

Reg No.: _____

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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 carries 5 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 carries 10 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 carries 10 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)
