Code No: 114AB **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, October/ November- 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) Explain the procedure to separate the no-load losses of a transformer. [2]
b) Draw the shell type transformer and explains its principle of operation. [3]
c) State the conditions for parallel operation of transforms. [2]
d) Draw equivalent circuit of a short circuit test. [3]
e) Explain the principle of operation of a single phase auto transformer. [2]
f) Draw a circuit diagram for conversion of 2-winding transformer in to auto transformer in additive polarity. [3]
g) Define slip and its condition at the time of starting of 3-ϕ IM. [2]
h) Describe the relation between torque and rotor power factor. [3]
i) Explain speed control of 3-ϕ IM using change of frequency. [2]
j) Explain the working of Star-delta starter used in 3-ϕ IM. [3]

PART-B **(50 Marks)**

2.a) Why transformer rating in KVA? Explain in detailed.
b) Derive the condition for maximum efficiency in a single phase transformer.
c) Draw a simple graph and explain how efficiency changes with respect to power factor. [3+3+4]

OR

3.a) Explain the different types of losses in the transformer.
b) Derive the EMF equation of a single phase transformer.
c) A 25 KVA single phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500 V, 50Hz mains. Calculate (i) primary and secondary currents on full load (ii) secondary emf (iii) maximum flux in the core. [3+3+4]

4.a) A 100 KVA lighting transformer has a full load loss of 3 KW, the losses being equally divided between iron and copper. During a day, the transformer operates on full load for 3 hours, one half loads for 4 hours, and the output being negligible for the remainder of the day. Calculate the all day efficiency.
b) With neat circuit diagram explain principle of operation of a sumpners test on single phase transformer. [4+6]

OR

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5.a) A 10 KVA, 500/250 V single phase transformer has its maximum efficiency of 94% when delivering 90% of its rated output at unity pf. Estimate its efficiency when delivering its full load output at pf of 0.8 lagging.

b) Derive and explain necessary condition for zero and negative regulation of a transformer. [4+6]

6.a) Explain the scott connection operation with necessary circuit diagrams.

b) Two transformers are required for a scott connection operating from a 440V, 3-phase supply for supplying two single phase furnaces at 200 V on the two phase side. If the total output is 150 KVA, calculate the secondary to primary turn ratio and the winding currents of each transformer. [4+6]

OR

7.a) Derive the condition for saving of a copper in a single phase auto transformer.

b) A two winding transformer is rated at 2400/240 V, 50 KVA. It is reconnected as a step up auto transformer, with 2400 V input. Calculate the rating of the auto transformer and the inductively and conductively transferred powers while delivering the rated output at unity pf. [4+6]

8.a) An 8 pole 50 Hz 3 phase slip ring induction motor has effective rotor resistance of 0.08 ohms per phase. Starting speed is 650 rpm. How much resistance must be inserted in the rotor phase to obtain the maximum torque at starting? Ignore the magnetizing current and stator leakage impedance.

b) Explain the torque speed characteristics of 3-ϕ IM. [4+6]

OR

9.a) Derive and explain rotating magnetic field in a three phase induction motor.

b) The power input to the rotor of a 400V,50Hz,6 pole,3-phase induction motor is 75 KW. The rotor electromotive force is observed to make 100 complete alterations per minute. Calculate (i) slip (ii) rotor speed (iii) rotor copper losses per phase (iv) Mechanical power developed. [5+5]

10.a) Explain the procedure for conducting No load test on three phase induction motor.

b) Explain the speed control of induction motor using Rotor resistance control. [5+5]

OR

11.a) Explain the procedure of conducting of blocked rotor test on three phase induction motor.

b) Explan the working of Induction generator. [5+5]

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