

R15

Code No: 124AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2017

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) Explain the need of finding Voltage regulation of a transformer. [2]
- b) Explain the significance of Voltage transformation Ratio (K) of a transformer. [3]
- c) Distinguish between Power and Distribution transformers. [2]
- d) What are hysteresis and eddy current losses and how can we reduce them? [3]
- e) Explain the importance of Polarity test in transformer. [2]
- f) What is the advantage of V – V connection? [3]
- g) List the applications of three phase induction motor. [2]
- h) Briefly explain the phenomena of Crawling in Induction motor. [3]
- i) How come the large rating Induction motors can be started? [2]
- j) Explain in brief the different methods of Speed control of Induction motors. [3]

PART-B

(50 Marks)

- 2.a) Derive the emf equation of a transformer.
- b) Draw and explain the total equivalent circuit of the transformer referred to Primary. [5+5]

OR

- 3.a) Draw the no-load and ON-load phasor diagrams for lagging p.f of 1- ϕ Transformer.
- b) A 4400 V, 50 Hz transformer has a hysteresis loss of 1250 W, eddy current loss of 2050 W and full load copper loss of 4000 W. If the transformer is supplied at 6600V, 75 Hz. What will be the losses? Assume that the full – load current remains the same. [5+5]

- 4.a) Explain the necessity of performing the O.C and S.C tests of a single phase transformer.

- b) A single – phase 200 KVA transformer has an efficiency of 95 % on full – load at 0.8 power factor and on half load at 0.8 power factor. Find:

- i) Iron loss
- ii) Full – load copper loss. [5+5]

OR

- 5.a) Explain the load sharing by two transformers if they have unequal voltage ratios.
- b) The maximum efficiency of a 500 KVA, 3300/500 V, 50 Hz single phase transformer is 97 % and occurs at $\frac{3}{4}$ full load, unity power factor. If the impedance is 10 %, calculate the regulation at full load; power factor is 0.8 lagging. [5+5]

- 6.a) List the advantages and disadvantages of Star-Star connection of transformers.
- b) A three phase 1000 KVA, 6600/1100 V transformer is delta connected on the primary and star connected on the secondary. The primary resistance/phase is $1.8\ \Omega$ and secondary resistance/phase is $0.025\ \Omega$. Determine the efficiency on full load at Unity power factor and 0.8 Power factor lagging if the iron loss is 15 KW. [5+5]

OR

- 7.a) Explain the conditions to be fulfilled for paralleling three-phase transformers.
- b) Two single phase electric furnaces A and B are supplied at 220V from a three phase, 1100 V supply by means of a Scott-connected transformer combination. If the total output is 600 KW at 0.6 power factor lagging, determine the currents in the winding and transformation ratio of each transformer. [5+5]

- 8.a) Derive the equation for frequency of rotor current under running conditions.
- b) A 50 H.P, 6-pole, 50 Hz, slip ring induction motor runs at 960 rpm on full load with a rotor current of 40 A. Allowing 300 W for copper loss in the short-circuiting gear and 1200 W for mechanical losses, find the resistance per phase of the three phase rotor winding. [5+5]

OR

- 9.a) Explain the constructional details of the three phase Induction motor.
- b) A 3-phase, 6-pole, 50 Hz induction motor has 160 N-m as its useful full-load torque. The rotor emf is observed to make 90 cycles per minute. Calculate: i) Motor output in KW ii) Copper losses in rotor iii) Motor input iv) Efficiency if mechanical torque lost in friction and windage is 20 N-m and stator losses are 800 W. [5+5]

- 10.a) Explain the working of Induction generator.
- b) Explain the constructional details and working of star-delta starter used in 3- ϕ I.M. [5+5]

OR

11. Draw the circle diagram of a 3-phase I.M. Explain how do you estimate the performance characteristics of 3- ϕ I.M. [10]

---ooOoo---