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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Seventh Semester, B.E. - Electrical and Electronics and Engineering
Semester End Examination; Dec. - 2019
AC - DC Drives

Time: 3 hrs   *Max. Marks: 100*

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

1 a. With a neat block diagram, explain the functions of the components of an electric drive. | 6

b. With neat circuit diagram and speed-torque characteristics, explain the dynamic braking and plugging operations of a separately excited DC motor. | 8

c. A 220 V, 750 rpm, 150 A separately excited DC motor has an armature resistance of 0.1 Ω. It is fed from a single phase fully controlled rectifier with as AC voltage source of 230 V, 50 Hz. Assume continuous conduction and calculate; | 6

 i) Firing angle for rated motor torque and 500 rpm

 ii) Motor speed $\alpha = 140°$ and rated torque

2 a. For a separately excited DC motor controlled by a 1-ϕ fully controlled rectifier. Obtain the expression for output voltage during discontinuous conduction mode. Obtain the boundary conditions and draw the speed torque characteristics. | 12

b. Define continuous conduction and discontinuous conduction mode. For a DC separately excited motor fed from 1-ϕ half controlled rectifier. Explain the motor operation in continuous conduction mode and arrive at the expression for output voltage, speed and torque. | 8

UNIT - II

3 a. With neat circuit and relevant waveforms, explicate the operation of a 3-ϕ fully controlled rectifier fed separately excited DC motor in discontinuous conduction mode. | 10

b. Exemplify the operation of a DC drive in all four quadrants, when fed by single phase dual converter? Also state how speed reversal can be obtained? | 10

4 a. Explain and analyse the operation of a DC separately excited motor during; | 10

 i) Regenerative braking

 ii) Dynamic braking when controlled by a DC converter.

 Plot the speed torque characteristics.

b. Explain the operation of four quadrant chopper with circuit diagram and operating characteristics. | 10

UNIT - III

5 a. With a neat block diagram, explain the phase locked loop control of DC motor. 10

b. Derive an expression for closed loop opertion of a separately excited DC motor for change in voltage. 10

6 a. Explain the operation of 3-ϕ induction motor with unbalanced supply voltage and single phasing. Draw the corresponding speed torque characteristics. 10

b. Obtain the performance equations of a 3-ϕ IM. 10

UNIT - IV

7 a. With a neat circuit and relevant wave forms, elaborate the operation of VSI fed IM drive. 10

b. Using V/F control, explains the speed control phenomenon of a 3-ϕ Induction motor. 10

8 a. Explain in detail with relevant circuit and characteristics, how a static scherbius drive is used to control speed of a wound rotor Induction motor below synchronous speed. 10

b. With neat diagrams, exemplify AC dynamic braking, self-excited barking and zero-sequence braking of Induction motor drives. 10

UNIT - V

9 a. Explain the operation synchronous motor, when fed from a fixed frequency supply. 10

b. With a neat circuit, discuss the opertions of a self-controlled synchronous motor drive employing load commutated thyristor inverter. 10

10 a. With a neat sketch, explian the various processes involved for manufacturing cement in a cement mill drive system. 10

b. Explain clearly the rating and different types of motors employed in the textile mill industry for different opertaion. 10

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