

II B.Tech II Semester(R05) Supplementary Examinations, January 2010  
ELECTRICAL TECHNOLOGY  
(Electronics & Communication Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

1. (a) Mention the different reasons for the drop in the terminal voltage of a shunt generator when it is loaded?  
(b) A 4-pole, DC shunt generator, with a shunt field resistance of  $100\Omega$  and an armature resistance of  $1\Omega$ , has 378 wave connected conductors in its armature. The flux/pole is  $0.02\text{Wb}$ . If a load resistance of  $10\Omega$  is connected across the armature terminals and the generator is driven at 1000rpm, calculate power absorbed by the load.[6+10]
2. (a) Sketch the 3-point starter used to start D.C. shunt motor and explain the function of no-volt coil and overload coil?  
(b) A 4 pole DC Series motor has 944 wave connected armature conductors. At a certain load the flux per pole is  $34.6\text{ mWb}$  and the total mechanical torque developed is  $209\text{Nm}$ . Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of  $500\text{V}$ . The total motor resistance is  $3\Omega$ [10+6]
3. Draw the phasor diagrams of a transformer at no load and full load lagging power factor conditions and explain the operation of a transformer.[16]
4. (a) State and prove the condition for maximum efficiency of a transformer.  
(b) A 30 KVA single phase transformer has an iron loss of 457 watts and copper loss of 125 watts when delivering half the full load. At what percentage of full load will the transformer have maximum efficiency.[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  $55\text{V}$  across its slip rings on open circuit when normal stator voltage is applied. The rotor is star connected and has impedance  $(0.7+j5)\Omega$  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  $(4+j3)\Omega$  and
  - ii. running normally with 5% slip.[10+6]
6. (a) Derive Pitch and Distribution factors used in the design of armature winding of alternator.  
(b) A 3-phase, 16-pole alternator has the following data: Number of slots = 192; Conductors / slot = 8 (conductors of each phase are connected in series); coil span =  $160^\circ$  (electrical); Calculate the pitch and distribution factors.[8+8]
7. Explain the principle operation of a shaded pole single phase induction motor and draw its torque speed characteristic.[16]
8. Explain the following with reference to the indicating instruments [16]
  - (a) Deflecting torque
  - (b) Controlling torque
  - (c) Damping torque
  - (d) Scale and pointer