Hall Ticket Number:

Code No.: 7213 M

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.E. I Year (EEE) II-Semester (Make Up) Examinations, August-2016
(Power Systems & Power Electronics)

Machine Modelling and Analysis

Time: **3** hours   Max. Marks: **70**

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2=20 Marks)

1. What do you mean by energy and co-energy in a magnetic field of an electromagnetic device?

2. Draw and explain the steady state operating characteristics of a shunt connected DC machine with constant voltage source.

3. Draw the cross section diagram of a dc machine with parallel armature winding and mention the parallel paths.

4. Mention about reference frame speeds, variable notations for the commonly used reference frames.

5. If A is in one reference frame and B another, show that $({}^{A}K^{B})^{-1} = {}^{B}K^{A}$.

6. What is Parks transformation?

7. Draw the winding arrangement of two pole, three phase, Wye connected, symmetrical induction machine.

8. Show that the inertia constant H is equivalent to the stored energy of the rotor at synchronous speed normalized to the base power.

9. Draw the diagram of elementary two pole, two phase and salient pole synchronous machine.

10. Write the basic equation for mutual inductance between windings x and y.

Part-B (5 × 10=50 Marks)
(All bits carry equal marks)

11. a) Demonstrate the computer simulation of a coupled circuit with the help of equations.

    b) Draw and express the two axis primitive model of a synchronous machine with damper windings.

12. a) Describe the mathematical model of DC series machine.

    b) Develop the Time domain block diagram of DC series machine.

13. a) Explain about three phase stationary circuit Resistor elements transformed to arbitrary reference frame with the help of equations.

    b) Explain about three phase stationary Inductor elements transformed to arbitrary reference frame with the help of equations.

14. a) Draw the equivalent circuit diagram of two pole, three phase and star connected symmetrical Induction machine in machine Variables using necessary variables.

    b) Obtain voltage equations of two pole, three phase and star connected symmetrical Induction machine in machine Variables in terms of flux linkages/sec.

15. a) Obtain the voltage equations of a three phase Synchronous machine with the reference frame fixed in rotor.

    b) Develop the equivalent circuit of a three phase Synchronous machine with the reference frame fixed in rotor with the help of equations.

16. a) Develop the equivalent circuit of magnetically coupled coil with coil 2 selected as reference and with the help of equations briefly.

    b) Draw time domain block diagram of DC Shunt motor along with state equations.

17. Write short notes on any **two** of the following:

    a) Variables observed from various reference frames.

    b) Torque equation of Induction machine in machine variables.

    c) Torque equation of synchronous machine in machine variables.

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