

Code: R7220205

R7

B.Tech II Year II Semester (R07) Supplementary Examinations, April/May 2013

ELECTRICAL MACHINES - II

(Electrical and Electronics Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

- 1 Discuss the constructional details of single-phase transformer and hence obtain the expression for induced e. m. f. of transformer.
- 2 (a) Define efficiency of a transformer? Obtain the condition for maximum efficiency.
(b) A 25 KVA, 2500 / 250 V, 1-phase transformer has the following losses. Iron loss = 960 watts, full load copper loss = 1500 watts. Calculate at what load maximum efficiency occurs, and the value of maximum efficiency at unity power factor.
- 3 (a) With all necessary instruments draw a neat experimental set up to conduct OC and SC tests on a single phase transformer.
(b) A single phase 250/500 V transformer gave the following results:
OC test: 250 V, 1 A, 80 W on LV side
SC test: 20 V, 12 A, 100 W on HV side.
Find the maximum efficiency of the transformer.
- 4 (a) Describe the voltage regulation of three phase transformer with neat phasor diagram.
(b) A 3-phase, 130 KVA, 5000/800 V Star/Star, 50 Hz transformer has an iron loss of 1550 W. The maximum efficiency of transformer occurs at 85% of load.
Calculate: (i) The efficiency of transformer at full load and 0.8 pf lagging
(ii) The maximum efficiency at 0.8 pf leading.
- 5 (a) Deduce an expression for rotor side starting current, starting power factor, stand still frequency and stand still e.m.f of slip ring induction motor.
(b) A 4 pole 3- Φ induction motor operates from a supply whose frequency is 50 Hz.
Calculate the following:
(i) The speed at which the magnetic field of stator is rotating.
(ii) The speed of rotor when the slip is 4%.
(iii) Frequency of the rotor current when the slip is 3%.
(iv) The frequency of the rotor current at stand still.

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- 6 (a) What are the losses in an induction motor? Explain in detail.
(b) Derive the condition for maximum torque of a 3- Φ induction motor under running conditions.
- 7 (a) A 10 KW, 400 V 3-phase induction motor has full load efficiency of 0.87 and power factor 0.85. At stand still at rated voltage the motor draws 5 times full load current and develops a starting torque of 1.5 times full load torque. An autotransformer is installed to reduce the starting current to give full load torque at the time of starting. Calculate the voltage applied line current.
(b) A 3-phase squirrel cage induction motor has maximum torque equal to thrice the full load torque. Determine the ratio of starting torque to full load torque if started by:
(i) DOL starter.
(ii) Star delta starter. The maximum torque occurs at 0.1 slip
- 8 (a) Explain the speed control of induction motor by rotor rheostat control and injecting e.m.f in the rotor side.
(b) The rotor of 3-phase slip ring induction motor has an induced voltage of 100 V and impedance of $0.2 + j1$ ohm at stand still. The induction motor has full load slip of 0.04 driving constant torque load and running at 1440 r.p.m. Calculate the voltage to be injected if the motor is to be driven at 800 r.p.m.
