University of Mumbai
Sample Paper
Examinations Summer 2022
SE SEM 4 CI

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	If damping ratio $\zeta = 0.6$ and natural frequency $\omega_n = 5$, Rise time will be nearly
Option A:	5.535 Sec
Option B:	0.5535 Sec
Option C:	5 Sec
Option D:	55.35 Sec
2.	What is the Laplace Transform of impulse function
Option A:	S
Option B:	1
Option C:	1/S
Option D:	A
3.	Mason Gain formula is using to calculate
Option A:	Transfer Function
Option B:	Feedback Function
Option C:	Number of loops
Option D:	Number of paths
4.	What is the steady state error of the ramp input for type 1 system
Option A:	A/K
Option B:	A/(1+K)
Option C:	0
Option D:	∞
5.	For the characteristic equation $F(S) = S^3+9S2+18S+180 =0$ Find the system behavior by Routh Array
Option A:	Unstable
Option B:	Marginally stable
Option C:	Relative Stable
Option D:	Stable
6.	Which is the active Transducer from following
Option A:	Inductive Transducer
Option B:	Capacitive Transducer
Option C:	Synchro Transducer
Option D:	Piezoelectric Transducer

7.	What is the gauge factor
Option A:	Ratio of fractional change in resistance to fractional change in length
Option B:	Ratio of fractional change in width to fractional change in length
Option C:	Ratio of fractional change in length to fractional change in resistor
Option D:	Ratio of fractional change in resistance to fractional change in inductance
8.	What is the principle of operation of LVDT
Option A:	Reluctance
Option B:	Permanence
Option C:	Mutual Inductance
Option D:	Self Inductance
9.	Output of D/A converter is _____
Option A:	given to an analog display
Option B:	given to a digital display
Option C:	given to a CRO
Option D:	given to a voltmeter
10.	The heart of the SCADA system is _
Option A:	CPU
Option B:	PLC
Option C:	Relays
Option D:	I/O task

Q2	Solve any Two Questions out of Three 10 marks each
A	Derive the equation of unit step response of a second order system for underdamped case.
B	Draw the Bode Plot for the transfer function and obtain ω_{gc} and ω_{pc} and hence comment on stability $G(S)H(S) = \dfrac{100(1+0.1S)(1+0.01s)}{s^2+s+4}$
C	Find the range of K for stability for a unity feedback system. Also find $K_{marginal}$ and $\omega_{marginal.}$ And comment on stability $G(S) = \dfrac{K(s+1)}{s^2(s+2)(S+5)}$

Q3	Solve any Two Questions out of Three 10 marks each
A	A second order system is given by $\dfrac{C(S)}{R(S)} = \dfrac{64}{S^2+8S+64}$ Find its rise time, peak time, peak overshoot and settling time if subjected to unit step input. Also calculate expression for its output response
B	The loop transfer function of a certain system is $G(S)H(S) = \dfrac{K}{S(S+4)(S^2+4S+20)}$ Draw the root Locus and comment on stability
C	

	Explain different types of temperature transducers with the diagrams

Q4	Solve any Two Questions out of Three 10 marks each
A	Explain different types of pressure transducers with the diagrams
B	Explain RS232/485 in detail also explain Fieldbus and Modbus in detail.
C	Explain SCADA system and its components in detail