University of Mumbai
Examination 2020 under cluster 2+5

Curriculum Scheme: Revised 2016/2012

Examination: Third Year Semester V

Course Code and Course Name: MEC502 Mechanical Measurement and Control

Time: 1hour   Max. Marks: 50

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College Name: A.P. Shah Institute of Technology

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Note to the students:- All Questions are compulsory and carry equal marks .

Q1.	The transient response, with feedback system
Option A:	rises slowly
Option B:	rises quickly
Option C:	decays slowly
Option D:	decays quickly
Q2.	The unit-impulse response of a system is given by $c(t) = 0.5e^{-t/2}$. Its transfer function is
Option A:	$\frac{1}{(s+2)}$
Option B:	$\frac{1}{(1+2s)}$
Option C:	$\frac{2}{(s+2)}$
Option D:	$\frac{2}{(1+2s)}$
Q3.	If the unit-step response of a system is a unit impulse function, then the transfer function of such a system will be
Option A:	1
Option B:	$\frac{1}{s}$
Option C:	s
Option D:	$\frac{1}{s^2}$
Q4.	Type of a system depends on the
Option A:	No. of its poles

Option B:	Difference between the no. of poles and zeros
Option C:	No. of its real poles
Option D:	No. of poles it has at the origin
Q5.	A unity feedback system has open loop transfer function as $$G(s) = \frac{16}{s(s+16)}$$ Identify the type of system
Option A:	Overdamped
Option B:	Underdamped
Option C:	Critically damped
Option D:	Undamped
Q6.	The settling time of a feedback system with the closed-loop transfer function $$\frac{C(s)}{R(s)} = \frac{\omega^2}{s^2 + 2\xi\omega s + \omega^2}$$
Option A:	$t_s = \frac{2}{\xi\omega}$
Option B:	$t_s = \frac{\xi\omega}{2}$
Option C:	$t_s = \frac{4}{\xi\omega}$
Option D:	$t_s = 4\xi\omega$
Q7.	The velocity-error constant K_v of a feedback system of a closed-loop transfer function $$\frac{C(s)}{R(s)} = \frac{G(s)}{1 + G(s)H(s)}$$
Option A:	$K_v = \lim_{s\to 0} sG(s)H(s)$
Option B:	$K_v = \lim_{s\to 0} s\frac{G(s)}{1 + G(s)H(s)}$
Option C:	$K_v = \lim_{s\to 0} sG(s)$
Option D:	$K_v = \lim_{s\to 0} s[1 + G(s)H(s)]$
Q8.	A system has the following transfer function $$G(s) = \frac{100(s+5)(s+50)}{s^4(s+10)(s^2+3s+10)}$$ The type and order of the system are respectively
Option A:	4 and 9
Option B:	7 and 4
Option C:	4 and 7
Option D:	9 and 4

Q9.	The step response of a system is $c(t) = 1 - 5e^{-t} + 10e^{-2t} - 6e^{-3t}$. The impulse response of the system is
Option A:	$5e^{-t} - 20e^{-2t} + 18e^{-3t}$
Option B:	$5e^{t} - 20e^{2t} + 18e^{-3t}$
Option C:	$5e^{-t} + 20e^{-2t} + 18e^{-3t}$
Option D:	$5e^{-t} + 20e^{-2t} - 18e^{-3t}$
Q10.	Given a unity feedback with $$G(s) = \frac{K}{s(s+4)}$$ The value of K for the damping ratio of 0.5 is
Option A:	1
Option B:	9
Option C:	4
Option D:	16
Q11.	In type I system, a constant output velocity at steady state will be possible, when
Option A:	There is no error
Option B:	There is a constant steady-state error
Option C:	There is a variable steady-state error
Option D:	There is a fluctuating error
Q12.	The impulse response of a system is $c(t) = 5e^{-10t}$; its step response is equal to
Option A:	$0.5e^{-10t}$
Option B:	$5(1 - e^{-10t})$
Option C:	$0.5(1 - e^{-10t})$
Option D:	$10(1 - e^{-10t})$
Q13.	The open loop transfer function of a system is 10/(1+s), the steady- state error to a unit-step input will be
Option A:	Zero
Option B:	1/11
Option C:	10
Option D:	Infinity
Q14.	The damping ratio and natural frequency of a second-order system are 0.6 and 2 rad/s respectively. Which of the following combinations gives the correct values of peak and settling time, respectively, for the unit-step response of the system?
Option A:	3.33 s and 1.95 s
Option B:	1.95 s and 1.5 s
Option C:	1.95 s and 3.33 s
Option D:	1.5 s and 1.95 s
Q15.	The steady-state error, due to a ramp input for a type-2 system, is equal to

Option A:	Zero
Option B:	Infinite
Option C:	Non-zero number
Option D:	Constant
Q16.	**If a second-order system has poles at -1±j, then the step response of the system will exhibit a peak value at**
Option A:	4.5 s
Option B:	3.5 s
Option C:	3.14 s
Option D:	1 s
Q17.	**Differentiation of parabolic response is a ------------- response?**
Option A:	Parabolic
Option B:	Ramp
Option C:	Step
Option D:	Impulse
Q18.	**The output in response to a unit step input for a particular continuous control system is $c(t) = 1 - e^{-2t}$. What is the delay time Td?**
Option A:	0.346
Option B:	0.693
Option C:	0.173
Option D:	1.386
Q19.	**Time taken by the response to reach and stay within a specified error is called**
Option A:	Raise time
Option B:	Peak time
Option C:	Delay time
Option D:	Settling time
Q20.	**Laplace transform of unit impulse signal is:**
Option A:	A/s
Option B:	A
Option C:	1
Option D:	1/s
Q21.	**The damping ratio and peak overshoot are measures of:**
Option A:	**Relative stability**
Option B:	**Absolute stability**
Option C:	**Steady state error**
Option D:	Speed of response
Q22.	**Consider a system with transfer function. Its damping ratio will be 0.5 when**

	the values of k is: $$G(s) = \frac{(s+6)}{ks^2 + s + 6}$$
Option A:	2/6
Option B:	3
Option C:	1/6
Option D:	6
Q23.	A control system, having a unit damping factor, will give
Option A:	A critically damped response
Option B:	An oscillatory response
Option C:	An undamped response
Option D:	No response
Q24.	A second-order system exhibits 100% overshoot. Its damping coefficient is:
Option A:	Equal to 1
Option B:	Equal to 0
Option C:	Less than 1
Option D:	Greater than 1
Q25.	For a second-order system $$2\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 8x$$ The damping ratio is
Option A:	0.1
Option B:	0.25
Option C:	0.333
Option D:	0.5