Reg.No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

III SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2015 / JAN 2016

SUBJECT: ELECTRICAL MACHINERY-1 [ELE-205]

REVISED CREDIT SYSTEM

Time: 3 Hours 05 January 2016 MAX.MARKS: 50

Instructions to Candidates

- Answer **ANY 5 FULL** questions.
- Use of Non programmable scientific calculators is permitted.

1A. A 6.25 kVA, 500 / 250 V, 50 Hz, single-phase transformer gave the following test results:

No load (OC)(LV side) : 250 V, 1.25 A, 150 W

Short circuit (SC)(HV side) : 20 V, 12.5 A, 175 W

a) Draw the approximate equivalent circuit referred to the secondary side
b) Determine the efficiency of the transformer when supplying full load at 0.8 pf lag. **5 M**

1B. List the differences between power transformer and distribution transformer **2 M**

1C. Draw the phasor diagram of a transformer supplying lagging load. **3 M**

2A. A single phase, 50 Hz, 120 kVA, 2400 / 240 V two-winding transformer is to be connected as an auto-transformer with additive polarity. For a constant input voltage of 2400 V, determine supply current, load current, transformed VA and conducted VA. **5 M**

2B. Discuss different methods for cooling transformers based on their rating. **5 M**

3A. Two single phase furnaces are supplied by two phases of a Scott connected transformers each at 100 V from a 3 phase, 500 V supply. The furnace connected to the teaser transformer takes 10 kW while the other furnace consumes 5 kW, both at upf. Determine

a) Transformation ratios of the transformers,
b) Three line currents drawn from the supply.

Draw the phasor diagram on both primary and secondary. **6 M**

3B. Explain the working of Induction generator. Mention one application. **4M**

4A. A 3 phase, 50 Hz, 12 pole, 420 V delta connected induction motor has the following equivalent circuit parameters: **6M**

Stator impedance = (2.95 + j 6.82) Ω per phase;

Stand still rotor impedance referred to stator = (2.08 + j 4.11) Ω per phase.

When running at 4 % slip, determine:

a) Electrical input to the motor
b) Stator and Rotor copper losses
c) Useful torque if rotational losses are 750 W.

Neglect exciting branch admittance.

4B. Draw the torque slip characteristics of a squirrel cage induction motor and mark the salient points. **4M**

5A. A 3 phase, 400V, 50 Hz, 6 pole star connected induction motor has the following test data: **6M**

No load Test : 400V, 9 A, 1250 W (Line Value)

Blocked Rotor test : 200V, 50A,6930 W (Line Value)

Draw the circle diagram and obtain the values of operating power factor, slip and efficiency at rated current of 30 A.Assume stator and rotor copper losses to be equal.

5B. Explain the voltage buildup in shunt generator **4M**

6A. Draw a neat sketch of a 3-point starter used for DC shunt motors. Explain how it protects the machine under low voltage and over load conditions. **5M**

6B. A 4 pole, 22 kW, 220 V DC shunt motordraws a line current of 7.4 A at no load. The field resistance is 50Ωand armature resistance is 0.25 Ω. Determine: **5M**

a) Rotational losses of the machine
b) Efficiency at full load.