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Code No: EE1516

GEC-R14

II B. Tech II Semester Regular Examinations, May 2016

ELECTRICAL MACHINES-II
(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 60

Note: All Questions from **PART-A** are to be answered at one place.

Answer any **FOUR** questions from **Part-B**. All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. What is that importance of 86.6 % tapping in scott connection?
2. Distinguish between squirrel-cage induction motor and slip ring induction motor.
3. What is meant by crawling & cogging?
4. How can you get maximum possible power factor of 3-phase induction motor from the circle diagram.
5. Explain why pole changing method is not used for slip ring induction motor.
6. Draw the equivalent circuit of single phase induction motor based on double revolving field theory when it operates with a slip 'S'.

PART-B

4 × 12 = 48M

1. a) Explain scott connection for converting 3-phase into 2-phase supply with neat diagrams. (7M)
b) A 3-phase step up transformer is connected to $500\sqrt{3}$ volts main and takes a current of 240A. Calculate the secondary line voltage, line current and output at UPF for i) star / delta ii) delta / star
Assume the turns ratio to be 12. (5M)
2. a) Explain the principle of operation of a 3-phase induction motor. Explain why the rotor forced to rotate in the direction of rotating magnetic field. (6M)
b) A 50 H.P., 3-phase, 4 pole, 50 Hz induction motor has full load efficiency of 85%. The friction and windage losses are one-third of the no-load losses and the full load rotor copper losses are equal to the iron losses. Find the full load speed. Neglect stator resistance. (6M)
3. a) Derive an expression for maximum torque developed in a three phase induction motor. Hence prove that the ratio of maximum torque to starting torque is $(1+a^2) / 2a$ where 'a' is the ratio of rotor resistance per phase to rotor stand still leakage reactance per phase. (6M)

- b) A 3-phase, 4 pole, 50Hz induction motor has a rotor resistance of 0.1 ohm per phase and stand still reactance of 0.8 ohm per phase. If the full load slip is 5%. Determine the full load torque as a percentage of maximum torque. What should be the value of external rotor resistance per phase to give half of the maximum torque at starting. (6M)
4. a) Explain how do you construct the circle diagram of three phase induction motor from no load and blocked rotor test results. (6M)
- b) A 15 kW, 400V, 4 pole, 50Hz, 3-phase, star connected induction motor gave the following test results
 No load test : 400V, 9A, 1310W
 Blocked rotor test: 200V, 50A, 7100W
 Voltage and current are line values
 Stator and rotor ohmic losses at stand still are assumed equal. Draw the circle diagram. Hence, determine the maximum power input and maximum power output. (6M)
5. a) Describe briefly the various methods of speed control of 3-phase induction motor. (6M)
- b) A 50 KVA, 400 V, 50 Hz, 3-phase squirrel cage induction motor has a full load slip of 5%. Its stand still impedance is 0.866 ohms per phase. It is started using a tapped Auto transformer. If the maximum allowable supply current at the time of starting is 100A, calculate the tap position and the ratio of starting torque to full load torque. (6M)
6. a) Why 1-phase induction motor is not a self start machine explain with the help of cross field theory. (6M)
- b) Explain working principle of operation of shaded pole motor. (6M)
