Code No: 114AB

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2015
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 M. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 M and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Define transformer, and classify different types of transformer. (2M)
b) Derive transformer EMF equation. (3M)
c) Draw a no load diagram of single phase transformer. (2M)
d) Why the transformer core is laminated? (3M)
e) Write short notes on Scott connection of a 3-phase transformers. (2M)
f) Comparison between 1-phase and 3-phase transformers. (3M)
g) Define slip in induction motor. (2M)
h) Derive the expression for maximum torque in 3-phase induction motor. (3M)
i) Discuss the advantages of circle diagram of a 3-phase induction motor. (2M)
j) Explain the principle of working of an Induction generator. (3M)

PART-B

(50 Marks)

2.a) Discuss the construction details of a transformer.
b) A single-phase transformer has 400 primary and 1000 secondary turns. The Net cross-Sectional area of the core is 60 cm^2. If the primary winding be connected to a 50 Hz supply at 500V, calculate
i) The peak value of the flux density in the core.
ii) The voltage induced in the secondary winding. [5+5]

OR

3.a) Explain the effect of variation of supply voltage and frequency on iron losses.
b) In a test to determine the losses of a 440 V, 50 Hz transformer, the total iron losses were found to be 2500 W at normal frequency and voltage. When the applied voltage and frequency is 220 V and 25 Hz, the iron losses were found to be 850 W. Calculate the eddy current loss at normal voltage and frequency. [5+5]

4.a) What is the need of parallel operation of single phase transformer? List out the Necessary and sufficient conditions for parallel operation of single phase transformer.
b) How we can predetermine the efficiency and regulation of single phase transformers. [6+4]

OR

5. The following test results were obtained for a 20kVA, 50Hz, 400/240V distribution transformer:

OC test(lv side) : 240 V, 1.066 A, 126.6 W

SC test(hv side) : 57.5 V, 8.34 A, 284 W Calculate

a) Equivalent circuit parameters when refered to hv side.

b) Efficiency of the transformer at half full - load with 0.8 power factor lagging. [5+5]

6.a) What is auto-transformer? Compare auto-transformer with two winding transformer.

b) A star/star/delta (P/S/T) transformer has rated voltages of 11 kV, 1.1 kV and 440 V. There is a balanced load of 500 kVA at 0.8 pf lagging in the secondary and 100 kVA at UPF in the tertiary. Find the primary currents and its power factor. [4+6]

OR

7.a) A 2-ph, 4 wire 250 V system is supplied to a plant which has a 3-ph motor load of 30 kVA. Two Scott connected transformers supply the 250 V motor. Calculate:

i) Voltage ii) kVA rating of each transformer

b) Discuss the ON load and OFF load trap changing transformers. [5+5]

8.a) Explain the construction and working principle of three phase induction motor.

b) A 3 phase induction motor has 2 poles and is connected to 400V, 50Hz supply. Calculate the actual rotor speed and rotor frequency when the slip is 4%. [5+5]

OR

9. In a 6 pole, 3-phase 50 Hz induction motor with star connected rotor, the rotor resistance per phase is 0.3 ohm, the reactance at standstill is 1.5 ohm per phase and an emf between the slip rings on open circuit is 175V. Calculate:

a) slip at a speed of 960 rpm

b) rotor emf per phase

c) rotor frequency and reactance at a speed of 950 rpm. [3+3+4]

10. Estimate the starting torque as a percentage of full-load torque for a 3-phase Induction motor for the following methods of starting:

a) Direct on line, b) Star-Delta, and c) Autotransformer which limits the starting current to twice the full load current. The full load slip is 0.03 and the short-circuit current is six times the full-load current. [3+3+4]

OR

11. Explain the various speed controlled methods of a 3-phase IM. [10]

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