Code No: R22024 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations, November - 2018
ELECTRICAL MACHINES - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Compare and Contrast between Core type of transformer and Shell type of transformer [8M]
   b) The core of a 120 KVA, 11000/415V, 50 Hz, single phase core type transformer has a cross section of 25 cm x 25 cm. Find i) the number of High voltage and low voltage turns per phase and ii) the emf per turn if the maximum core density is not to exceed 1.6 Tesla. Assume a stacking factor of 0.88. What will happen if its primary voltage is increased by 15 % on no load [7M]

2. a) Derive the condition for maximum efficiency of a Single phase transformer. [7M]
   b) A 660 V/ 220 V single – phase transformer takes a no – load current of 2 A at a power factor of 0.225 lagging. The transformer supplies a load of 30 A at a power factor of 0.9 lagging. Calculate the current drawn by the primary from the mains and the primary power factor. Neglect the winding resistance and reactance [8M]

3. a) Describe how the primary current adjusts itself as the load on a transformer is increased [7M]
   b) Open and short-circuit tests performed on a 500 kVA, 6600/2300 V, 50 Hz transformer yielded the following data:
   No-load loss = 3 kW ; Full-load short circuit loss = 4 kW.
   Calculate the load (kVA) at which the transformer efficiency would be maximum for a given power factor. Calculate this efficiency for a power factor of 0.85. [8M]

4. a) Explain the basic purpose of a tertiary winding. [5M]
   b) An ideal 3-phase step-down transformer, connected delta/star delivers power to a balanced 3-phase load of 120 kVA at 0.8 power factor. The input line voltage is 11 kV and the turn-ratio of the transformer, phase-to-phase is 10. Determine the line voltages, line currents, phase voltages and phase currents on both the primary and the secondary sides. [10M]

5. a) Compare and contrast the squirrel-cage and slip-ring induction motors. [7M]
   b) A 6-pole, 50 Hz, 3-phase induction motor running on full load develops a useful torque of 160 Nm when the rotor emf makes 120 complete cycles per minute. Calculate the shaft power output. If the mechanical torque lost in friction and that for core-loss is 10 Nm. Compute (i) the copper-loss in the rotor windings, (ii) the input to the motor, and (iii) the efficiency. The total stator loss is given to be 800 W. [8M]

6. a) Derive the equations for Starting torque and maximum torque of a three phase induction motor [8M]
   b) Explain about the Cogging and Crawling and give its affects on Three phase induction motor [7M]
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7. A 400 V, 3-phase, 6-pole, 50 Hz induction motor gave the following test results: [15M]
No-load : 400 V, 8 A, 0.16 power factor
Blocked-rotor : 200 V, 39 A, 0.36 power factor
Determine the mechanical output, torque and slip when the motor draws a current of 30 A from the mains. Assume the stator and rotor copper losses to be equal.

8. a) What methods are used in starting squirrel cage induction motor? Which is the most common method used and what is its superiority? [8M]

b) Explain in detail about the Rotor – resistance control in Slip ring Induction motors [7M]