

University of Mumbai
Examinations summer 2022

Program: **BE Mechanical Engineering**

Curriculum Scheme: **Rev2016** Examination: **TE Semester: VI**

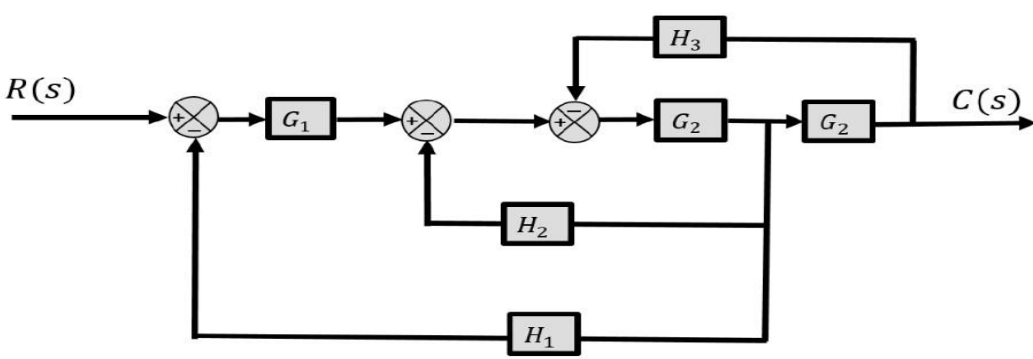
Course Code: **MEDLO 6021** Course Name: **Mechatronics**

Time:

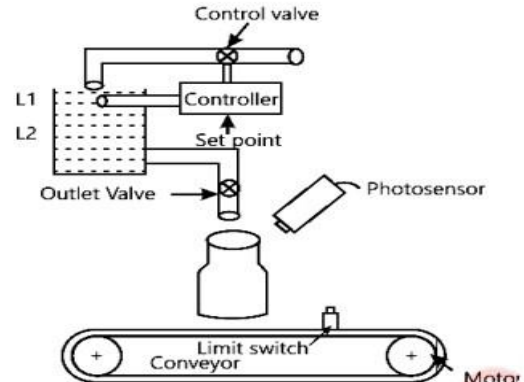
Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks (2 Marks Each)
1.	Where is the feedback generated by sensors in a mechatronics system given?
Option A:	Input sensors
Option B:	Comparators
Option C:	Mechanical actuators
Option D:	Output sensors
2.	_____ is the time required for the response to reach 50% of the final value in the first attempt.
Option A:	Rise time
Option B:	Peak time
Option C:	Settling time
Option D:	Delay time
3.	What is the smallest change which a sensor can detect termed
Option A:	Accuracy
Option B:	Precision
Option C:	Resolution
Option D:	Scale
4.	Most of the a.c. motors used in servo applications are
Option A:	Three phase induction motors
Option B:	Two phase induction motors
Option C:	Single phase induction motors
Option D:	Synchronous motors
5.	What type of interface does a DAQ (Data Acquisition) hardware creates
Option A:	Interface between two similar signals
Option B:	Interface between a computer and signal
Option C:	Interface between two dissimilar signals
Option D:	Interface between two similar hardware
6.	Which valve works on electricity and not on pressure difference?
Option A:	Rubber valve
Option B:	Pilot valve
Option C:	Check valve
Option D:	Solenoid valve
7.	What is used for controlling the pressure to increase beyond set value?
Option A:	Hydraulic pump
Option B:	Pressure Relief valve
Option C:	Accumulator
Option D:	Filter

8.	By adding a pole at the origin of s-plane, the Nyquist plot of a system will be rotate by
Option A:	180 degrees in clockwise direction
Option B:	180 degrees in anti-clockwise direction
Option C:	90 degrees in clockwise direction
Option D:	90 degrees in anti-clockwise direction
9.	In a PID controller, the overshoots have increased. The derivative time constant has to be ----- so as to reduce the overshoots.
Option A:	Reduced to Zero
Option B:	Increased
Option C:	Reduced
Option D:	None of the above
10.	PLC operates on the following signals
Option A:	Digital
Option B:	Impulse
Option C:	Analog
Option D:	Frequency

Q2	Solve any Two Questions out of Three 10 Marks each
A	<p>A) The block diagram of a control system is shown below. Using the method of "reduction of block diagram", find the transfer function, $T(s) = C(s)/R(s)$.</p> 
B	Plot the root locus for a system whose $G(S) H(s) = \frac{K(s+1)}{s(s+2)(s+3)}$
C	Explain different types of signal filters with circuit diagram and examples

Q3	Solve any Two Questions out of Three	10 Marks each
A	Define Mechatronics and give applications? Explain key elements of mechatronics in detail?	
B	Define Sensors and various criteria for selecting the sensors?	
C	Draw an electro pneumatic circuit for A+ B+ delay A- B-	

Q4	Solve any Two Questions out of Three	10 Marks each
A	Explain with a neat sketch classification of stepper motors with its application, advantages and disadvantages	
B	Define PID and explain each one of it in detail with a neat sketch	
C	<p>A process control system illustrated in figure 1 is desired to fill the bottle and convey this. The outlet valve is opened to fill the bottle as when the limit switch senses the presence of bottle and is closed automatically when the photo sensor produces the signal as when the bottle is filled. The level of water in tank is maintained through a control valve. Develop a PLC ladder logic diagram for this control application</p>  <p style="text-align: center;">Figure. 1</p>	