

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: BE
BRANCH: EEE**

**SEMESTER: VI
SESSION : SP/2019**

SUBJECT : EE6205 INDUSTRIAL DRIVES AND CONTROL

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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- Q1 (a) What are the reasons for using load equalisation in an electrical drive? [2]
(b) Explain the multiquadrant operation of a motor driving a hoist load with a labelled diagram. [3]
- Q2 (a) What are the advantages of electrical drives? [2]
(b) Write the torque equation for a motor-load system and explain acceleration and deceleration phenomena. [3]
- Q3 (a) Name any four classes of motor duty as per IS:4722-1968. [2]
(b) A motor operates on a periodic duty cycle in which it is clutched to its load for 10 min and declutched to run on no-load for 20 min. Minimum temperature rise is 40°C. Heating and cooling time constants are equal and have a value of 60 min. when load is declutched continuously the temperature rise is 15 °C. Determine [3]
i. Maximum temperature during the duty cycle, and
ii. Temperature when the load is clutched continuously.
- Q4 (a) Explain any one method of speed sensing. [2]
(b) Explain closed-loop current limit control scheme. [3]
- Q5 (a) Write down the basic equations for speed - armature current relation and for speed - Torque relation applicable to all dc motors. Modify the equation for series motors. [2]
(b) A 220 V, 200 A, 800 rpm dc separately excited motor has an armature resistance of 0.06 Ω. The motor armature is fed from a variable voltage source with an internal resistance of 0.04 Ω. Calculate internal voltage of the variable voltage source when the motor is operating in regenerative braking at 80% of the rated motor torque and 600 rpm. [3]
- Q6 (a) Write a short note on field flux control of shunt motor with supporting diagram. [2]
(b) A 200 V, 875 rpm, 150 A separately excited dc motor has an armature resistance of 0.06 Ω. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220 V, 50 Hz. Assuming continuous conduction, calculate [3]
i. Firing angle for rated motor torque and 750 rpm
ii. Firing angle for rated motor torque and (-500) rpm
iii. Motor speed for $\alpha = 160^\circ$ and rated torque

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