

**II B.Tech II Semester Supplementary Examinations, April/May 2005**  
**ELECTRO MECHANICS-II**  
**(Electrical & Electronic Engineering)**

**Time: 3 hours****Max Marks: 70**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) Draw the equivalent circuit of  $1-\phi$  transformer.  
(b) A 75 KVA, 11,000/440V,  $1-\phi$  transformer has a primary winding having a resistance of 7.8 ohm and a reactance of 9.4 ohm. The resistance and reactance of the secondary winding are 0.0085 ohm and 0.0123 ohm respectively. Calculate the equivalent impedance
  - i. referred to the primary side, and
  - ii. referred to the secondary side.
  - iii. Also calculate the total copper loss in the transformer.
2. (a) Derive the condition for maximum efficiency in a  $1-\phi$  transformer.  
(b) A 100 KVA, single phase transformer has an iron loss of 600W and a copper loss of 1.5 kW at full load. Calculate the efficiency a
  - i. 100KVA output at 0.8p.f. lag
  - ii. 50 KVA output at UPF and
  - iii. 75 KVA output at 0.8 p.f.lead.
3. (a) What are the conditions to be satisfied for the parallel operation of transformers.  
(b) 2000 KVA transformer, A is connected in parallel with a 4000 KVA transformer B to supply a  $3-\phi$  load of 5000 KVA at 0.8 p.f. lagging. Determine the sharing of each transformer the voltage drops in windings at their rated loads are as follows: Transformer A : Resistance 2% Reactance 8%  
*Transformer B : Resistance 1.6% ; Reactance 3% .*
4. (a) Explain the scott connection in transformers.  
(b) Explain ON-load and OFF-load tapchangers.
5. (a) Explain how the R.M.F. is produced in a  $3-\phi$  induction motor with suitable diagrams.  
(b) A 440V, three phase, 50Hz, 6pole induction motor running at 970 rpm takes 50kW at a certain load. The friction and windage loss is 1.6kW, stator loss is 1kW. Calculate
  - i. percentage slip
  - ii. rotor copper loss

- iii. output from the rotor and
  - iv. efficiency.
6. (a) Draw the torque/slip characteristics of an induction motor.
- (b) The rotor resistance and standstill reactance per phase of a 3-phase, slip ring Induction motor are 0.02 ohm and 0.1 ohm respectively. What should be the value of external resistance per phase to be inserted in the rotor circuit to give maximum at starting?
7. (a) Explain the construction and principle of operation of schrage motor.
- (b) Calculate the ratio of the starting torque to the full-load torque of a 3- $\phi$  squirrel cage induction motor when started by
- i. direct switching
  - ii. star-delta starter, and
  - iii. auto-transformer starter having 40% tapping.
- The short circuit current of the motor at the rated voltage is 7 times the full-load current and the full load slip is 3%.
8. (a) Compare the 3- $\phi$  squirrel cage and slipping induction motors.
- (b) Explain the various methods of speed control of induction motor.

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