

II B.Tech I Semester Supplementary Examinations, May 2005
ELECTRICAL TECHNOLOGY
(Common to Electronics & Instrumentation Engineering, Bio-Medical
Engineering and Electronics & Control Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the constructional features of a D.C. Machine with the help of a neat sketch.
 (b) Name the main parts of a D.C. Machine and state the materials of which each part is made.
 (c) Explain different methods of excitation of D.C. Generators with suitable diagrams.
2. (a) Explain speed control of a D.C. Series Motor.
 (b) A 200V d.c. series motor runs at 1000 rpm when operating at its full load current of 30A. The motor resistance is 0.5Ω and the magnetic circuit can be assumed unsaturated. What will be the speed if
 - i. the load torque is increased by 44%
 - ii. the motor current is 20A.
3. (a) Draw the phasor diagram of transformer under loaded conditions.
 (b) Explain the principle of working of 1-Phase transformer on no-load conditions. Also explain the nature of no-load current.
4. (a) Obtain an expression for the regulation of a single-phase transformer from its equivalent circuit / phasor diagram.
 (b) A 20 kVA, 2500 / 250 volts, 50 Hz, 1-phase transformer gave the following test results:

O.C. test(L.V. side):	250 V	1.4 A	105 W
S.C. test (H.V. side):	104 V	8 A	320 W

Compute the parameters of the approximate equivalent circuit referred to L.V.

5. (a) With usual notation deduce the expression for starting torque of a 3-phase induction motor.
 (b) The rotor of a 3-phase induction motor has 0.04Ω resistance per phase and 0.2Ω standstill reactance per phase. What external resistance is required in the rotor circuit in order to get half of the maximum torque at starting? Neglect stator impedance. By what percentage will this external resistance change the current and pf at starting?

6. (a) Draw a neat sketch showing the various parts of a synchronous machine and explain each part briefly.
- (b) A 3ph, 50 Hz, 20 poles Salient pole alternator with star connected stator winding has 180 slots on the stator. Each slot consists of 8 conductors. The flux per pole is 25mwb and is sinusoidally distributed. The coils are full pitch.

Calculate

- i. the speed
 - ii. the generated e.m.f per phase and
 - iii. the line e.m.f.
7. (a) Explain the working principle of the synchronous motor on no load and on load with the help of phasor diagrams.
- (b) A 3 phase, 44 V, 50 Hz star connected synchronous motor develops 7.4 kW. The effective resistance per phase of the stator winding is 0.5 ohm. The motor operates at power factor of 0.75 lagging. Iron and mechanical losses amount to 500W and the excitation loss is 650W.

Calculate

- i. armature current
 - ii. efficiency of the motor.
8. (a) Discuss the differences between capacitor start. Capacitor run and permanent split capacitor motors.
- (b) A small motor has an output torque of 0.25 N.m and a speed of 100 rad/sec. If the input current is 0.6 A at 230 V and 0.6 lagging p.f find
- i. output power in watts
 - ii. efficiency.
