

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY,
ODISHA**

Mid semester Examination 2015

BRANCH: ME, PE (3rd Semester)

SUB: - ELEMENTS OF ELECTRICAL MACHINES

FULL MARKS – 20

TIME 2 HOURS

Answer Q.No.1 which is compulsory and attempt any three
from the remaining.

1. Answer All Questions.

[5x1]

(a) What are the function of commutator and yoke in DC machine?

✓ (b) Why starters are used for dc motors?

✓ (c) What is the significance of 'back emf'?

✓ (d) Draw exact and approximate equivalent circuit diagram of a transformer.

(e) What are the different methods of speed control of DC shunt motor?

2.(a) A dc shunt machine has armature and field resistances of 0.025 ohms and 80 ohms respectively. When connected to constant 400V bus-bars and driven a generator at 450 rpm, it delivers 120kW. Calculate its speed when running as a motor and absorbing 120 kW from the same bus-bars. [2.5]

(b) A 220V shunt motor having armature resistance of 0.4 ohms takes an armature current of 30A on a certain load. By how much the flux is reduced to raise the speed by 30% if the developed torque is constant? Neglect saturation and armature reaction. [2.5]

3. (a) A long-shunt, compound generator delivers a load current of 50 A at 500 V and the resistance of armature, series field and shunt field are 0.05 ohm and 250 ohm respectively. Calculate the generated emf and the armature current. Allow 1.0 V per brush for contact drop. [2.5]

(b) Explain different characteristics of DC shunt generator. [2.5]

4 (a) Write down the advantages of autotransformer over two winding transformer. [2.5]

(b) A 10kVA, 2500/250V, single phase transformer gave the following test results:

Open circuit test: 250V, 0.8A, 50W

Short circuit test: 60V, 3A, 45W

Calculate the equivalent circuit parameters referred to HV side. Also determine the efficiency at full load and unity power factor.

[2.5]

5 (a) The primary of single phase transformer takes 1A at a power factor of 0.4 lagging when it is connected across a 200V, 50 Hz supply and the secondary is open circuit. The number of turns on primary is twice that on the secondary. A load taking 15 A at lagging power factor of 0.8 is now connected across the secondary. What is the value of primary current?

[2.5]

(b) Derive the developed armature torque equation of a DC motor.

[2.5]

6 (a) A single phase transformer when supplied from 220V, 50 Hz supply has eddy current loss of 50W. if the transformer is connected to 330V, 50 Hz supply, what would be the eddy current loss?

[2.5]

(b) Draw different connections of three phase transformers, with reference to their phasor groups.

[2.5]