University of Mumbai

Examination 2020 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Bachelor of Engineering**

Curriculum Scheme: **Electronics & Telecommunication (Rev2019 "C")**

Examination: **SE Semester III**

Course Code: **ECC305** and Course Name: **Electronic Instrumentation & Control Systems**

Time: 2 Hour Max. Marks: 80

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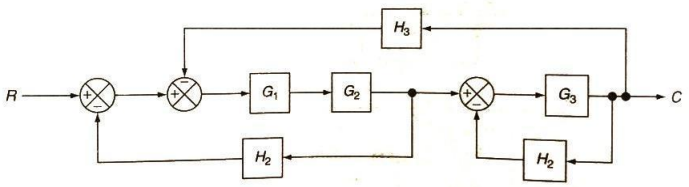
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	On which principle Wheatstone bridge works?
Option A:	full deflection
Option B:	partial deflection
Option C:	null deflection
Option D:	no diffraction
2.	The simplest type of bridge used for the measurement of medium inductance is a - - -
Option A:	Maxwell
Option B:	Schering
Option C:	Hey
Option D:	Wheatstone
3.	The principle of Homogeneity and superposition is applied to - - - -
Option A:	Linear time-variant system
Option B:	Non-linear time-variant system
Option C:	Linear time-invariant system
Option D:	Non-linear time-invariant system
4.	In Force-Voltage analogy, damper is analogous to - - - -
Option A:	Inductance
Option B:	Charge
Option C:	Current
Option D:	Resistance
5.	A Schering bridge can be used for the - - - -
Option A:	protecting the circuit from temperature rises
Option B:	testing capacitors
Option C:	measuring voltages
Option D:	measuring currents
6.	The overall transfer function, from block diagram reduction, for parallel blocks is - - - -
Option A:	Sum of individual gain

Option B:	Difference of individual gain
Option C:	Product of individual gain
Option D:	Division of individual gain
7.	The steady state error due to a step input *Au(t)* is given by - - - -
Option A:	*A/(1+Kp)*
Option B:	*A/Kp*
Option C:	*1/AKp*
Option D:	*Kp/(1+A)*
8.	What is the Type and the Order of the system, $G(s) = \frac{100(s+5)(s+30)}{s^3(s+2)(s^2+3s+10)}$.
Option A:	4 and 9
Option B:	4 and 7
Option C:	3 and 5
Option D:	3 and 6
9.	Which among the following second order systems will take more time to reach it's steady state value?
Option A:	Undamped system
Option B:	Critically damped system
Option C:	Overdamped system
Option D:	Underdamped system
10.	The characteristic equation of a system is given below. Find the range of values for k. $s^3+3ks^2+(k+2)s+4=0$
Option A:	0<k<0.523
Option B:	0.527<k<infinity
Option C:	0.678<k<infinity
Option D:	0.21<k<0.527
11.	Function of transducer is to convert - - - -
Option A:	Electrical signal into non electrical quantity
Option B:	Electrical signal into mechanical quantity
Option C:	Non electrical quantity into electrical signal
Option D:	To do nothing
12.	The change in loading and unloading curves is known as - - - -
Option A:	Zero drift characteristics
Option B:	Sensitivity drift
Option C:	Hysteresis
Option D:	Zero drift plus sensitivity drift characteristics

13.	Phase margin of the system is used to specify - - - -
Option A:	relative stability
Option B:	absolute stability
Option C:	time response
Option D:	frequency response
14.	If damping ratio of a given system is 0.5, then the lines joining complex poles with origin are inclined to negative real axis at - - - -
Option A:	±90 deg
Option B:	±60 deg
Option C:	±45 deg
Option D:	±30 deg
15.	In Bode diagram, the factor *1/(jw)(jw)* in the transfer function gives a line having slope
Option A:	20 dB per decade
Option B:	40 dB per decade
Option C:	-20 dB per decade
Option D:	-40 dB per decade
16.	Where are the closed loop poles of the following system located? $G(s)H(s) = \frac{1}{s^2+49}$
Option A:	They are located on negative real axis
Option B:	They are located on *jw* axis
Option C:	They are located on right half of s-plane
Option D:	They are located, one on the right half and one on the left half
17.	The open loop transfer function of a unity feedback system is given by $G(s) = \frac{K(s+2)}{s(s^2+2s+2)}$. The centroid is ----
Option A:	0
Option B:	-1/2
Option C:	-2/3
Option D:	1/2
18.	Gain margin is the reciprocal of the gain at the frequency at which the phase angle is - - - -
Option A:	90 deg
Option B:	180 deg
Option C:	-180 deg
Option D:	0 deg
19.	A system has 8 poles and 3 zeros. The slope of its highest frequency asymptote in its magnitude plot is - - - -
Option A:	-40 dB/decade
Option B:	-60 dB/decade
Option C:	-100 dB/decade
Option D:	-150 dB/decade

20.	Settling time is inversely proportional to product of the damping ratio and - - - -
Option A:	Time constant
Option B:	Maximum overshoot
Option C:	Peak time
Option D:	Undamped natural frequency

Q2.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Explain functional blocks of a measurement system.
ii.	Compare temperature transducers RTD and Thermocouple.
iii.	Find resonance peak and resonance frequency for a unity feedback system having forward path transfer function as $G(s) = \frac{36}{s(s+8)}$.
B	**Solve any One** **10 marks each**
i.	Obtain transfer function of the block diagram shown in figure – 
ii.	Sketch the root locus for the following system with $K>0$ $G(s)H(s) = \frac{K}{s(s+1)(s+2)(s+4)}$.

Q3.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Explain the working principle of LVDT with a neat sketch.
ii.	What are compensators? Why are they needed in control systems?
iii.	Sketch polar plot of $G(s) = \frac{1}{s(s+a)(s+b)}$.
B	**Solve any One** **10 marks each**
i.	Draw Bode plot for a unity feedback control system with open loop transfer function, $G(s) = \frac{K}{s(1+s)(1+0.1s)}$.
ii.	Investigate the stability of the system that has the characteristic equation : $s^5+2s^4+24s^3+48s^2-25s-50=0$

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Examination: **SE** Semester **III**

Course Code: **ECC305** and Course Name: Electronic **Instrumentation & Control Systems**

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	A
Q3.	C
Q4	D
Q5	B
Q6	A
Q7	A
Q8.	D
Q9.	C
Q10.	B
Q11.	C
Q12.	C
Q13.	A
Q14.	B
Q15.	D
Q16.	B
Q17.	A
Q18.	C
Q19.	C
Q20.	D