CBCS SCHEME

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21MT42

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Electrical Drives and Control

Time: 3 hrs. Max. Marks: 100

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. Explain the components of electric drive system with a neat block diagram. Mention its advantages. **(10 Marks)**

b. Summarize the working of group drive and individual drive with relevant functional diagram. **(10 Marks)**

OR

2 a. Derive an expression for thermal model of an electric motor and plot the heating and cooling curves to represent the same. **(10 Marks)**

b. With a neat graph, illustrate the various classes of duty and represent the variation in temperature and torque. **(10 Marks)**

Module-2

3 a. Demonstrate the relationship between torque and the speed in an electric motor and show the graph with relevant expression. **(06 Marks)**

b. Compare the highlights of electric braking with mechanical braking. **(06 Marks)**

c. A 220 V DC shunt motor has an armature resistance of 0.062 Ω and with full field has an end of 215 V at speed of 960 rpm. The motor is driving a load with a torque of 172 Nm. Calculate the minimum speed at which the motor can hold the load by mean by regenerative braking. **(08 Marks)**

OR

4 a. Outline the working principle of plugging type of braking process in DC shunt and series motor with a neat circuit. **(10 Marks)**

b. Distinguish between the regenerative braking and dynamic braking. **(05 Marks)**

c. List and explain various components of load torque with suitable expressions. **(05 Marks)**

Module-3

5 a. With a neat circuit diagram, explain the working of 3-point starter and mention its advantages and limitations. **(10 Marks)**

b. Elaborate on the phase controlled rectifier based power control circuit in DC motors. **(10 Marks)**

OR

6 a. Demonstrate the operation of slip-ring induction motor and mention its advantages and limitations. **(10 Marks)**

b. With a neat circuit diagram, explain the working of 4-point starter in an electric motor. **(10 Marks)**

Module-4

7 a. Draw the circuit to control the speed of DC shunt motor and explain the steps involved in variation of field resistance. **(10 Marks)**

b. Interpret usage of Ward – Leonard method to control the speed of DC shunt motor over forward and reverse rotations. **(10 Marks)**

OR

8 a. Explain the working of silicon controlled rectifier (SCR) with I-V characteristics and a circuit to control speed of a DC motor. **(10 Marks)**

b. Outline the operating of DC choppers in speed control of DC motor and list its advantages. **(10 Marks)**

Module-5

9 a. Summarize the classification of AC regulators used to control the rms value of ac voltage applied to motor. **(08 Marks)**

b. Illustrate the working of 3 phase half wave and full wave AC regulator with a neat circuit diagram. **(12 Marks)**

OR

10 a. List the most commonly used inverter power circuit for AC motor drives and briefly explain any two invertors. **(10 Marks)**

b. Explain the speed control technique used in three phase induction motor. **(10 Marks)**

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