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Exam.Code:1018  
Sub. Code: 7788

1059

M.E. Electronics Engineering (Power System)  
Second Semester

EE-8204 (b): Modeling and Analysis of Electrical Machines

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt any five questions.

x-x-x

- I. For the given transfer function of a system

$$T(s) = \frac{b_0}{s^3 + a_2s^2 + a_1s + a_0}$$

- II. Obtain the dynamic phase-variable state-model for a system described by the differential equation. (10)
- III. Develop the expression for force in a singly-excited electromechanical system in terms of energy and co-energy. Also, find out the expressions for flux linkage, and current,  $i$  in terms of energy and co-energy. (10)
- IV. Starting from voltage equations of three-phase induction machine in 'arbitrary reference frame', develop the voltage equation based model of the same machine in 'synchronously rotating reference frame'. (8,2)
- V. Also, draw its equivalent circuit model in 'synchronously rotating reference frame'. (10)
- VI. Derive the steady-state equivalent circuit from the dynamic equations of three phase induction motor. (10)
- VII. Develop the electromechanical dynamic model of a symmetrical single phase induction motor with its equivalent circuit representation. (10)
- VIII. a) Develop the detailed nonlinear electromechanical dynamic model of permanent magnet synchronous machine (PMSM).  
b) Compare the power output ratio of PM dc brushless motor and PM synchronous motor. (6,4)

P.T.O.

(2)

IX. Explain various reactances and time constants from the d-axis equivalent circuits of a three-phase synchronous machine. (10)

X. Write short notes on:-

a) Switched reluctance motor

b) Parks transformation (2x5)

x-x-x