B.Tech Sem – V (2007 Course) (Electrical Engg.) : WINTER - 2018
SUBJECT: INDUCTION MACHINES THEORY AND DESIGN

Day: Saturday
Date: 01/12/2018

Time: 02.30 PM TO 05.30 PM
Max Marks: 80

W-2018-2806

N.B:

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY.** Out of the remaining attempt **ANY TWO** questions from each section.
2) Figures to the **RIGHT** indicate full marks.
3) Draw neat labeled diagrams **WHEREVER** necessary.
4) Answers to both the sections should be written in **SEPARATE** answer books.
5) Use of non programmable calculator is **ALLOWED.**
6) Assume suitable data, if necessary.

SECTION-I

Q.1 **a)** What is the importance of slip in a three phase Induction Motor? **(05)**

b) Why starters are necessary for starting Induction Motor? Name the different methods of starting. **(05)**

c) Describe the working of a Shaded pole motor. **(04)**

Q. 2 **a)** Draw and explain the equivalent circuit of a three phase Induction Motor. **(06)**

b) Explain with the help of suitable diagrams, how rotating magnetic field is produced in a three phase Induction Motor? **(07)**

Q. 3 **a)** Explain the method of speed control of three phase Induction Motor by varying the rotor resistance. **(06)**

b) Discuss the procedure of drawing the circle diagram of an Induction Motor. **(07)**

Q. 4 **a)** What are the different starting methods of single phase induction motor? Draw & explain torque speed characteristics of Resistance split motor & state the applications. **(07)**

b) Explain the double-revolving field theory for single phase induction motors. **(06)**

SECTION-II

Q. 5 **a)** Derive output equation for a 3 phase induction motor. **(05)**

b) Discuss in brief the process of design of wound rotor. **(05)**

c) Discuss various factors which affect the choice of specific loadings of a Single Phase Induction Motor. **(04)**

P. T. O.

Q. 6 **a)** Find the main dimensions for a 415 Volts 50 Hz 11kW, 1440 rpm, 3-phase induction motor using following data **(07)**
Specific Magnetic Loading = 0.46 wb/m^2, Specific Electric Loadings = 30000 A/m, , Full Load Efficiency = 0.87, Full load power factor = 0.88.

b) Discuss in detail the factors which affect the size of 3-phase induction motor. **(06)**

Q. 7 **a)** 15 kW, 415 volts, 3-phase, 6-pole, 50 Hz star connected squirrel cage induction motor has following data : **(07)**
Number of stator slots = 54, no. of rotor slots = 63, number of conductors per slot = 16, full load efficiency = 0.85, full load power factor = 0.84, δ_b = 6 A/mm^2, δ_e = 7 A/mm^2. Calculate the bar current & end ring current, cross section of each bar and each end ring.

b) Explain the factors taken into consideration while selecting the number of stator slots. **(06)**

Q. 8 **a)** Determine the main dimensions of a 3 HP, 230 V, 50 Hz, 4 pole, single phase induction motor using following data: **(07)**
B = 0.44 wb/m^2, ac = 11000 A/m, Cos Φ = 0.72 lag, full load efficiency = 68%.
Assume square pole construction.

b) Explain the procedure to design main & starting winding of a single phase induction motor **(06)**

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