

**Registration No.**

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**M.E./M.Tech. Degree Examinations, January 2017**

**First Semester**

**POWER ELECTRONICS AND DRIVES**

**PD16101 – ANALYSIS OF ELECTRICAL MACHINE**

**(Regulation 2016)**

**QP Code: 504221**

**Time: Three hours**

**Maximum : 100 marks**

**Answer ALL questions**

**PART A - (10 X 2 = 20 Marks)**

1. Define leakage Coefficient and fringing flux in magnetic circuit
2. Compare singly and doubly excited system
3. Write the general torque equation of DC machine
4. Draw the OCC of separately excited DC generator and comment on it.
5. Write the advantage of reference frame theory.
6. What do you mean by clarke's transformation?
7. Sketch the steady state torque-speed characteristics with variation of rotor resistance.
8. Briefly explain the dynamic characteristics of induction machine.
9. Write down the different methods to reduce hunting in synchronous machine?
10. Define load angle in synchronous motor?

**PART B - (5 X16 = 80 Marks)**

11. (a) Explain the concept of electro mechanical energy conversion and derive the (16) energy balance equation of multiple mechanical and electrical inputs.

**(OR)**

(b) Explain the machine winding and air gap mmf of 2-pole Y –connected (16) salient pole synchronous machine with suitable diagrams and equations.
12. (a) Explain the dynamic performance of different rated permanent magnet D.C (16) machine during starting and during sudden change of load with characteristic curve.

**(OR)**

- (b) Derive the voltage and torque equations of D.C. shunt and D.C series (16) machine and explain steady state torque-speed characteristics.
13. (a) (i) Explain in details of historical background of reference frame theory. (8)  
(ii) Derive the stationary circuit variables transformed to arbitrary (8) reference frame of a 3-phase resistive element.
- (OR)**
- (b) Explain in details the variables observed from several frames of reference. (16)
14. (a) Derive the voltage and torque equations in machine variables of 3-phase (16) induction motor.
- (OR)**
- (b) Derive the voltage equations in arbitrary reference frame variables of 3- (16) phase induction machine and draw the circuit diagrams.
15. (a) Derive the voltage equations in rotor reference frame variables (Park's (16) equation) of a 3-phase synchronous machine.
- (OR)**
- (b) Explain the digital computer simulation of a 3-phase synchronous machine (16) with relevant equation and block diagrams.