Code No: 114AB **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, April - 2018
ELECTRICAL MACHINES – II
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Draw the phasor diagram of transformer under zero voltage regulation. [2]
b) What is the effect of increase in frequency on hysteresis losses and eddy current losses in a single phase transformer? [3]
c) What could be the effect if short circuit test is conducted on LV side? [2]
d) What will happen if percentage impedances of transformers are unequal in the parallel operation? [3]
e) Why is the auto transformer is not used as distribution transformer? [2]
f) What is the function of tertiary winding in a 3-ϕ transformer? [3]
g) What is the effect of skewing the rotor slots of an induction motor? [2]
h) Draw the speed-torque characteristics of a deep-bar double cage induction motor. [3]
i) What are the limitations of speed control by conventional methods? [2]
j) What will be the effect on torque developed by an induction motor if applied voltage is reduced to half with frequency unchanged? [3]

PART-B

(50 Marks)

2.a) Develop an equation for induced emf in a transformer winding in terms of flux and frequency?
b) The secondary winding of step up transformer takes a current of 820 A, when working at full load at 0.8 power factor lagging. The primary current is 30 A at 0.7 power factor lagging, if the transformation ratio is 30:1, calculate the no-load current? [5+5]

OR

3.a) Draw and explain the full load vector diagram of single phase transformer under lagging load.
b) A 100 kVA, 6.6 kV/415V, single phase transformer has an effective impedance of (3 + j10 Ω) referred to h.v side. Estimate full load voltage regulation at 0.8 p.f leading and power factor corresponding to the zero voltage regulation? [5+5]

4.a) In OC and SC tests of a transformer, explain why the wattmeter in OC test reads core losses and wattmeter in SC test reads copper losses?
b) The maximum efficiency of 100 kVA, 3 kV/500 V, 50Hz single phase transformer is 95% which occurs at 3/4 th of full load, unity power factor. If the impedance is 10%, Calculate regulation at full load at 0.8 power factor lagging. [5+5]

OR

5.a) Describe the experimental test procedure to separate the core losses of a transformer.

b) A 1100/400V, 1-phase transformer gave the following test results open circuit test 1100V, 2A, 180W on l.v. side; short circuit test 20V, 25A, 20W on h.v. side Calculate the equivalent circuit constants. [5+5]

6.a) Derive an expression for approximate relative weights of conductor material in an autotransformer and 2-winding transformer, the primary voltage being V_1, and secondary voltage V_2. Compare the weights of conductor material when the transformation ratio is 3. Ignore the magnetizing current?

b) Explain open delta connection to carry out 3-phase operation with the help of two transformers. [5+5]

OR

7. A Scott connected transformer supplies two single phase furnaces at 200V, each taking 200 kW. The load on the leading phase is at unity power factor and that on the other phase is 0.8 power factor. The three phase input line voltage is 6600 V. Calculate the values of line currents on the 3-phase side. Neglect the magnetizing and core loss currents in the transformers. [10]

8.a) What are its advantages and disadvantages of wound rotor type induction motor?

b) Explain the phenomenon of crawling and cogging. [5+5]

OR

9.a) Explain how starting performance of 3-phase squirrel cage type induction motor is improved by means of double cage rotor windings.

b) Explain the phenomenon of crawling and cogging. [5+5]

10. A three phase, 15 kW, 400 V, 50 Hz, 4-pole, delta connected squirrel cage induction motor has the following data:
No-load: 400 V, 5.0 A, p.f. 0.2
Blocked rotor: 120 V, 20.0 A p.f. 0.6
The ratio of stator to rotor copper losses on short circuit is assumed to be unity. Draw the circle diagram and determine (a) the full load current and power factor (b) the maximum power developed (c) starting torque. [10]

OR

11. Explain the induction motor operation under injection of an e.m.f. into the rotor circuit. [10]

---ooOoo---