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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SECOND SEMESTER M.TECH DEGREE EXAMINATION, MAY 2018

Electrical and Electronics Engineering

(Electrical Machines, Power Control and Drives)

01EE6302 Electric Drives

Max. Marks : 60 Duration: 3 Hours

Part A

1. a) Explain steady state stability of electrical drives. (5 marks)

   b) A 220V, 875rpm, 150A separately excited dc motor has an armature resistance of 0.06ohm. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220V, 50 Hz.

   Assuming continuous conduction, calculate

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

   (ii) firing angle for twice rated motor torque and -500 rpm.

   (iii) motor speed for $\alpha=160^0$ (4 marks)

2. a) A motor drives two loads and has an inertia of 0.2 kg-m^2 and runs at a constant speed of 1000 rpm. One load has rotational motion. It is coupled to the motor through a reduction gear with a=0.2 and efficiency of 80%. The load has a moment of inertia of 5 kg-m^2 and a torque of 5Nm. Other load has translational motion and consists of 100 kg weight to be lifted up at a uniform speed of 1.5 m/s. coupling between this load and the motor has an efficiency of 90%. Determine equivalent inertia referred to the motor shaft and power developed by the motor.

   (6 marks)

   b) What are the classifications of load torque? Draw the speed-torque characteristics of any three loads. (3 marks)

3. Explain the four quadrant operation of a separately excited dc motor using dual converter in circulating current mode. (9 marks)

Part B

4. a) Explain the closed loop operation of stator voltage control of induction motor drives with necessary diagrams. (6 marks)

b) Explain the working of a current source inverter fed induction motor drive with necessary diagrams. (6 marks)

5. a)Explain the operation of a static scherbius drive with neat diagram. Mention its advantages and disadvantages. (6 marks)

b)With a neat diagram explain the volts/hertz control in induction motor. Mention the advantages. (6marks)

6. Explain the direct vector control operation of three phase induction motor drive with neat block diagram. (12 marks)

Part C

7. a) Draw and explain the performance characteristics of synchronous motor drive in constant torque region and field weakening region. (4 marks)

b) Explain with neat block diagram the operation of a self controlled synchronous motor. (5 marks)

8. Describe with block diagram the closed loop v/f control implementation of synchronous motor drive. (9marks)

9. a) Explain the speed control of a BLDC motor drives with necessary diagrams and waveforms. (6 marks)

b) What are advantages of BLDC motor over conventional DC motor? (3 marks)