



GATE-2019
Full Length Test
Instrumentation Engineering

Name:

Test ID: **IN-FLT-2019**

Duration: 3 hours

Maximum marks : 100

Please read the following instructions carefully

General Instructions

1. Total duration of examination is 180 minutes (3 hours).
2. The clock will be set at the server. The countdown timer in the top right corner of screen will display the remaining time available for you to complete the examination. When the timer reaches zero, the examination will end by itself. You will not be required to end or submit your examination.
3. The Question Palette displayed on the right side of screen will show the status of each question using one of the following:
 - a. You have not visited the question yet.
 - b. You have not answered the question.
 - c. You have answered the question.
 - d. You have NOT answered the question, but have marked the question for review.
 - e. You have answered the question, but marked it for review.

The **Marked for Review** status for a question simply indicates that you would like to look at that question again. If a question is answered and **Marked for Review**, your answer for that question will be considered in the evaluation.

Navigating to a Question

4. To answer a question, do the following:
 - a. Click on the question number in the Question Palette to go to that question directly.
 - b. Select an answer for a multiple choice type question by clicking on the bubble placed before the 4 choices namely A, B, C, D. Use the virtual numeric keypad to enter a number as answer for a numerical type question.
 - c. Click on **Save and Next** to save your answer for the current question and then go to the next question.
 - d. Click on **Mark for Review and Next** to save your answer for the current question, and also mark it for review, and then go to the next question.
 - e. **Caution:** Note that your answer for the current question will not be saved, if you navigate to another question directly by clicking on its question number without saving the answer to the previous questions.
 - f. You can view all the questions by clicking on the **Question Paper** button. This feature is provided, so that if you want you can just see the entire question paper at a glance.

Answering a Question

5. Procedure for answering a multiple choice (MCQ) type question:
 - a. To select your answer, click on the bubble button of one of the options
 - b. To deselect your chosen answer, click on the bubble button of the chosen option again or click on the clear response button
 - c. To change your chosen answer, click on the bubble button of another option
 - d. To save your answer, you **MUST** click on the **Save and Next button**.
 - e. To mark the question for review, click on the **Mark for Review and Next** button. If an answer is selected for a question that is Marked for Review, that answer will be considered in the evaluation.

6. Procedure for answering a numerical answer type question:

- a. To enter a number as your answer, use the virtual numerical keypad
 - b. A fraction (eg. -0.3 or $-.3$) can be entered as an answer with or without '0' before the decimal point. As many as four decimal points, e.g. 12.5435 or 0.003 or -932.6711 or 12.82 can be entered.
 - c. To clear your answer, click on the Clear Response button
 - d. To save your answer, you MUST click on the **Save and Next** button
 - e. To mark a question for review, click on the **Mark for Review and Next button**. If an answer is selected (for MCQ) or entered (for numerical answer type) for a question that is Marked for Review, that answer will be considered in the evaluation.
7. To change your answer to a question that has already been answered, first select that question for answering and then follow the procedure for answering that type of question.
8. Note that ONLY Questions for which answers are saved or marked for review after answering will be considered for evaluation.

Paper Specific Instructions:

9. There are a total of 65 questions carrying 100 marks. Questions are of multiple choice type or numerical answer type. A multiple choice type question will have four choices for the answer with only one correct choice. For numerical answer type questions, the answer is a number and no choices will be given. A number as the answer should be entered using the virtual keyboard on the monitor.
10. Questions Q.1 – Q.25 carry 1mark each. Questions Q.26 – Q.55 carry 2marks each.
11. Questions Q.56 – Q.65 belong to General Aptitude (GA) section and carry a total of 15 marks. Questions Q.56 – Q.60 carry 1mark each, and questions Q.61 – Q.65 carry 2marks each.
12. Questions not attempted will result in zero mark. Wrong answers for multiple choice type questions will result in NEGATIVE marks. For all 1 mark questions, $\frac{1}{3}$ mark will be deducted for each wrong answer. For all 2 marks questions, $\frac{2}{3}$ mark will be deducted for each wrong answer. There is no negative marking for questions of numerical answer type.
13. Physical calculator is NOT allowed. All candidates will be provided with an online scientific calculator which has to be used to answer the questions.

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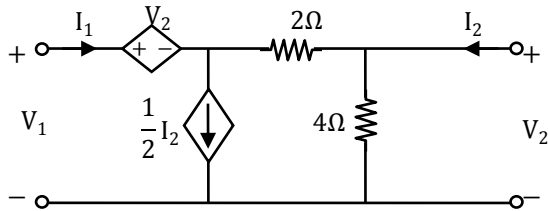
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Full Length Test Instrumentation Engineering

Q.1 - Q.25 Carry One Mark each.

1. The h parameters of the following network is



(A) $\begin{bmatrix} 4 & 3/2 \\ -2 & 1/2 \end{bmatrix}$

(C) $\begin{bmatrix} -2 & 3/2 \\ -2 & 1/2 \end{bmatrix}$

(B) $\begin{bmatrix} -2 & 2/3 \\ -2 & 1/2 \end{bmatrix}$

(D) $\begin{bmatrix} -4 & 3/2 \\ -2 & 2 \end{bmatrix}$

2. Find the first maximum value of the response that occurs at time t_{\max} for given system

$$\frac{C(s)}{R(s)} = \frac{25}{s^2 + 6s + 25}$$

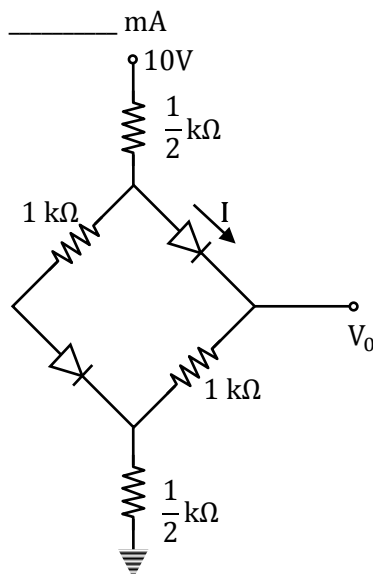
(A) π

(C) $\pi/4$

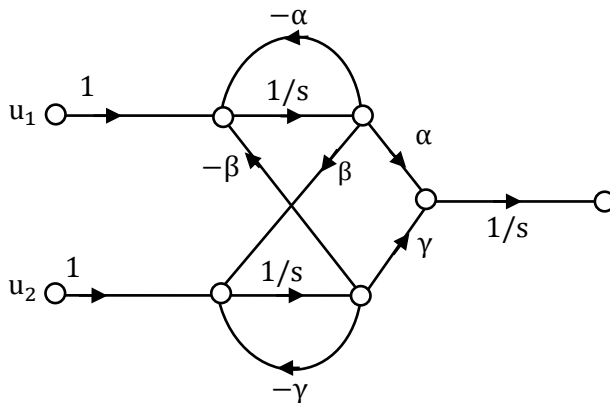
(B) $\pi/2$

(D) $\pi/8$

3. For the circuit shown in figure the cut-in voltage of diode, $V_r = 0.7V$ then the value of I is



4. A signal flow graph of a system is given below

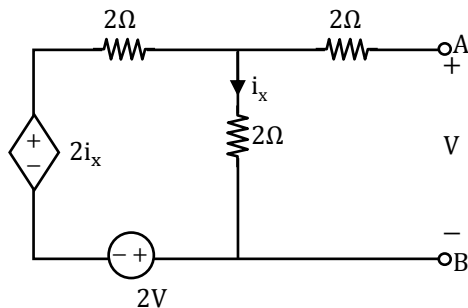


The set of equations that correspond to this signal flow graph is

(A) $\frac{d}{dt} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{bmatrix} \beta & -\gamma & 0 \\ \gamma & \alpha & 0 \\ -\alpha & -\beta & 0 \end{bmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} + \begin{bmatrix} 1 & 0 \\ 0 & 0 \\ 0 & 1 \end{bmatrix} \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}$ (C) $\frac{d}{dt} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{bmatrix} -\alpha & \beta & 0 \\ -\beta & -\gamma & 0 \\ \alpha & \gamma & 0 \end{bmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} + \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}$

(B) $\frac{d}{dt} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{bmatrix} 0 & \alpha & \gamma \\ 0 & -\alpha & -\gamma \\ 0 & \beta & -\beta \end{bmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} + \begin{bmatrix} 0 & 0 \\ 0 & 1 \\ 1 & 0 \end{bmatrix} \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}$ (D) $\frac{d}{dt} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{bmatrix} -\gamma & 0 & \beta \\ \gamma & 0 & \alpha \\ -\beta & 0 & -\alpha \end{bmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} + \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 1 & 0 \end{bmatrix} \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}$

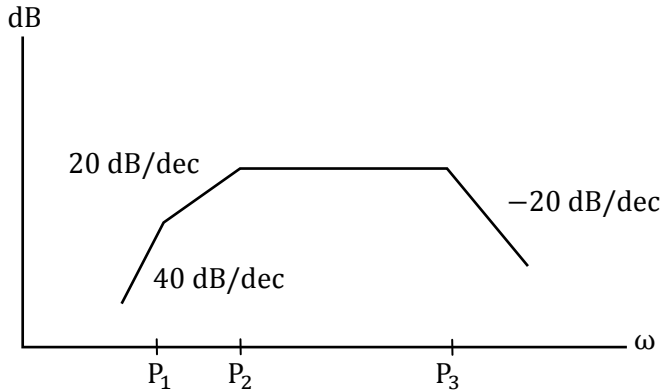
5. A circuit shown below



What is the voltage across terminals A And B?

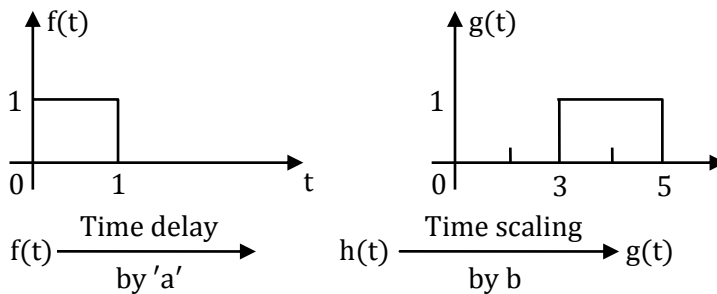
- (A) 0V (B) -1V (C) -2V (D) ∞
6. A common source amplifier is driven by a voltage source with a internal resistance $R_s = 300 \Omega$. The load is $R_D = 20 \text{ k}\Omega$ FET parameter are $g_m = 2 \text{ mS}$, $r_d = 20 \text{ k}\Omega$, $C_{gd} = 4 \text{ pF}$, $C_{gs} = 8 \text{ pF}$. The upper cutoff frequency is _____ MHz
7. Consider the amplitude modulated (AM) signal $A_C \cos \omega_c t + 2 \cos \omega_m t \cos \omega_c t$ for demodulating the signal using envelope detector, the minimum value of A_C should be _____
8. Consider the function $y = x^2 - 6x + 9$. The maximum value of y obtained when x varies over the interval 2 to 5 will be at _____

9. The magnitude plot for a minimum phase function is shown in figure. The phase of this system will be monotonically

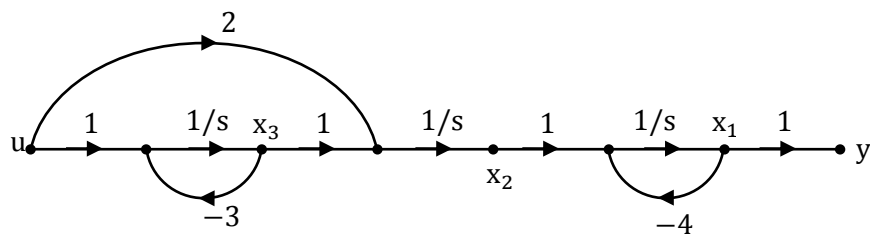


- (A) Decreasing from 180° to 0° (C) Increasing from 0° to 180°
 (B) Decreasing from 180° to -90° (D) Increasing from -90° to 180°

10. The value of a is



11. For the system shown below the state space representation is $\dot{x} = Ax(t) + Bu(t)$. The matrix A is

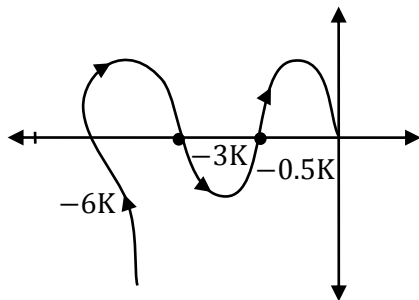


- (A) $\begin{bmatrix} 0 & 1 & -4 \\ 1 & 0 & 0 \\ -3 & 0 & 0 \end{bmatrix}$ (C) $\begin{bmatrix} -4 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & -3 \end{bmatrix}$
 (B) $\begin{bmatrix} 0 & -1 & 4 \\ -1 & 0 & 0 \\ 3 & 0 & 0 \end{bmatrix}$ (D) $\begin{bmatrix} 4 & -1 & 0 \\ 0 & 0 & -1 \\ 0 & 0 & 3 \end{bmatrix}$

12. Let P, Q, R, S be $m \times m$ matrices each with non-zero determinant
 If PQRS = I, then R^{-1} is

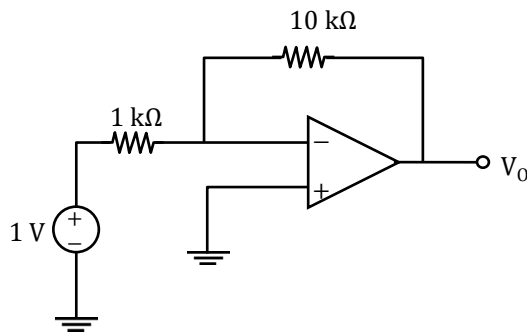
- (A) SPQ (C) PQS
 (B) $Q^{-1}P^{-1}S^{-1}$ (D) $S^{-1}P^{-1}Q^{-1}$

13. Nyquist plot of a system is shown in the below figure

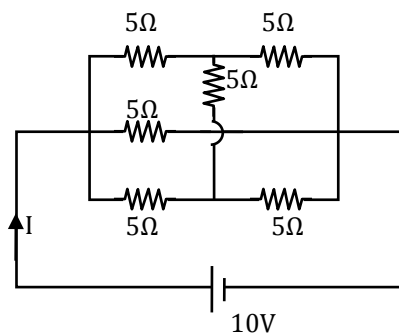


Which of the following shows the above system characteristics?

- (A) Marginally stable (C) Stable
(B) Conditionally stable (D) Unstable
14. An amplifier has gain $A = 1000 \pm 10$. A negative feedback is provided such that the gain variation remains within 0.1%. The amount of feedback factor is _____
15. An Op-Amp has a poor gain = 5. Find the output voltage (V_o) _____



16. Temperature of a heated surface is measured using pyrometer. The emissivity of surface is assumed as 0.85 and the temp measured as 1350°C . If actual emissivity is 0.9. What would be the error in temp measurement?
- (A) -38°C (C) $+19^\circ\text{C}$
(B) $+38^\circ\text{C}$ (D) $+23.1^\circ\text{C}$
17. In circuit shown in below



The current flowing in the circuit is _____

18. Let $x(t)$ be a continuous time, real valued signal band limited to f Hz. The Nyquist sampling rate, in Hz for $y(t) = x(3t) + x(t) + x(0.5t)$ is $a f$ Hz. Then a is _____

19. The following program is run on an 8085 μP

Memory Address (hex)	Instruction
2000	LXI SP, 1000
2003	PUSH H
2004	PUSH D
2005	CALL 2050
2008	POP H
2009	HLT

At the completion of execution of the program the SP contains _____

- (A) OFFE (C) OABE
(B) OEEF (D) OFFA

20. A laminar flow experiment is carried out to examine viscosity of 2 different fluids. Fluid A is pumped through a pipe and volumetric flow rate is recorded, in another pipe fluid B flows and same volumetric flow rate is recorded for same pressure drop per unit length. If the ratio of viscosity of fluid B to A is 16 then what is the ratio of diameters of pipe A to pipe B

- (A) $\sqrt{16}$ (C) $\frac{1}{\sqrt{16}}$
(B) $\sqrt{4}$ (D) $\frac{1}{\sqrt{4}}$

21. The BW of DSB suppressed carrier modulation system when the modulating frequency varies between 500Hz and 5kHz is _____(kHz)

- (A) 555 kHz (C) 500 kHz
(B) 505 kHz (D) 9 kHz

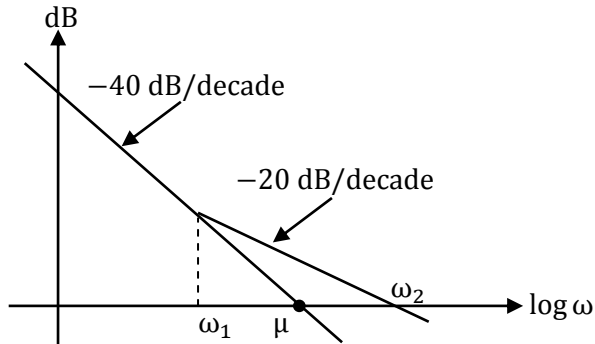
22. Green's theorem is used to convert

- (A) Line integral to surface integral (C) Line integral to volume integral
(B) Surface integral to volume integral (D) None of these

23. Determine the maximum velocity of the emitted photoelectrons when a molybderum surface having a work function of 4.3ev is irradiated by mercury light having a wavelength of $0.2537\mu\text{m}$. The e/m ratio is 0.176×10^{12} c/kg

- (A) 45.6×10^6 m/s (C) 0.456×10^6 m/s
(B) 4.56×10^6 m/s (D) 456×10^6 m/s

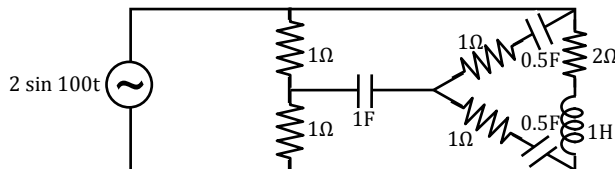
24. Bode magnitude asymptotic plot of a certain system has a gain of 25 is sketched shown below. The value of μ is _____ rad/sec



25. The particular solution for a given differential equation $(D^2 + 5D + 6)y = \sin 2x$ is
- (A) $\frac{5\sin 2x - \cos 2x}{104}$ (C) $\frac{10\sin 2x - 2\cos 2x}{-104}$
 (B) $\frac{5\cos 2x - \sin 2x}{104}$ (D) $\frac{10\cos 2x - 2\sin 2x}{-104}$

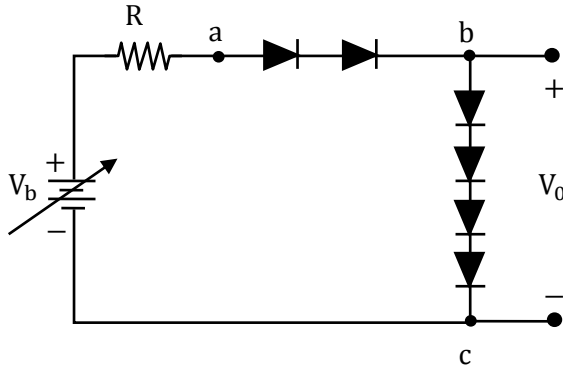
Q.26 - Q.55 Carry Two Mark each.

26. The rms value of current through 1F capacitor of fig is _____ Amp.

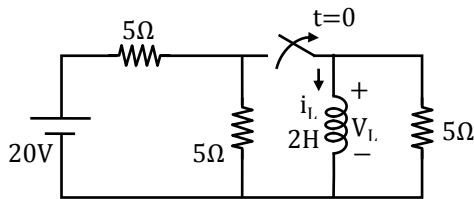


- (A) 1 (C) 3
 (B) 0 (D) 4
27. A received single tone sinusoidally modulated SSB - SC signal $\cos\{(\omega_c + \omega_m)t\}$ has a normalized power of 0.5 volt. The signal is to be detected by carrier reinsertion technique envelope detector. The amplitude of the carrier to be reinserted so that power in the recovered signal at the demodulator output is 90% of the normalized power is (Assume the dc component is neglected)
- (A) 10 Volts (C) 5.5 Volts
 (B) 4.5 Volts (D) 3 Volts
28. A continuous time system $y(t) = e^{-5|x(t)|}$ is
- (A) $Y(t) = \infty$ if $x(t)$ is ∞ (C) Unbounded
 (B) Strictly bounded (D) Can't say

29. For the circuit show below all the diodes are identical and have the characteristic $V_\gamma = 0.5$ V and $R_F = 50 \Omega$. Then the regulation of V_0 when V_b increases from its nominal value of 4 V to the value of 6 V is _____. [Take $R = 4 \text{ k}\Omega$]



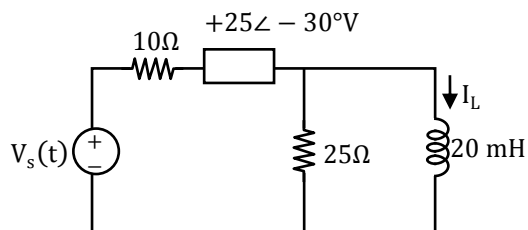
30. Switch opened at $t = 0$ then the value of $V_L(0^+) =$ _____ Volts



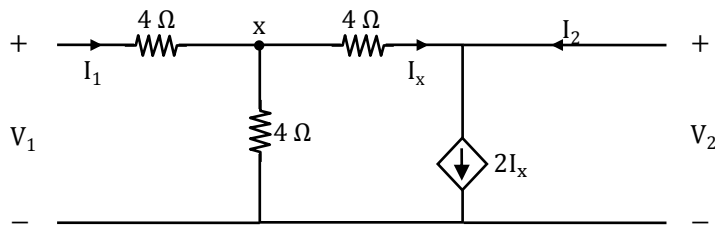
31. What will be the closed loop transfer function of a unity feedback control system whose step response is given by $c(t) = K[1 - 1.66e^{-8t} \sin(6t + 37^\circ)]$?

- (A) $\frac{100K}{s^2 + 16s + 100}$ (C) $\frac{K}{s^2 + 16s + 100}$
(B) $\frac{10}{s^2 + 16s + 100}$ (D) $\frac{10K}{s^2 + 16s + 10}$

32. If $\omega = 500 \text{ rad/s}$ and $I_L = 2.5 \angle 40^\circ$. The phase of $V_s(t)$ is _____ degree

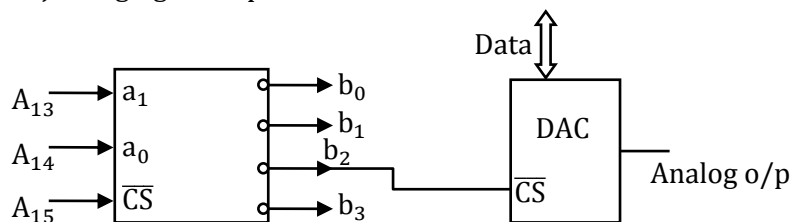


33. A circuit shown below



One of the equation of above network is $V_1 = SV_2 + MI_2$, what is the value of $M \times S$

34. A 8 - bit DAC is interfaced with a MP having 16 Address lines (A_0 to A_{15}) as shown in the adjoining figure. A possible valid address for this DAC is



- (A) 2937 H (C) AFFF H
(B) 4FFF H (D) C000 H

35. A root is to be calculated for the equation $x^3 - 3x - 5 = 0$ by using Newton-Raphson method. If initial approximation of x is 2 then next approximation of x is _____

36. 'x' is the matrix $x = \begin{bmatrix} b^2 & 1 \\ (b^2 + b - 1) & (1 - b) \end{bmatrix}$ and $x^2 - x + I = 0$

I: Identity matrix

0: Zero matrix

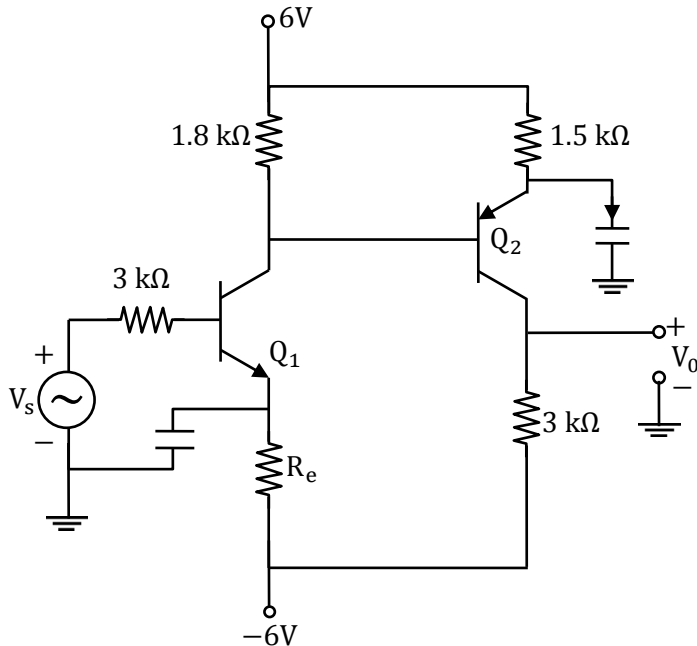
Then, which of the following denotes the inverse of x ?

- (A) $\begin{bmatrix} -b & (b^2 - 1) \\ (b - 1) & 1 \end{bmatrix}$ (C) $\begin{bmatrix} (b - 1) & b^2 \\ b^2 & (-b^2 + b - 1) \end{bmatrix}$
(B) $\begin{bmatrix} (1 - b) & (b^2 - 1) \\ b^2 & b \end{bmatrix}$ (D) $\begin{bmatrix} (1 - b^2) & -1 \\ (1 - b - b^2) & b \end{bmatrix}$

37. A laser beam of 50 mW and aperture 5 mm and $\lambda = 720$ nm is fused with lens of focal length 0.1m. The intensity of the image is _____ MW/m²

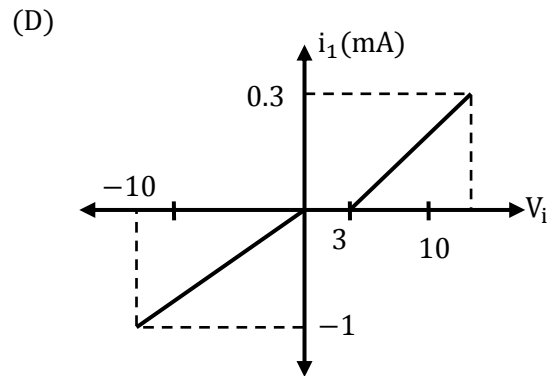
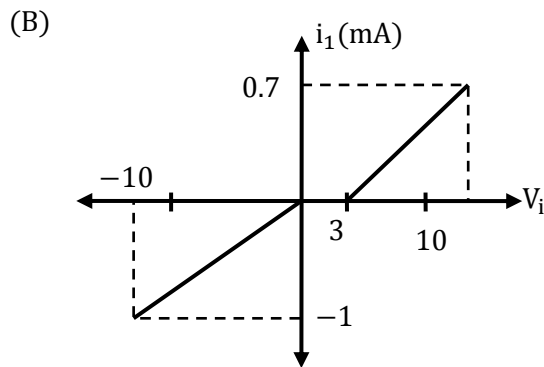
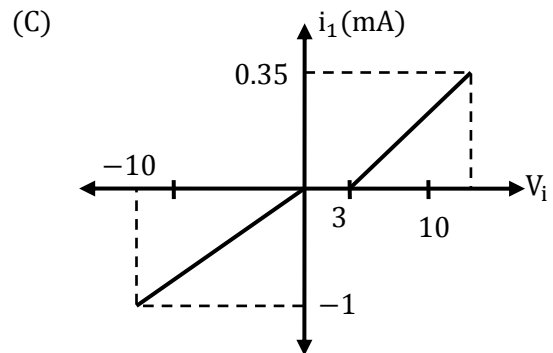
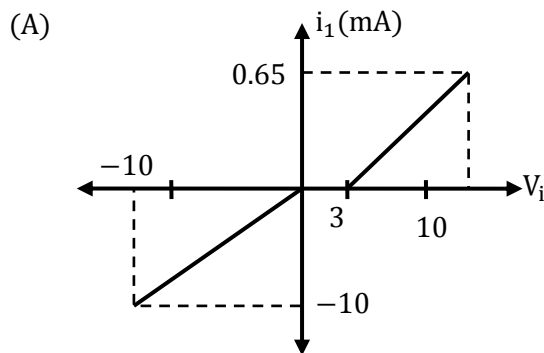
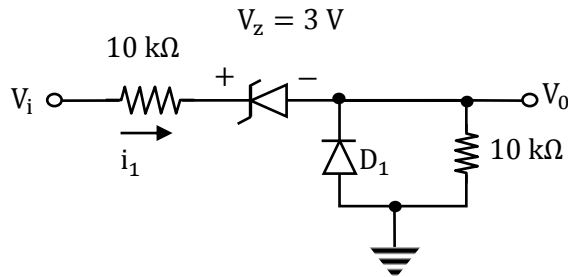
38. The resistance of an unknown resistor is determined by a Wheatstone bridge. The solution for the known resistance is stated as $R_4 = \frac{R_1 R_2}{R_3}$. The limiting values of various resistances are $R_1 = 500 \pm 1\%$; $R_2 = 615 \pm 1\%$; $R_3 = 100 \pm 0.5\%$
The limiting error in ohm is _____

39. The amplifier shown in figure has to be biased so that $V_0 = 0V$ when $V_s = 0V$. Neglecting the base currents of both the transistors and assuming both the emitter-base junctions to have a forward bias of $0.6V$. The required value of $R_e = \underline{\hspace{2cm}}$ k Ω

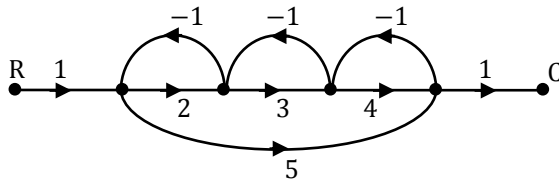


40. For a MOD - 12 counter, the FF has a $t_{pd} = 60$ ns. The NAND gate has a t_{pd} of 25 ns. The clock frequency should be greater than or equal to _____ MHz
41. A CS amplifier is driven by a voltage source with internal resistance $R_S = 300\Omega$. The load is $R_D = 20k\Omega$. FET parameters are $g_m = 2m\text{ S}$, $r_d = 20k\Omega$, $C_{gs} = 8pF$, $C_{gd} = 4pF$.
The upper cut off frequency is
- (A) 5.7 MHz (C) 6.5 MHz
(B) 4.1 MHz (D) 3.7 MHz

42. Consider the circuit as shown in figure below plot of i_1 over the input voltage $-10 \leq V_i \leq +10V$ is

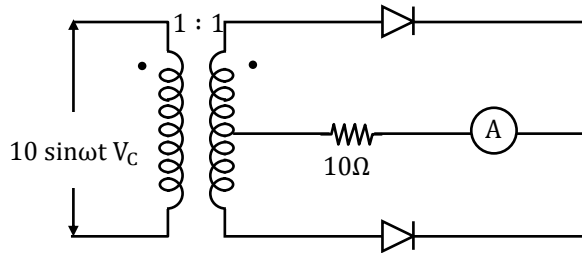


43. In the following signal flow graph, the gain C/R is _____



44. An emitter follower using a pnp transistor with $\beta_0 = 150$ is biased at $I_C = 0.25 \text{ mA}$. The voltage signal source has $R_s = 3 \text{ k}\Omega$. In order to make the overall $R_0 = 110 \Omega$,
 $R_E = \text{_____ k}\Omega$
 [given, $g_m = \frac{I_C}{V_T} = \frac{I_C(\text{mA})}{25}$ at 290k]

45. Circuit shown in below



The energy dissipated in 10Ω resistor, in 20 sec is _____ J

46. The Z-T of a signal $f(k)$ is given by

$$F(z) = \frac{2z^6 - z^5 + 3z^3 + 2z^2}{z^7 + 2z^6 + z^5 + z^4 + 0.5} = \frac{n(z)}{d(z)}$$

Where $n(z)$ and $d(z)$ are the numerator and denominator polynomial respectively. The value of $f[3] =$ _____

47. A function 'u' is given as

$$u = \log \frac{x^4 + y^4}{x + y}. \text{ Then } x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} \text{ is}$$

- (A) $3u$ (C) 3
(B) $4u$ (D) 4

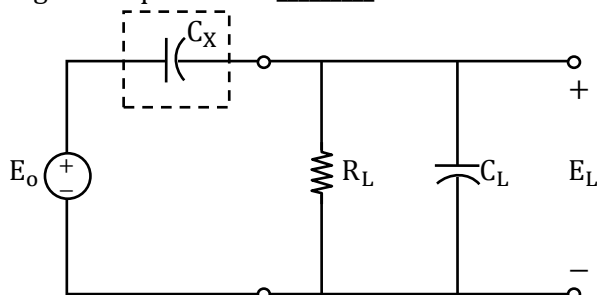
48. The values of resistance of thermistors A and B at 298 K is $2\text{ k}\Omega$ and the ratio of their resistance at 398 K is 0.5, then what is the difference in the material constant of thermistor A and B?

- (A) 1000 (C) 822
(B) 900 (D) 950

49. A Thermistor has a resistance temperature coefficient of -5% over a temperature range of 25°C to 50°C . If the resistance of thermistor is $100\ \Omega$ at 25°C , what is the resistance at 35°C ?

- (A) $40\ \Omega$ (C) $50\ \Omega$
(B) $45\ \Omega$ (D) $55\ \Omega$

50. Consider the electrical equivalent of a piezoelectric crystal, the output voltage is measured using high impedance meter. The expression for load voltage in terms of source voltage for higher frequencies is _____



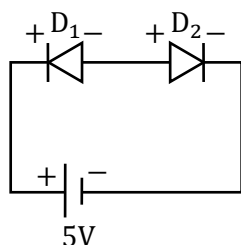
- (A) $\frac{k\tau\omega}{\sqrt{1+\omega^2\tau^2}} E_o$ (C) $\frac{C_x}{C_x+C_L} E_o$
 (B) $\frac{k\omega}{\sqrt{1+\omega^2\tau^2}} E_o$ (D) $\frac{C_L}{C_x+C_L} E_o$

51. Two piezoelectric crystals are used for dynamic pressure measurement. One of the crystal having capacitance of 1000 pF while the second crystal has 1500 pF. The outputs of two crystal are measured by charge amplifier whose input resistance is 1 MΩ and capacitance is 50 pF. If the pressure applied with a frequency of 25 rad/s then the percentage error in the measurement of magnitude of output when pressure is successively applied to first crystal and then to second crystal?

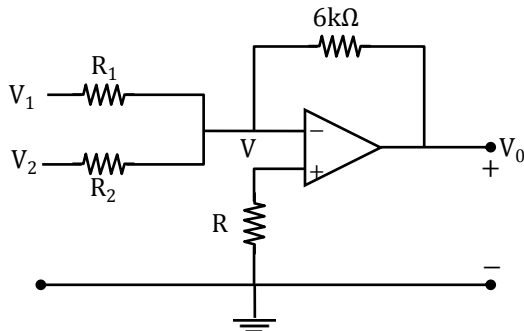
- (A) 47.5% (C) 4.75%
 (B) 0% (D) 32.2%

52. Two identical junction diode D_1 and D_2 connected back to back. I_s of each diode is 10^{-8} Amp, Breakdown voltage is 50V. If V_{D_1} & V_{D_2} are drop across diode D_1 & D_2 respectively, then $V_{D_1} - V_{D_2} =$ _____ V

Assume $\frac{kT}{q} = 25\text{mV}$



53. The circuit shown simulates the relation $V_0 = -2V_1 - 3V_2$. The Value of R is _____ Ω .



Assume, Op-Amp is ideal.

54. An equal percentage valve used in a fire hydrant system of a process plant has flow rate from 10 m^3 control signal for 0 cm (minimum) - 10cm (maximum) - stem length. If control signal is of 12mA then the flow rate of water is
 (A) $3.16 \text{ m}^3/\text{sec}$ (C) $50 \text{ m}^3/\text{sec}$
 (B) $31.6 \text{ m}^3/\text{sec}$ (D) $316 \text{ m}^3/\text{sec}$
55. For a unity feedback system, process transfer function is given by $G_p(s) = \frac{1}{s(s+1)(s+5)}$. The controller is of PID mode calculate the optimal value of integral time based on ultimate cycle method of tuning is _____ sec.

General Aptitude One Marks Question Q. 56 to Q. 60

56. Three bells chime at an interval of 18, 24 and 32 minutes respectively. At a certain time they begin to chime together. What length of time will elapse before they chime together again?
 (A) 2 hours 24 minutes (C) 1 hour 36 minutes
 (B) 1 hour 12 minutes (D) 4 hours 48 minutes
57. In a one day cricket match, the total runs made by a team were 200. Out of these 160 runs were made by spinners.
 Conclusion I: 80% of the team consists of spinners.
 Conclusion II: The opening batsmen were spinners.
 (A) Only conclusion I follows (C) Either I or II follows
 (B) Only conclusion II follows (D) Neither I nor II follows
58. In a car race of 12km, a participant covers a distance of the first 3 km in 6 minutes. He then increases his speed and covers twice the distance already covered in 6 minutes. He covers the rest of the distance in 12 minutes. Find his average speed.
 (A) 9.23m/s (C) 6.20m/s
 (B) 7.44m/s (D) 8.33m/s

Directions for Q. No. 59: Choose the option which is FARTHEST to the word mentioned in Question

59. **MOROSE**

- (A) Exuberant (C) Mortified
(B) Moron (D) Crestfallen

60. A team of five is to be selected from amongst five boys A, B, C, D and E and four girls P, Q, R and S. Some criteria for selection are as follows

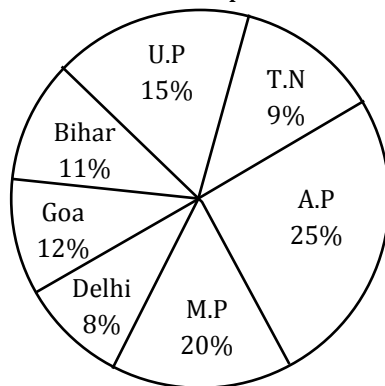
C and P have to be together, Q cannot go with R. E cannot go with S. B and D have to be together. Q cannot go with A. Unless stated otherwise, these criteria apply to all the following questions.

If two of the members have to be boys, the team will consist of

- (A) CEPQS (C) ACPRS
(B) AEPQS (D) BDPRS

General Aptitude Two Marks Question Q. 61 to Q. 65

Direction for Q. No 61: Data of different states regarding population of states in the year 1998 is shown in pie chart study the graph and answer the question that follows.



Total population of given states = 32,76,000

Following table shows that sex & literacy wise population ratio

States	Sex		Literacy	
	Male	Female	Literate	Illiterate
Andhra Pradesh	5	3	2	7
Madhya Pradesh	3	1	1	4
Delhi	2	3	2	1
Goa	3	5	3	2
Bihar	3	4	4	1
Uttar Pradesh	3	2	7	2
Tamil Nadu	3	4	9	4

61. What will be the total percentage of total number of males in U.P, M.P & Goa together to the total population of all given states ?

- (A) 28.5% (C) 23%
(B) 18.5% (D) 32%

62. A cube is coloured red on one of the face, green on the opposite face, yellow on another face and blue on a face adjacent to the yellow face. The other two faces are left uncolored. It is then cut into 125 smaller cubes of equal size. How many cubes uncolored on the all the faces?
- (A) 27 (C) 48
(B) 36 (D) 64

63. NOVICE: SEASONED
- (A) Opulent: Grand (C) Affluent: Impecunious
(B) Nefarious : Wicked (D) Filthy: Disgusting

Direction for Q. No 64: Consider the information in the statements to be true. On the basis read the following questions and mark:

64. The Minister said that the teachers are still not familiarised with the need, importance and meaning of population education in the higher education system. They are not even clearly aware about their role and responsibilities in the population education programme.
- I. Population education programme should be included in the college curriculum.
II. Orientation programme should be conducted for teachers on population education
- (A) If only I follows (C) If neither I nor II follows
(B) If only II follows (D) If both I and II follow
65. The question is followed by two statements I and II. Mark the answer.
What is the value of the ratio $(a + c) : c$?
- I. The ratio of $a : b = 1 : 5$.
II. The ratio of $b : c = 3 : 2$.
- (A) If the question can be answered by using one of the statements alone, but cannot be answered using the other statement alone.
(B) If the question can be answered by using either statement alone.
(C) If the question can be answered by using both statements together, but cannot be answered using either statement alone.
(D) If the question cannot be answered even by using both statements together