USN | | | | | | | | | | |

10EE46

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Transformers and Induction Machines

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define Transformer and derive an EMF equation of a Transformer. **(06 Marks)**

b. Explain with the help of phasor diagram the operation of 1ϕ transformer when lagging power factor load is connected to the practical transformer. **(06 Marks)**

c. A Transformer on no load has a core loss of 50W, draws a current of 2A (rms) and has an induced emf of 230V (rms). Determine the no load power factor, core-loss current and magnetizing current. Also calculate the no load circuit parameters of the transformer. Draw the equivalent circuit and mention the parameters. **(08 Marks)**

2 a. Draw the approximate equivalent circuit of the given transformer and describe the required tests to determine the constants of the equivalent circuit. **(08 Marks)**

b. Derive conditions for the maximum efficiency of a transformer. **(06 Marks)**

c. Calculate the Regulation of a transformer in which copper loss is 1% of output and the percentage reactance drop is 5%. When load power factor is i) 0.9 lagging ii) 0.9 leading. **(06 Marks)**

3 a. Derive an expression for load sharing between two similar transformers connected in parallel with unequal voltage ratio. **(08 Marks)**

b. What is an auto transformer? Deriver an expression for the saving of copper in a auto transformer as compared to an equivalent 2 winding transformer. **(06 Marks)**

c. With a neat sketch explain the operation of constant voltage transformer. **(06 Marks)**

4 a. Enumerate the conditions for proper operation of 3ϕ transformers in parallel. **(06 Marks)**

b. Briefly explain the transformer connection for 3 phase operation for
   i) Star – Star
   ii) Delta – Delta
   iii) Star – Delta. **(06 Marks)**

c. Two Single phase Furnaces A and B are supplied at 100V by means of Scott connected transformer combination from a 3ϕ, 6600V system. The voltage of Furnace 'A' is leading. Calculate the line currents on the 3ϕ side, when the furnace 'A' takes 400kW at 0.707 lagging. **(08 Marks)**

PART – B

5 a. Show that a rotating magnetic field can be produced by the use of 3ϕ currents of equal magnitude and explain how this principle of rotating field is applied to the case of Induction motor. **(10 Marks)**

b. Derive the equation for Torque developed by the 3ϕ induction motor. Draw the typical Torque – slip characteristic curve and explain. **(10 Marks)**

6 a. A 3ϕ, 400V, 20HP, 50Hz star connected induction motor gave the following test results.

No Load	:	400V	1250W	9A
Blocked rotor	:	150V	4000W	38A

Stator copper loss equal to Rotor copper loss at stand still. Draw the circle diagram and estimate.

i) Full load current
ii) Full load pf
iii) Full load slip
iv) Ratio of maximum torque to full load torque. **(12 Marks)**

b. What is crawling and cogging? Explain each in brief. **(08 Marks)**

7 a. Discuss the working of a deep bar induction motor with a neat sketch. **(06 Marks)**

b. Write a note on importance of induction generator in wind mills. **(06 Marks)**

c. With a neat sketch explain the working of a double cage induction motor. Draw the equivalent circuit. **(08 Marks)**

8 a. With a neat sketch explain the construction, working and applications.

i) Split phase single phase induction motor
ii) Capacitors start single phase induction motor. **(10 Marks)**

b. Explain the double field revolving theory as applied to a single phase induction motor and prove that it cannot produce any starting torque. **(10 Marks)**

* * * * *