SEMESTER: 3$^{RD}$

COURSE NAME: B.TECH

BRANCH NAME: EE, EEE
SUBJECT NAME: ELECTRICAL MACHINE-I

TIME: **90 Minutes**

FULL MARKS: **30**

Answer **All** Questions.
The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

Q1.    Answer all Questions.                                                                                 [2 × 3]

a) What is an ideal transformer?                                                                              - CO1

b) Explain why OC test and SC tests are conducted on LV and HV sides of the                                   - CO2
transformer respectively?

c) Define critical field resistance and critical speed of a DC shunt generator.                               - CO3

Q2.                                                                                                          [8]

Derive expression for maximum efficiency of a 1-phase transformer and for load at                             - CO1
maximum efficiency. Also derive the conditions for maximum and zero voltage
regulation in 1-phase transformer.

OR

Determine the percentage efficiency and regulation at full load 0·9 p.f. lagging of a                        - CO1
5kVA, 220/440V single phase transformer. When the following test data is obtained.
OC. Test – 220 V, 2 A, 100 W on L.V. side;
S.C. Test – 40 V. 11·4 A, 200 W on H.V. side.

Q3.                                                                                                          [8]

Explain the different parts of DC machine and neat diagram                                                    - CO2

OR

A DC generator has armature e.m.f. of 100V when flux per pole is 20 mWb and speed is                          - CO2
900rpm. Calculate e.m.f. generated when (i) speed is 1000 rpm with same flux, and (ii)
speed is 900 rpm but flux is 23 mWb

Q4.                                                                                                          [8]

An 8-pole DC generator has per pole flux of 40 mWb and winding is connected in lap with                       - CO3
960 conductors. Calculate the generated e.m.f on open circuit when it runs at 400 rpm. If the
armature is wave wound, at what speed must the machine be driven to generate the same
voltage.

OR

Draw and compare the Open circuit characteristics of different types of DC                                    - CO3
generators.

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