Code No: R5211002 **R5**

II B.Tech I Semester(R05) Supplementary Examinations, May/June 2010
ELECTRICAL TECHNOLOGY
(Common to Electronics & Instrumentation Engineering, Bio-Medical Engineering, Electronics & Control Engineering, Electronics & Computer Engineering and Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Why do Iron losses occur in a D.C. Machine?
   (b) Mention the factors on which Iron losses in the armature of a D.C. Machine depend upon. How these losses are reduced?
   (c) Draw the power flow diagram of D.C. shunt generator. [4+6+6]
2. (a) State the reasons for drop in speed of a D.C. Shunt motor when it is loaded.
   (b) Explain why a D.C. Series Motor is best suited for Electric traction applications.
   (c) Explain why a D.C. Shunt Motor can be referred as Constant Speed Motor
   (d) A 250V unsaturated shunt motor has an armature resistance (including brushes and inter poles) of 0.04Ω and a field resistance of 100Ω.
      i. Find what resistance must be added to the field winding to increase the speed from 1200rpm to 1500rpm when supply current is 200A.
      ii. With the field resistance as in (i) find the speed when the supply current is 100A.[3+3+3+7]
3. (a) Derive an emf equation of a single phase transformer.
   (b) The maximum flux density in the core of 250 /3000 Volts 50 HZ single phase transformer is 1.2 webers per square meter. If the emf per turn is 8 volts determine primary and secondary turns and area of the core. [8+8]
4. (a) Define voltage regulation of a transformer. Deduce the expression for the voltage regulation
   (b) The number of turns on the primary and secondary windings of a single phase transformer are 350 and 35 respectively. If the primary is connected to a 2.2 KV 50 HZ supply determine the secondary voltage. [8+8]
5. (a) Explain why a 3-phase Induction Motor cannot develop torque when running at synchronous speed. Define the slip and deduce how the frequency of rotor currents and magnitude of rotor e.m.f are related to slip.
   (b) A 3-phase star connected Induction motor has 55V across its slip rings on open circuit when normal stator voltage is applied. The rotor is star connected and has impedance (0.7+j5)Ω per phase. Find the rotor current when the machine is
      i. at stand still with the slip rings connected to a star connected starter with a phase impedance of (4+j3)Ω and
      ii. running normally with 5% slip. [10+6]
6. (a) Explain the constructional features of alternator.
   (b) How e.m.f is induced in an 3-phase alternator? Derive the expression for e.m.f induced in an alternator in terms of pitch and distribution factors. [8+8]
7. Using double field revolving theory for single phase induction motors. Give its torque speed characteristic. Why this motor does not have starting torque. [16]
8. (a) Discuss the classification of electrical instruments
   (b) Explain the significance of controlling torque and damping torque relevant to the operation of indicating instruments. [8+8]

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