Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE308

Course Name: Electric Drives

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries5 marks. Marks

1 What is an Electric Drive? Explain the function of each blocks with the help of a neat block diagram. (5)

2 Explain the armature voltage control and field weakening mode control of DC separately excited motor drive system. (5)

3 With a chopper circuit and waveforms explain the regenerative braking of a DC motor drive. (5)

4 Explain the speed control method of induction motor with stator voltage and also state the disadvantages of this method. (5)

5 Compare CSI fed IM drive with VSI fed IM drive (5)

6 Explain the Park's transformation. (5)

7 With a block diagram explain the variable frequency control of SM drive in self-control mode. (5)

8 Explain the V/F control characteristics in torque-speed plane of a SM drive (5)

PART B

Answer any two full questions, each carries10 marks.

9 a) What are the different components of a load torque? Explain each component in detail. (5)

b) Derive the mathematical condition to obtain the steady state stability of equilibrium point. (5)

10 With a neat sketch, explain the motoring and braking operation of three phase fully controlled rectifier control of separately excited DC motor. (10)

11 A 200 V, 875 rpm, 150 A separately excited dc motor has an armature resistance of 0.06Ω. It is fed from a single phase fully controlled rectifier with an ac voltage of 220 V,50Hz. Assuming continuous conduction, calculate (10)

(i) Firing angle for rated motor torque and 750 rpm

(ii) Firing angle for rated motor torque and -500 rpm

(iii) Motor speed for firing angle $\alpha=160^{\circ}$ and rated torque

PART C

Answer any two full questions, each carries10 marks.

12 Explain the operation of four quadrant chopper fed separately excited DC motor drive with necessary diagrams. (10)

13 Explain the closed loop static rotor resistance control method for the speed control of a slip ring induction motor. What are the disadvantages of this method? (10)

14 Explain the static Kramer scheme for the speed control of a slip ring IM. Explain the firing angle control of thyristor bridge with constant motor field. (10)

PART D

Answer any two full questions, each carries 10 marks.

15 a) With a neat circuit and waveform explain a thyristor based CSI fed IM drive. (5)

b) Explain how CSI fed IM drive can be used for regenerative braking and multiquadrant operation. (5)

16 a) Explain in detail about the classification of PM synchronous motor? (5)

b) Explain the field oriented control (FOC) of an AC motor with a block diagram (5)

17 With a block diagram explain the Micro controller based PMSM drive. (10)

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