Hall Ticket Number:

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Code No.: 22703 M

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.E. (EEE: CBCS) II-Semester Make Up Examinations, September-2017
(Power Systems & Power Electronics)
Machine Modeling 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. Draw the basic two pole machine diagram and label its parts.
2. Write the voltage and current relationship regarding machine modeling.
3. Distinguish between DC series motor and DC shunt motor with respect to machine modeling.
4. Mention the transfer function of DC motor.
5. What are the commonly used reference frames?
6. Write transformation matrix.
7. What happens if a 3-phase balanced set is transformed to an arbitrary reference frame?
8. What do you mean by free acceleration characteristics?
9. How will a synchronous machine behave during 3-ph fault at machine terminals?
10. Write voltage equation of a synchronous machine with reference to rotor frame theory.

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

11. a) Formulate the relation between mutual inductance (L_{21}) and reluctance of magnetic flux path (R_m) between two coils consists of turns N_1 and N_2 of magnetically coupled circuit.

    b) Formulate torque equation of Kron's primitive machine.

12. a) Develop the equivalent circuit of a DC series motor, write the voltage, current and torque equations. Obtain its transfer function equations with suitable assumptions.

    b) Develop time domain block diagram of DC shunt motor.

13. a) Explain about balanced steady state relationships used in the analysis of electric machine.

    b) Describe the concept of transformation between reference frames.

14. a) Draw the approximate steady state torque characteristics of a single excited induction motor for various rotor resistance. Explain in detail about it.

    b) Formulate voltage equations of symmetrical induction machine in arbitrary reference frame variables and its equivalent circuit diagram.

15. a) With the help of energy stored in coupling field expression of a synchronous machine formulate torque equation in rotor reference frame variables.

    b) Define park's transformation and explain its significance in the analysis of synchronous machine.

16. a) Establish a relationship between voltage and current for basic machine analysis purpose.

    b) Obtain transfer function of DC shunt motor and formulate equivalent state space matrix for this machine.

17. Answer any *two* of the following:
    a) Explain the concepts of reference frame theories with proper illustrations.
    b) Describe the equations of transformation for rotor circuits of induction machine.
    c) List parks equations w.r.t synchronous machine.

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