Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

III SEMESTER B. TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE-UP EXAMINATIONS, DECEMBER 2018

SUBJECT: ELECTRICAL MACHINERY-1 [ELE 2103]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date:29 December 2018** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Test results of a single phase 50 kVA, 2200/110 V, 50 Hz transformer is given.

OC Test (LV side): 110 V, 10 A, 400 W.

SC Test (HV side): 90 V, 22.73 A, 808W.

Obtain the approximate equivalent circuit referred to the high voltage side. ***(05)***

1B. Draw the phasor diagram representing voltage and current in the primary and secondary side of a single phase transformer with the lagging load. ***(03)***

1C Explain why the tap changers are normally connected on HV side of a transformer. ***(02)***

2A. A 60 kVA, 11.5/2.3 kV, 50 Hz, two winding transformer is to be employed as an autotransformer with voltage ratio 13.8/11.5 kV. When tested as a two winding transformer at rated load, at 0.85 pf lagging, its efficiency was 98 %. Find the full load efficiency of the autotransformer supplying upf load. ***(04)***

2B. Find the all-day efficiency of a 50 kVA distribution transformer with a core loss of 400W and full load copper loss of 808W.

During the whole day the transformer is loaded as follows:

12 Hours	20 kW	@ 0.6 pf lagging
8 Hours	40 kW	@ 0.8 pf lagging
4 Hours	48 kW	@ 0.95 pf lagging

(04)

2C. Explain the torque slip characteristics of the single phase induction motor. ***(02)***

3A. A 3ϕ, 50 Hz, four pole, induction motor has a star connected rotor. The per phase rotor resistance is 0.1 Ω and per phase standstill reactance is 2 Ω. If the induced emf between the slip rings is 100 V at a speed of 1460 rpm, determine (a) slip (b) rotor induced emf (c) per phase rotor reactance and (d) rotor current. Assume the slip rings are short circuited. ***(04)***

3B. Write technical notes on

(a) Induction generators.

(b) Deep bar induction motors ***(06)***

4A. A 3 phase, 50Hz, six pole, induction motor develops a shaft power output of 20HP at 3% slip. Calculate (a) Gross power developed and (b) Rotor copper loss, if the rotational losses amount to 1.5HP. ***(03)***

4B. Explain the reason for Crawling of induction motor with the help of torque-slip characteristics. ***(03)***

4C. Develop a single layer wave winding table for the stator winding of a three phase AC machine with 24 slots and four poles. Assume RYB sequence. ***(04)***

5A. A 3ϕ, 50 Hz, 4 pole, induction motor has a full load slip of 3.5 % Calculate (a) frequency of rotor current at standstill (d) frequency of rotor current at full load. ***(02)***

5B. Explain the need of starters in three phase induction motor. With a neat sketch discuss the working of a Star – Delta starter. ***(04)***

5C. Derive the emf equation of DC generators. Discuss the effect of armature reaction on the generated voltage. ***(04)***