Code: 13A02404 **R13**

B.Tech II Year II Semester (R13) Regular & Supplementary Examinations May/June 2016

ELECTRICAL MACHINES – II

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Why the transformer core is laminated?
(b) Define all day efficiency of a transformer.
(c) What is the main purpose for conducting short circuit test on a 1-Φ transformer?
(d) Give any two comparisons of Two-winding transformer with Auto transformer.
(e) Draw the Phasor diagram of Y-Δ connected three-phase transformer.
(f) Define slip of Induction motor.
(g) Give the expression for starting torque of an induction motor.
(h) Define Crawling phenomena referred to Induction motor.
(i) Draw the Stator resistor/reactor starter diagram of Induction motor.
(j) Mention any two speed control methods from stator side of Induction motor.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Derive the e.m.f equation of the transformer

(b) The No-Load current of a 4400/440 V, 1-Φ, 50 Hz transformer is 0.04 A. It consumes power 80 W at no-load when supply is given to LV side and HV side is kept open. Calculate the following: (i) Power factor of no-load current. (ii) Iron loss component of current. (iii) Magnetizing component of current.

OR

3 (a) Draw the Exact and approximate equivalent circuits of 1-Φ transformer and explain.

(b) Explain in detail about the different types of losses that occur in transformers.

UNIT – II

4 (a) With neat circuit diagram, explain how the efficiency can be predetermined by conducting Sumpner's test on transformers.

(b) A 1-Φ 200/400 V, 6 KVA, 50 Hz transformer gives the following test results:

OC test on LV side: 200V, 0.8 A, 80 W

SC test on HV side: 25 V, 10 A, 90 W.

Determine the circuit constants referred to as LV side.

OR

5 (a) Describe the Parallel operation of transformers with equal voltage ratios.

(b) A 1-Φ, 2400/240 V, 120 KVA two-winding transformer is connected as an Auto transformer with additive and subtractive polarity. Determine the KVA rating of the Auto Transformer in both the cases?

UNIT – III

6 (a) Explain about the Δ- Δ & open- Δ connections of transformers.

(b) Explain about Scott connection of transformers. Also draw the phasor diagram.

OR

7 (a) With the help of neat diagrams, explain constructional details of cage and wound rotor Induction Motor.

(b) The rotor e.m.f (between slip rings) of a 3-Φ induction motor having star-connected rotor at standstill is 60 V. the rotor resistance and the standstill reactance are 0.6 Ω and 4 Ω respectively. Determine: (i) Rotor current/phase at starting when the slip rings are short-circuited. (ii) Rotor current/phase if a star-connected rheostat of resistance 3 Ω/ phase is connected across the slip rings.

Contd. in page 2

UNIT – IV

8 (a) Derive the expression for Mechanical power developed in the rotor of an Induction Motor.

(b) Derive the expression for shaft torque of an Induction Motor. Also obtain the condition for Maximum Torque.

OR

9 A 3-Φ, 400 V, induction motor gave the following results:

No-Load test: 400 V, 1200 W, 8 A

Short circuit test: 150 V, 3900 W, 36 A

The rotor copper loss at standstill is half the total copper loss. Draw the circle diagram. Determine the full-load value of the current, power factor and slip when the normal rating is 14 kW. Also calculate motor input at full-load, stator copper loss, rotor copper loss rotor input, mechanical power output, efficiency of the motor.

UNIT – V

10 (a) With the help of circuit diagram and equations, explain Auto Transformer starting of Induction motor.

(b) Explain the Cascading method of Speed control of Induction motors.

OR

11 A 3-Φ, 50 Hz, 4-pole, 12 kW, 400 V slip-ring induction motor, with its slip rings short circuited, develops rated output at rated voltage and frequency. At a slip of 5 percent, the maximum torque occurs with zero external resistance and it is 1.5 times the full-load torque. Neglecting stator resistance and rotational losses, calculate the following: (i) Slip and rotor speed at full-load torque. (ii) Rotor Ohmic loss at full-load torque. (iii) Starting torque at rated voltage and frequency. (iv) Starting current in terms of full-load current. (v) Efficiency at full-load.

*****