

## FIFTH SEMESTER B. TECH. (INSTRUMENTATION AND CONTROL ENGG.) END SEMESTER DEGREE EXAMINATIONS, DECEMBER – 2018

SUBJECT: CONTROL SYSTEM COMPONENTS [ICE 3105]

## TIME: 3 HOURS

## MAX. MARKS:50

## **Instructions to Candidates:**

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A 1B 1C	Draw the schematic of an armature controlled DC servo motor and explain its working. Describe the importance of knee point.	
	Draw the torque speed characteristics of a DC servomotor and explain the effect of increase or decrease in coil resistance values. A 200 g mass is tied with a string which needs to be accelerated upwards at least 2 m/s <sup>2</sup> . The spindle that pulls up has a radius of 5 cm. Calculate the torque and power requirements.	4 2
2B	For the figure given in Fig. 2B, calculate the final position of TR and individual stator voltages of TX and TR, if TX rotor is at 60° CW.	4
2C	For a double acting cylinder drive as shown in Fig. 2C, explain the working and position of the cylinder for all the possible combinations solenoid valve actuation.	3
3A	The maximum flow rate through an equal percentage control value is $10 \text{ m}^3/\text{hr}$ . If the value has a turndown ratio of 30:1, estimate the flow rate at 40%, 50% and 60% respectively.	3
3B	Draw a level control system with control valve as actuator and explain about the loop gain.	3
3C	Discuss the methods to avoid cavitation and flashing in detail.	4
<b>4</b> A	Explain the working of a pilot bleed type proportional relay controller.	4
<b>4B</b>	Describe the construction and working of Swash plate piston pump.	4
<b>4</b> C	Find the overall gear ratio of the gear train given in Fig. 4C.	2
5A	List all the types of cam and followers and explain its working in short.	4
5B	Explain the working of a Gerotor pump with neat sketch.	2

**5C** Derive the expression for total angular acceleration of a disc in a gyroscope with necessary vector diagrams.







Fig. 2C



Fig. 4C

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