MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

FIFTH SEMESTER B. TECH (ELECTRONICS AND INSTRUMENTATION) PROCTORED ONLINE END SEMESTER EXAMINATION Dec. 21/Jan. 22

SUBJECT: Control System Components (ICE 3151)

TIME: 2.20 - 3.45 PM

DATE: 23/12/2021

MAX MARKS 20

Note: Answer All questions.

1	A	Describe the construction and working of the rate gyroscope.	4M
	В	With neat diagram, explain working principle of the shuttle valve and list the applications of time delay valve.	3M
	С	A drive has following equations for motor and load torques: $T = -1 - 2\omega_m$ and $T_l = 3\sqrt{\omega_m}$ Obtain equilibrium points and determine steady state stability analytically.	3M
2	A	Refer <u>https://www.tachogenerators.co.uk/pdf/59271be96d355GT5.pdf</u> (also in the files section of this team) and evaluate the "Replacement switching diagram", page 6 and arrive at the performance characteristics if this was to be used as a feedback device for diesel locomotion.	4M
	В	 i. Find the proper C_v for a valve that must allow 150 gal of ethyl alcohol per minute with a specific gravity of 0.8 at maximum pressure of 50 psi. ii. An equal percentage valve has a maximum flow of 50 cm³/s and a minimum of 2 cm³/s. If the full travel is 3 cm, find the flow at a 1-cm opening. 	3М
	С	A cam that is designed for cycloidal motion drives a flat-faced follower. During the rise, the follower displaces 1 in for 180° of cam rotation. If the cam angular velocity is constant at 100 rpm, determine the displacement, velocity, and acceleration of the follower at a cam angle of 60° .	3M