of the transformer.
   b. Wood is used as transformer's core.

Q6. Prove that an auto transformer requires less copper than ordinary transformer.

Q7. What are the conditions for satisfactory and successful operation of transformers connected in parallel?

P.T.O.

Part – C   [Marks: 12 each]

Q8. Explain with construction features the working principle of brushless dc machines? What is the reason for popularity now days? Also mention its applications.

OR

Enlist different methods to control the speed of d.c. motor. Explain any **two** in detail with suitable diagram and expressions.

Q9. **i)** Explain what is meant by All Day Efficiency of a transformer and what is its significance?

ii) A transformer has its maximum efficiency of 0.98 at 15 KVA at unity power factor (*upf*). Calculate it's all day efficiencies for the following load cycles:

a. Full load of 20 *kVA* 14 hours/day and no-load rest of the day.

b. Full load 4 hours/day and 0.4 full-load rest of the day.

Assume the load to operate on *upf* all day.   [4 + 8]

OR

With circuit diagram explain Open circuit and short Circuit test in transformers. Also derive the corresponding expressions.

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