

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

CLASS: B.Tech
BRANCH: EEE

SEMESTER : VII
SESSION : MO/2024

SUBJECT: EE437 INDUSTRIAL DRIVES AND CONTROL

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
-

		CO	BL
Q.1(a)	Explain different types of load torques with graphical analysis and provide suitable example	[5] 1	2
Q.1(b)	A motor has two loads. One has rotational motion. It is couple to the motor through a reduction gear with a = 0.1 and efficiency of 90%. The load has moment of inertia of 10Kgm ² and a torque of 10 Nm. Other load has translational motion and consists of 1000Kg weight to lifted to a uniform speed of 1.5m/s. Coupling between this load and the motor has efficiency of 85%. Motor has an inertia of 0.2kgm ² . And runs at a constant speed of 1420 rpm. Determine equivalent inertia referred to the motor shaft and torque developed by the motor.	[5] 1	2
Q.2(a)	Obtain the thermal model of a motor for temperature rise of the system	[5] 2	3
Q.2(b)	A constant speed drive has the following duty cycle. (i)Load rising from 0 to 400kW: 5 min (ii)Uniform load of 500kW : 5 min. (iii) Regenerative power of 400kW returned to the supply : 4 min (iv) Remains idle for : 2 min Estimate the power rating of the motor. Assume the losses to be proportional to (power) ²	[5] 2	3
Q.3(a)	Analyse different speed control methods of DC machines and give conclusion which one is practically feasible	[5] 3	4
Q.3(b)	Analyse the operation of Single phase fully controlled rectifier. Derive the relation of average output voltage in single phase fully controlled rectifier in continuous and discontinuous. Draw the relevant equivalent circuit and waveforms	[5] 3	4
Q.4(a)	Apply open loop and closed loop Volts/Hz control to voltage fed inverter induction machine. Draw the block diagrams, speed-torque characteristics of the drive and effect of load torque variation.	[5] 4	5
Q.4(b)	Investigate the harmonics impact on inverter fed induction motor	[5] 4	5
Q.5(a)	Evaluate the operation of a brushless dc (trapezoidal PMAC) motor drive. Draw the circuit and waveforms. Write the governing equations	[5] 5	6
Q.5(b)	Design Real time closed loop speed control of BLDC motor using Arduino	[5] 5	6

:::::19/11/2024 M:::::