

- Instructions:**
- 1) All questions are compulsory.
  - 2) Figures in rounded ( ) brackets within the question, indicate the scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
  - 3) CO is the index number of the Course Outcome statement.
  - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyze, evaluate and create respectively.
  - 5) Assume suitable data if necessary.
  - 6) Use of non-programmable calculators is allowed

		Marks	BT Level	COs
<b>Q.1</b>	<b>A</b> A weight of 500 kg is being lifted up at a uniform speed of 1.5 m/s by a winch driven by a motor running at a speed of 1000 rpm. The moment of inertia of motor and winch are 0.5 and 0.3 kg – m <sup>2</sup> respectively. Calculate the motor torque and equivalent inertia of motor referred to the motor shaft. In the absence of the weight, motor develops a torque of 100 N-m when running at 1000 rpm. Also estimate the motor power rating.	8	3	CO2
	<b>B</b> Find out expression for speed due to small perturbations for steady state stable Motor-Load System.	9	4	CO1
	<b>OR</b>			
	<b>B</b> State steady state stability of Electrical Drive. Justify the stability using motor torque and load torque characteristics with two examples each, for stable and unstable drive.	9	4	CO1
<b>Q.2</b>	<b>A</b> A 220V, 700 rpm, 10 A separately excited DC motor has an armature resistance of 0.5 Ω. It is fed from a single phase fully controlled rectifier with an AC source voltage of 230 V, 50 Hz. Assuming continuous conduction <b>calculate:</b>	8	3	CO4
	1. Firing angle for rated motor torque and 500 rpm.			
	2. Firing angle for rated motor torque and (-500) rpm			
	3. Motor speed for α=120° and half the rated torque.			
	<b>B</b> Draw and explain Single Phase Full Converter fed DC Motor Drive with necessary circuit diagram, waveforms mathematical expressions and characteristics.	9	4	CO3
	<b>OR</b>			
	<b>B</b> Draw and explain single phase semi-converter fed DC Motor Drive and justify that it is a single quadrant drive.	9	4	CO3

