2124

B.E. (Electrical and Electronics Engineering)
Third Semester
PC-EE-302: Electrical Machine - I

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt <u>five</u> questions in all, including Question No. 1 which is compulsory
and selecting two questions from each Unit.*

x-x-x

I.   Attempt the following:-

   a)   How the critical field resistance of a dc shunt generator is estimated from its
        OCC?

   b)   A certain transformer has a turns ratio of 1 and a coupling coefficient of 0.85.
        When 2V ac is applied to the primary, what is the secondary voltage?

   c)   How will you change the direction of rotation of a d.c. motor. Explain.

   d)   How does the addition of a capacitor influence the speed -torque curve of a
        single-phase induction motor?

   e)   Explain rotor inpendance transformation and its importance.   (5x2)

UNIT - I

II.   a) From the fundamentals, develop the exact equivalent circuit of a transformer.

      b) A 3-ϕ transformer bank consisting of three 1-phase transformer is used to step down
         the voltage of a 3-phase, 6600v transmission line. If primary line current is 10A.
         Calculate the secondary line voltage, line current and output kVA for Y/Δ connection,
         the terns ratio in 12 and neglect losses.   (2x5)

III. a) Define the regulation and efficiency of a transformer. Show how the power factor
         affects both of them.

      b) Briefly explain the function of compensating winding in D.C. machine.   (2x5)

IV.   Discuss in detail about shunt armature speed control of dc shunt motor. A 500 V dc
      shunt motor running at 500 rpm takes an armature current of 50A. Its affective
      armature resistance is 0.4Ω. What resistance must be placed in series with the armature
      to reduce the speed to 600 rpm, the torque remaining constant?   (10)

P.T.O.

UNIT - II

V. a) Explain the conditions under which an induction motor operates as a generator. What changes occur in the power flow during this transition?

b) During a blocked rotor test, a 3-φ 400V, 50Hz induction motor drawn 30A and consumer 6kW of power. Determine the equivalent resistance and reactance per phase referred to stator.

(2x5)

VI. a) What is a permanent slip capacitor motor? Explain its working and typical applications.

b) A shaded pole motor has a shaded portion of 25% of each pole. If the main flux produces an average flux density of 0.1 T over the shaded pole area, calculate the starting torque produced by the shading coil.

(2x5)

VII. Write notes on the following:-

a) Double revolving field theory

b) Frequency control and Rotor resistance control

(2x5)

x-x-x