# University of Mumbai

## Examination 2021 under cluster 5 (Lead College: APSIT)

**Examinations Commencing from 10th April 2021 to 17th April 2021**

Program: **Bachelor of Engineering**

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

Examination: **DSE** 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. | Poles are those values of s which makes |
| Option A: | Numerator of transfer function=0 |
| Option B: | Numerator of transfer function=1 |
| Option C: | Denominator of transfer function=0 |
| Option D: | Denominator of transfer function =1 |
| | |
| 2. | Megger is used to measure |
| Option A: | Unknown Resistance of Low value |
| Option B: | Unknown Resistance of High value |
| Option C: | Unknown Capacitance of Low value |
| Option D: | Unknown Capacitance of High value |
| | |
| 3. | Following is the phase angle for the factor $(1+j\omega/3)$ |
| Option A: | $Tan^{-1}\ 3/\omega$ |
| Option B: | $Tan^{-1}\ \omega/3$ |
| Option C: | $-Tan^{-1}\ \omega/3$ |
| Option D: | $-Tan^{-1}\ 3/\omega$ |
| | |
| 4. | In a bode magnitude plot, which one of the following slopes would be exhibited at high frequencies by a 4th order all-pole system? |
| Option A: | -80 dB/decade |
| Option B: | -40 dB/decade |
| Option C: | 40 dB/decade |
| Option D: | 80 dB/decade |
| | |
| 5. | When the number of poles is equal to the number of zeroes, how many branches of root locus tends towards infinity? |
| Option A: | 0 |
| Option B: | 1 |
| Option C: | 2 |
| Option D: | 3 |
| | |
| 6. | The unknown capacitance of Schering bridge is given by |
| Option A: | Cx=C2R4 |

| | |
|---|---|
| | R3 |
| Option B: | $Cx=\frac{R2R4}{R3}$ |
| Option C: | $Cx=\frac{R2C4}{C3}$ |
| Option D: | $Cx=\frac{R2C3}{C4}$ |
| | |
| 7. | For the given system the poles and zeros are $G(s)=\frac{s(s+1)}{(s+3)(s+4)}$ |
| Option A: | P=1, Z=3,4 |
| Option B: | P=3,4, Z=0,1 |
| Option C: | P=-3,-4, Z=0,-1 |
| Option D: | P=-3,-4, Z=-1 |
| | |
| 8. | The forward path transfer function of a unity feedback system is given by $(s)=\frac{100}{(s^2+10s+100)}$ . The frequency response of this system will exhibit the resonance peak at: |
| Option A: | 10 rad/sec |
| Option B: | 8.66 rad/sec |
| Option C: | 7.07 rad/sec |
| Option D: | 5 rad/sec |
| | |
| 9. | The phase angle for the open loop transfer function $G(s)H(s)=\frac{5}{s(s+1)(s+3)}$ |
| Option A: | $\phi=-90^0-\tan^{-1}\omega-\tan^{-1}\omega/3$ |
| Option B: | $\phi=-90^0-\tan^{-1}\omega-\tan^{-1}\omega/5$ |
| Option C: | $\phi=-90^0-\tan^{-1}\omega-\tan^{-}13\omega$ |
| Option D: | $\phi=-90^0-\tan^{-1}\omega-\tan^{-}15\omega$ |
| | |
| 10. | The place where the locii meet while moving to or from infinity is called |
| Option A: | Centroid |
| Option B: | Intersection with imaginary axis |
| Option C: | Root point |
| Option D: | Breakaway point |
| | |
| 11. | Consider the open loop transfer function $G(s)=\frac{K(s+6)}{(s+3)(s+5)}$ . In the root locus diagram the centroid will be located at: |
| Option A: | -4 |
| Option B: | -1 |
| Option C: | -2 |
| Option D: | -3 |
| | |
| 12. | Attenuation, amplification and filtering is done by |
| Option A: | Signal conditioner |
| Option B: | A/D converter |
| Option C: | Display systems |

| | |
|---|---|
| Option D: | Transducer |
| | |
| 13. | For Nyquist contour, the size of radius is ________ |
| Option A: | 25 |
| Option B: | 0 |
| Option C: | 1 |
| Option D: | ∞ |
| | |
| 14. | Kelvin's double bridge is a modified Wheatstone's bridge which consider |
| Option A: | Galvanometer error |
| Option B: | Contact Resistance |
| Option C: | High Resistance |
| Option D: | Battery error |
| | |
| 15. | The number of branches terminating at infinity is given by __________ , where P is number of open loop poles and Z is number of open loop zeros. |
| Option A: | P+Z |
| Option B: | P-Z |
| Option C: | P*Z |
| Option D: | P/Z |
| | |
| 16. | The breakaway point calculated mathematically |
| Option A: | Does not lie on root locus |
| Option B: | May or may not lie on root locus |
| Option C: | Always lie on root locus |
| Option D: | Lies on no root locus area only. |
| | |
| 17. | The polar plot of the open loop transfer function of a feedback control system intersects the real axis at -2. The gain margin of the system is |
| Option A: | -5 dB |
| Option B: | 0 dB |
| Option C: | - 6 dB |
| Option D: | 40 dB |
| | |
| 18. | The bridge is balanced when |
| Option A: | Detector or galvanometer voltage is infinity |
| Option B: | Detector or galvanometer current is zero |
| Option C: | Detector or galvanometer voltage is zero |
| Option D: | Detector or galvanometer current is infinity |
| | |
| 19. | The polar plot of a transfer function passes through the critical point (-1,0). Gain margin is ___________ |
| Option A: | Zero |
| Option B: | 1 dB |
| Option C: | 100 dB |
| Option D: | Infinity |
| | |
| 20. | ______________ is an undesired phenomenon |
| Option A: | Accuracy |
| Option B: | Precision |
| Option C: | Hysterisis |
| Option D: | Sensitivity |

| Q2. | Answer the following : |
| --- | --- |
| A | **Solve any Two** **5 marks each** |
| i. | Explain in detail the components of a generalized measurement system with the help of block diagram. |
| ii. | List and explain all the general rules for constructing root locus. |
| iii. | What is the relationship between frequency domain specifications and time domain specifications? |
| B | **Solve any One** **10 marks each** |
| i. | State the advantages of Kelvin's double bridge over Wheatstone bridge and derive expression for finding unknown resistance using Kelvin's double bridge. |
| ii. | Draw the polar plot for the given system $G(s)H(s)=\frac{100}{s^2(s+2)(s+4)(s+8)}$ |

| Q3. | Answer the following : |
| --- | --- |
| A | **Solve any Two** **5 marks each** |
| i. | Differentiate between Accuracy and Precision. |
| ii. | Explain in detail one bridge circuit used for measuring inductance. |
| iii. | Find the intersection points with imaginary axis for the given system $G(s)H(s)=\frac{k}{s(s+3)(s+6)}$ |
| B | **Solve any One** **10 marks each** |
| i. | Sketch the root locus for the given system (draw it on normal paper) $G(s)H(s)=\frac{k}{(s+2)^3}$ |
| ii. | List the magnitude plot and phase plot table for the given system: $G(s)H(s)=\frac{0.75(1+0.2s)}{s(1+0.5s)(1+0.1s)}$ |

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