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15MT554

Fifth Semester B.E. Degree Examination, June/July 2019
Drives and Controls

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. What are the advantages of electrical drives? **(06 Marks)**

b. With a neat block diagram explain the components of general electric derive system. **(06 Marks)**

c. Give comparison between AC drives and DC drives. **(04 Marks)**

OR

2 a. What are the various components of load torque? Explain. **(06 Marks)**

b. Explain the three modes of operation of electrical drives. **(10 Marks)**

Module-2

3 a. Explain about steady stability of on electric drive. **(08 Marks)**

b. Explain load equalization in electric drives. How can the load equalization be done for fluctuating loads? **(08 Marks)**

OR

4 a. A motor operates on a periodic duty cycle of a locked period of 20 min and a no-load period of 10min. The maximum temperature rise is 60°C heating and cooling time constants are 50 and 70 minutes respectively. When operating continuously on no-load the temperature rise is 10°C determine :

i) Minimum temperature during the duty cycle

ii) Temperature when the motor is loaded encountered. **(08 Marks)**

b. Explain briefly the various classes of motor duty as per load time variations encountered. **(08 Marks)**

Module-3

5 a. Describe the regenerative electrical braking for motors. **(06 Marks)**

b. A 200V, 875 rpm, 50A, separately excited dc-motor has an armature resistance 0.06Ω and an inductance of 2.85mH. It is fed from a single phase fully controlled bridge rectifier with an AC source voltage of 220V, 50Hz, calculate the motor speed for $\alpha = 120°$ and T = 1200 N-m. **(10 Marks)**

OR

6 a. With a neat circuit diagram and relevant waveform describe the control of separately excited DC motor using three–phase fully–controlled bridge rectifier. **(10 Marks)**

b. A 230V, 960rpm and 200A separately excited DC motor has an armature resistance of 0.02Ω. The motor is fed from a chopper which provides both motoring and braking operations, and braking is dynamic braking with a braking resistance of 2Ω. The source voltage is 230V. Calculate duty ratio of chopper for a motor speed of 600rpm and braking torque of twice the rated value. **(06 Marks)**

Module-4

7 a. Derive an expression for the torque when the induction motor is controlled by a current source inverter at fixed frequency. **(06 Marks)**

b. A 440V, 50Hz, 6pole, 950rpm, Y-connected indirection motor has following parameters referred to stator : $R_s = 0.5\Omega$, $R_r' = 0.4\Omega$, $X_S = X_r' = 1.2\Omega$, $X_m = 50\Omega$ motor is driving a fan load, torque of which is given by $T_L = 0.0123 Wm^2$. Now phase of motor fails. Calculate motor speed and current. Will it be safe to run motor for a long period? **(10 Marks)**

OR

8 a. Draw the circuit diagram and explain working of slip power recovery system using solid state scherbious system. **(08 Marks)**

b. With neat figure/current diagram discuss the following methods used to start the induction motor.
i) Star delta starter method
ii) Rotor resistance starter. **(08 Marks)**

Module-5

9 a. Write a technical note on textile mill drives and cement mill drives. **(08 Marks)**

b. Explain loom motors, card motors, and spinning motors with their selection for particular operation/function and their ratings for rolling mill drives. **(08 Marks)**

OR

10 a. Explain the requirements of paper machine drive. **(05 Marks)**

b. Describe the motors used in coal and mining industry. **(05 Marks)**

c. Mention the main requirements of electric motors used for traction work and explain suitability of DC series motor for traction. **(06 Marks)**

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