Code No: 114AB **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2016
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) Distribution transformers always designed for low magnetic losses. Why? [2]
b) State how the LV and HV windings are arranged in a shell-type transformer. [3]
c) What is meant by transformer action? Under what conditions will it takes place? [2]
d) What useful information is obtained from the short circuit test? [3]
e) List the advantages and disadvantages of Auto-transformers. [2]
f) Explain the principle of operation of OFF load tap changing in transformers. [3]
g) What is crawling in an induction motor? [2]
h) List out the applications of 3-phase induction motor? [3]
i) Draw the Equivalent circuit of no-load test of a 3-phase induction motor. [2]
j) Explain the principle of operation of induction generator? [3]

PART - B **(50 Marks)**

2.a) With the help of phasor diagram, explain the operation of single-phase transformer on No-load.
b) A single-phase transformer has 500 turns on the primary and 40 turns on the secondary winding. The mean length of the magnetic path in the iron core is 150 cm and the joints are equivalent to an air gap of 0.1 mm. When a Potential difference of 3000V is applied to the primary, maximum flux density is 1.2 wb/m^2. Calculate
i) The cross-sectional area of the core
ii) No-load secondary voltage
iii) The no load current drawn by the primary
iv) Power factor on no-load.
Given that AT/cm for a flux density of 1.2 wb/m^2 in iron to be 5, the corresponding iron loss to be 2 watts/kg at 50 Hz and the density of iron as 7.8 gram/cm^3. [5+5]

OR

3.a) Describe briefly the various losses in a transformer and explain how each loss varies with the load current.
b) Explain how the iron losses are varied with voltage and frequency. [5+5]

4.a) Define voltage regulation of a transformer. Deduce the expression for the voltage regulation.
b) The number of turns on the primary and secondary windings of a single phase transformer is 350 and 35 respectively. If the primary is connected to a 2.2 KV, 50 Hz supply. Determine the secondary voltage. [7+3]

OR

5.a) What are the conditions required for the parallel operation of two transformers?

b) Derive the equations for the currents supplied by each transformer when two transformers are operating in parallel with equal voltage ratios. [5+5]

6.a) Explain how transients are produced in 3-phase transformers?

b) Explain star/delta and delta/star connections used in a 3-phase connection of Transformers. Also, state their advantages and disadvantages. [5+5]

OR

7. Explain scott connection with neat diagrams. With necessary phasor diagrams, prove that a three phase system can established from a two-phase system using T-T connection. [10]

8.a) Derive a relation between full load torque and maximum torque of a three phase Induction Motor.

b) A 3-phase, 400 V, 50 Hz induction motor takes a power input of 35 KW at its full load speed of 980 rpm. The total stator losses are 1 KW and the friction and wind age losses are 1.5 KW. Calculate:
(i) slip (ii) Rotor ohmic losses (iii) shaft power (iv) shaft torque (v) efficiency. [5+5]

OR

9.a) Derive the torque-slip equation for a 3-phase induction motor and also the equation for the slip at which maximum torque occurs?

b) A 415 V, 29.8 kW, 50 Hz, delta connected motor gave the following test data: No-load: 415 V, 21 A, 1250 W Locked-rotor test: 100 V, 45 A, 2730 W Construct the circle diagram and determine (i) The line current and power factor for rated output (ii) The maximum torque. (iii) Slip (iv) efficiency. Assume stator and rotor cu losses equal at standstill. [5+5]

10.a) Explain the consequent pole technique for controlling the speed of three phase Induction Motor.

b) Briefly discuss the principle of cascade connection of induction machines? [5+5]

OR

11. Explain in detail about the various starting methods of 3-phase induction motors. [10]

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