

पुस्तिका में पृष्ठों की संख्या : 16
Number of Pages in Booklet : 16
पुस्तिका में प्रश्नों की संख्या : 100
No. of Questions in Booklet : 100

प्रश्न-पत्र पुस्तिका संख्या /
Question Paper Booklet No.

परीक्षा दिनांक

5-11-19(E)

SVPEC-91

3009653

Subject Code : 04

विषय / SUBJECT :

Electronics & Communication Engineering

समय : 2.00 घण्टे

Time : 2.00 Hours

अधिकतम अंक : 100
Maximum Marks : 100

प्रश्न-पत्र पुस्तिका एवं उत्तर पत्रक के पेपर सील/पॉलिथीन बैग को खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि उसके प्रश्न-पत्र पुस्तिका पर वही प्रश्न-पत्र पुस्तिका संख्या अंकित है जो उत्तर पत्रक पर अंकित है। इसमें कोई भिन्नता हो तो वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें। ऐसा न करने पर जिम्मेदारी अभ्यर्थी की होगी।

The candidate should ensure that Question Paper Booklet No. of the Question Paper Booklet and Answer Sheet must be same after opening the Paper Seal / Polythene bag. In case they are different, a candidate must obtain another Question Paper. Candidate himself shall be responsible for ensuring this.

परीक्षार्थियों के लिए निर्देश

1. सभी प्रश्नों के उत्तर दीजिए।
2. सभी प्रश्नों के अंक समान हैं।
3. प्रत्येक प्रश्न का केवल एक ही उत्तर दीजिए।
4. एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा।
5. प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4 अंकित किया गया है। अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले अथवा बबल को उत्तर पत्रक पर नीले बॉल प्वाइंट पेन से गहरा करना है।
6. OMR उत्तर पत्रक इस परीक्षा पुस्तिका के अन्दर रखा है। जब आपको परीक्षा पुस्तिका खोलने का कहा जाए, तो उत्तर पत्र निकाल कर ध्यान से केवल नीले बॉल प्वाइंट पेन से विवरण भरें।
7. प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा। गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है। किसी भी प्रश्न से संबंधित गोले या बबल को खाली छोड़ना गलत उत्तर नहीं माना जायेगा।
8. मोबाइल फोन अथवा इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है। यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी।
9. कृपया अपना रोल नम्बर ओ.एम.आर. पत्रक पर सावधानीपूर्वक सही भरें। गलत अथवा अपूर्ण रोल नम्बर भरने पर 5 अंक कुल प्राप्तांकों में से काटे जा सकते हैं।

चेतावनी: अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराते हुए विविध नियमों-प्रावधानों के तहत कार्यवाही की जाएगी। साथ ही विभाग ऐसे अभ्यर्थी को भविष्य में होने वाली विभाग की समस्त परीक्षाओं से विवर्जित कर सकता है।

INSTRUCTIONS FOR CANDIDATES

1. Answer all questions.
2. All questions carry equal marks.
3. Only one answer is to be given for each question.
4. If more than one answers are marked, it would be treated as wrong answer.
5. Each question has four alternative responses marked serially as 1, 2, 3, 4. You have to darken only one circle or bubble indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
6. The OMR Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with blue ball point pen only.
7. 1/3 part of the mark(s) of each question will be deducted for each wrong answer. A wrong answer means an incorrect answer or more than one answers for any question. Leaving all the relevant circles or bubbles of any question blank will not be considered as wrong answer.
8. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt as per rules.
9. Please correctly fill your Roll Number in O.M.R. Sheet. 5 Marks can be deducted for filling wrong or incomplete Roll Number.

Warning: If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would liable to be prosecuted. Department may also debar him/her permanently from all future examinations.

इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए।

Do not open this Test Booklet until you are asked to do so.

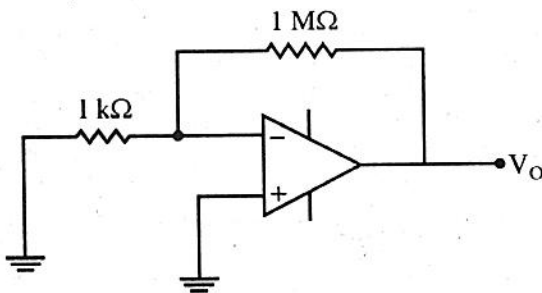
04



1. To avoid thermal runaway in a BJT circuit the following condition must be satisfied :

- (1) $V_{CE} < V_{CC}/2$
- (2) $V_{CE} = V_{CC}/2$
- (3) $V_{CE} > V_{CC}/2$
- (4) $I_C < V_{CC}/2 (R_C + R_E)$

2. An Op-Amp has input offset voltage of 1 mV and is ideal in all other respects. If this Op-Amp is used in the circuit shown in figure, the output voltage will be (select the nearest value)



- (1) 1 mV
- (2) 10 V
- (3) ± 1 V
- (4) 0 V

3. In an abrupt p-n junction, the doping concentrations on the p-side and n-side are $N_A = 9 \times 10^{16}/\text{cm}^3$ and $N_D = 1 \times 10^{16}/\text{cm}^3$. The p-n junction is reverse biased and the total depletion width is 3 μm . The depletion width on the p-side is

- (1) 2.7 μm
- (2) 0.3 μm
- (3) 2.25 μm
- (4) 0.75 μm

4. If a silicon BJT is in the cut-off region, then V_{CE} will be approximately

- (1) 0 V
- (2) minimum
- (3) 0.6 V
- (4) equal to V_{CC}

5. A certain p channel E-MOSFET has a $V_{GS(th)} = -2\text{V}$. If $V_{GS} = 0\text{V}$, the drain current is :

- (1) 0 A
- (2) $I_{D(ON)}$
- (3) maximum
- (4) I_{DSS}

6. The JFET is

- (1) a unipolar and voltage controlled device
- (2) a bipolar and voltage controlled device
- (3) a bipolar and current controlled device
- (4) a unipolar and current controlled device

7. MOSFET uses the electric field of

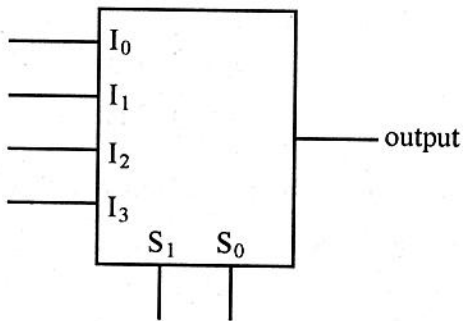
- (1) Gate capacitance to control the channel current.
- (2) Barrier potential of PN junction to control the channel current.
- (3) Both (1) and (2)
- (4) None of these

8. The overall bandwidth of two identical voltage amplifiers connected in cascade will be :

- (1) same as single stage
- (2) higher than single stage
- (3) lower than single stage
- (4) higher if stage gain is low and lower if stage gain is high

9. In CMOS technology, shallow P-well or N-well regions can be formed using
- (1) low pressure chemical vapour deposition
 - (2) low energy sputtering
 - (3) low temperature dry oxidation
 - (4) low energy ion-implantation

10. Output of the given 4×1 multiplexer is
- Where $I_0 = I_1 = C$, $I_2 = I_3 = C'$, $S_1 = A$ and $S_0 = B$ (C' is the compliment of C).



- (1) A Ex-OR B
 - (2) A Ex-NOR B
 - (3) A Ex-OR C
 - (4) A Ex-NOR C
11. For a parallel plate transmission line, let v be the speed of propagation and Z be the characteristic impedance. Neglecting fringe effects, a reduction of the spacing between the plates by a factor of two results in
- (1) halving of v and no change in Z
 - (2) no change in v and halving of Z
 - (3) no change in both v and Z
 - (4) halving of both v and Z

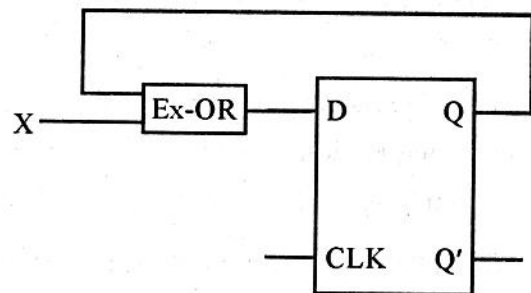
12. ALU (Arithmetic and Logic unit) of 8085 microprocessor consists of

- (1) Accumulator, temporary register, arithmetic & logic circuits only
- (2) Accumulator, arithmetic & logic circuits and five flags only
- (3) Accumulator, arithmetic & logic circuits only
- (4) Accumulator, temporary register, arithmetic & logic circuits and five flags only

13. The fastest logic family is

- (1) TTL
- (2) ECL
- (3) DTL
- (4) Schottky TTL

14. The digital circuit shown in the given figure has $X = 1$. It works as



- (1) J-K Flip Flop
- (2) R-S Flip Flop
- (3) T Flip Flop
- (4) D Flip Flop

15. For 8085 microprocessor, the instruction RST 6 restarts subroutine at address :

- (1) 00_H (2) 03_H
(3) 30_H (4) 33_H

16. Multiplication is done in 8085 microprocessors by repeated addition

- (1) this is done for memory optimization
(2) in ALU only addition and subtraction are possible
(3) a separate instruction is needed for the two
(4) none of these

17. Consider the execution of the following instructions by an 8085 microprocessor :

LXI H, $01FF_H$

SHLD 2050_H

After execution the contents of memory locations $2050H$ and $2051H$ and the registers H and L will be :

- (1) $2050H \rightarrow FF$; $2051H \rightarrow 01$; H \rightarrow FF; L \rightarrow 01
(2) $2050H \rightarrow 01$; $2051H \rightarrow FF$; H \rightarrow FF; L \rightarrow 01
(3) $2050H \rightarrow FF$; $2051H \rightarrow 01$; H \rightarrow 01; L \rightarrow FF
(4) $2050H \rightarrow FF$; $2051H \rightarrow 01$; H \rightarrow 00; L \rightarrow 00

18. Examine the following instructions to be executed by an 8085 microprocessor. The input port has an address of $01H$ and has a data $05H$ to input :

IN 01
ANI 80

After execution of the two instructions the following flag portions may occur :

1. zero flag is set.
2. zero flag is reset.
3. carry flag is cleared.
4. auxiliary carry flag is set.

Select the correct answer using the codes given below :

- (1) 1 and 3 (2) 2, 3 and 4
(3) 3 and 4 (4) 1, 3 and 4

19. D flip-flop can be made from J-K flip-flop by making :

- (1) $J = K = 0$ (2) $J = K = 1$
(3) $J = 0, K = 1$ (4) $J = K$

20. The number of Boolean functions that can be generated by 'n' variables, is equal to :

- (1) 2^n (2) $(2^2)^n$
(3) 2^{n-1} (4) 2^{n+1}

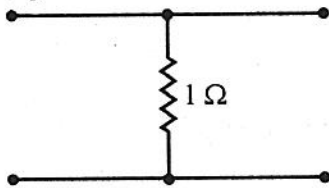
21. The program counter in an 8085 microprocessor is a 16-bit register because :

- (1) It counts 16 bits at a time.
- (2) There are 16 address lines.
- (3) It facilitates the user storing.
- (4) It has to fetch two 8-bit data at a time.

22. Output of the assembler in machine code is referred to as :
- (1) Object code
 - (2) Source code
 - (3) Macroinstruction
 - (4) Symbolic addressing
23. The maximum percentage error in the sum of two voltage measurements when $V_1 = 100 \text{ V} \pm 1\%$ and $V_2 = 80 \text{ V} \pm 5\%$ is
- (1) $\pm 4\%$
 - (2) $\pm 2.8\%$
 - (3) $\pm 6.5\%$
 - (4) $\pm 3\%$
24. The power of a three phase, three wired balanced system was measured by two Wattmeter method. The reading of one Wattmeter was found to be doubled that of other. What is the power factor of the system ?
- (1) 0.5
 - (2) 0.866
 - (3) 0.25
 - (4) 1
25. A direct memory access (DMA) transfer implies :
- (1) Direct transfer of data between memory and accumulator.
 - (2) Direct transfer of data between memory and I/O devices without the use of microprocessor.
 - (3) Transfer of data exclusively within microprocessor registers.
 - (4) A fast transfer of data between microprocessor and I/O devices.
26. The drawbacks of strain gauges are
- S1 : Low fatigue life
 S2 : They are expensive, brittle and sensitive to temperature
 S3 : Poor sensitivity
- Choose the correct one :
- (1) S1 only
 - (2) S1 & S2
 - (3) S2 & S3
 - (4) S1 & S3
27. Which of the following bridge can be used for inductance measurement ?
- (1) Wheatstone bridge
 - (2) Schering bridge
 - (3) Maxwell's bridge
 - (4) Wein bridge
28. Radiation pyrometers are used in the temperature range of
- (1) $0 - 500 \text{ }^\circ\text{C}$
 - (2) $500 - 1000 \text{ }^\circ\text{C}$
 - (3) $-250 - 500 \text{ }^\circ\text{C}$
 - (4) $1200 - 2500 \text{ }^\circ\text{C}$
29. Superposition theorem can be applied to following case :
- (1) Both linear and non-linear circuits
 - (2) linear circuits only
 - (3) non-linear circuits only
 - (4) None of these
30. The principle of operation of LVDT is based on the variation of
- (1) Self Inductance
 - (2) Mutual Inductance
 - (3) Reluctance
 - (4) Permanence

31. Norton's theorem states that a complex network connected to a load can be replaced with an equivalent impedance
- (1) in series with a current source
 - (2) in parallel with voltage source
 - (3) in series with a voltage source
 - (4) in parallel with current source

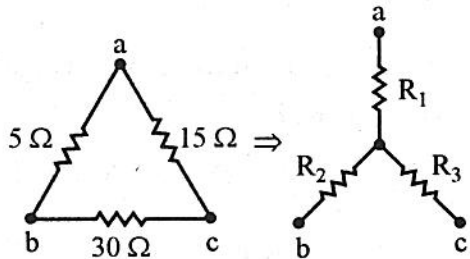
32. For the two port network shown in the figure



The value of [h] parameter matrix is

- (1) $\begin{bmatrix} 1 & 0 \\ -1 & -1 \end{bmatrix}$
- (2) $\begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix}$
- (3) $\begin{bmatrix} 0 & 1 \\ 1 & -1 \end{bmatrix}$
- (4) $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$

33. A delta connected network with its star-equivalent is shown in figure. The resistances R_1 , R_2 , R_3 (in ohms) are respectively

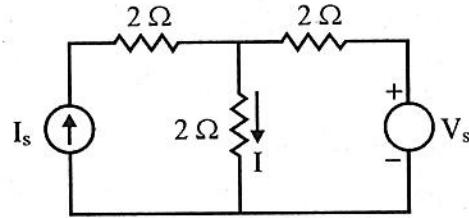


- (1) 1.5, 3 and 9
- (2) 3, 9 and 1.5
- (3) 9, 3 and 1.5
- (4) 3, 1.5 and 9

34. A network has 7 nodes and 5 independent loops. The number of branches in the network is

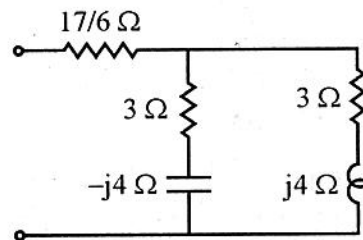
- (1) 10
- (2) 11
- (3) 12
- (4) 13

35. In the circuit shown, the value of V_s is 0 when $I = 4A$. The value of I when $V_s = 16V$, is :



- (1) 6 A
- (2) 8 A
- (3) 10 A
- (4) 12 A

36. The total impedance $Z(j\omega)$ of the circuit shown below is :



- (1) $(6 + j0) \Omega$
- (2) $(7 + j0) \Omega$
- (3) $(0 + j8) \Omega$
- (4) $(6 + j8) \Omega$

37. A 10 mH inductor carries a sinusoidal rms current of 1 A at a frequency of 50 Hz. The average power dissipated by the inductor is :

- (1) 0 W
- (2) 0.25 W
- (3) 0.5 W
- (4) 1.0 W

38. For 2.4 m diameter parabolic dish antenna operating at 4 GHz, the minimum distance required for far field measurement is close to
 (1) 7.5 cm (2) 15 cm
 (3) 15 m (4) 150 m
39. For electrostatic fields in charge free atmosphere, which one of the following is correct ?
 (1) $\nabla \times E = 0$ and $\nabla \cdot E = 0$
 (2) $\nabla \times E \neq 0$ and $\nabla \cdot E = 0$
 (3) $\nabla \times E = 0$ and $\nabla \cdot E \neq 0$
 (4) $\nabla \times E \neq 0$ and $\nabla \cdot E \neq 0$
40. A wave guide operated below cut-off frequency can be used as
 (1) A phase shifter
 (2) An attenuator
 (3) An isolator
 (4) None of these
41. Which of the following statement is true ?
 1. A capacitor is an open circuit to dc voltages.
 2. An inductor is a short circuit to dc currents.
 3. Series and parallel combinations of capacitors work the opposite way as they do for resistors.
 (1) Only 1 and 2
 (2) Only 1 and 3
 (3) Only 2 and 3
 (4) All 1, 2 and 3
42. The input impedance of a short circuited loss - less $\frac{\lambda}{4}$ line with characteristic impedance Z_0 is
 (1) Zero (2) Z_0
 (3) $\frac{Z_0}{2}$ (4) Infinity
43. The magnetic field at a distance r from the center of the wire with radius 'a' is proportional to
 (1) r for $r < a$ and $1/r^2$ for $r > a$
 (2) 0 for $r < a$ and $1/r$ for $r > a$
 (3) r for $r < a$ and $1/r$ for $r > a$
 (4) 0 for $r < a$ and $1/r^2$ for $r > a$
44. For a Hertz dipole antenna, the half power beam width (HPBW) in the E-plane is :
 (1) 360° (2) 180°
 (3) 90° (4) 45°
45. Which one of the following pairs is not correctly matched ?
 (1) Gauss's Law : $\oint \bar{D} \cdot d\bar{s} = \int_V \rho dv$
 (2) Gauss's theorem :

$$\oint_s \bar{D} \cdot d\bar{s} = \int_V \nabla \cdot \bar{D} dv$$

 (3) Coulombs law : $V = -\frac{d\phi_m}{dt}$
 (4) Stokes theorem :

$$\oint_t \bar{\xi} \cdot d\bar{l} = \int_s (\nabla \times \bar{\xi}) \cdot d\bar{s}$$

46. A discrete time system is defined by its impulse response $h(n) = 2^n u(n-2)$. The system is

- (1) Stable and Causal
- (2) Causal but not Stable
- (3) Stable but not Causal
- (4) Unstable and non-causal

47. The impulse response of a continuous time system is given by $h(t) = \delta(t-1) + \delta(t-3)$. The value of the step response at $t=2$ is

- (1) 0
- (2) 1
- (3) 2
- (4) 3

48. Which of the following is a non-causal system ?

- (1) $y(t) = x(t+1)$
- (2) $y(t) = x(t-1)$
- (3) $y(t) = x(t)+c$
- (4) $y(t) = x(t-1)+c$

49. The impulse response of an LTI system can be obtained by

- (1) differentiating the unit ramp sequence once
- (2) integrating the unit step sequence once
- (3) differentiating the unit step sequence once
- (4) integrating the unit ramp sequence once

50. The discrete time transfer function $\frac{1-2z^{-1}}{1-0.5z^{-1}}$ is

- (1) Non minimum phase and unstable
- (2) Minimum phase and unstable
- (3) Minimum phase and stable
- (4) Non minimum phase and stable

51. A system with input $x[n]$ and output $y[n]$ is given as $y[n] = \sin\left(\frac{5}{6}\pi n\right) \cdot x[n]$. The system is :

- (1) Linear, stable and invertible
- (2) Non-Linear, stable and non-invertible
- (3) Linear, stable and non-invertible
- (4) Linear, unstable and invertible

52. The impulse response of an LTI system is $h(t) = tu(t)$. For an input $u(t-1)$ the output is :

- (1) $\frac{t^2}{2}u(t)$
- (2) $\frac{t(t-1)}{2}u(t-1)$
- (3) $\frac{(t-1)^2}{2}u(t-1)$
- (4) $\frac{t^2-1}{2}u(t-1)$

53. Rayleigh probability density function (for $0 \leq r \leq \infty$) is defined as : ($\sigma = 1$)

- (1) $r \cdot e^{-r}$
- (2) $r^2 \cdot e^{-r^2}$
- (3) $\left\{ \frac{r \cdot e^{-r^2}}{2} \right\}$
- (4) e^{-r}

54. Two discrete time systems with impulse response $h_1[n] = \delta(n-1)$ and $h_2[n] = \delta(n-2)$ are connected in cascade. The overall impulse response of the cascaded system is :

- (1) $\delta(n-1) + \delta(n-2)$
- (2) $\delta(n-4)$
- (3) $\delta(n-3)$
- (4) $\delta(n-1) \cdot \delta(n-2)$

55. Routh array is prepared from

- (1) impulse response of the system
- (2) characteristic equation of the system
- (3) transfer function of the system
- (4) none of these

56. In with a negative feedback, the system gain and stability respectively

- (1) Decreases, Increases
- (2) Increases, Decreases
- (3) Decreases, Decreases
- (4) Increases, Increases

57. Let $x(n) = \left(\frac{1}{2}\right) u(n)$ and $y(n) = x^2(n)$ and $Y(e^{j\omega})$ be the Fourier Transform of $y(n)$, then $Y(e^{j0})$ is

- (1) $\frac{1}{4}$ (2) 2
- (3) 4 (4) $\frac{4}{3}$

58. A system has 14 poles and 2 zeros. It's high frequency asymptotes in its magnitude plot shall have a slope of.

- (1) -20 dB/decade
- (2) -240 dB/decade
- (3) -280 dB/decade
- (4) -140 dB/decade

59. The value of K for which the unity feedback system

$G(s) = \frac{K}{s(s+2)(s+4)}$ crosses the imaginary axis at

- (1) 2 (2) 4
- (3) 6 (4) 48

60. A system with the characteristic equation $s^2 + Ks + 2K - 1 = 0$ is stable for the value

- (1) $K < 0$ (2) $K = 0$
- (3) $K < 1/2$ (4) $K > 1/2$

61. If the characteristics equation of a system is given below. Comment on its stability.

$$S^6 - 8 S^5 + 5 S^4 + S^3 + S^2 + 3 S + 1 = 0$$

- (1) conditionally stable
- (2) marginally stable
- (3) stable
- (4) unstable



62. For a second order system with closed loop transfer function $T(s) = \frac{25}{s^2 + 6s + 25}$ the setting time for 2% band in second is

- (1) $\frac{5}{4}$ sec
- (2) $\frac{4}{3}$ sec
- (3) 1 sec
- (4) $\frac{7}{4}$ sec

63. Which one of the following effects in the system is not caused by negative feedback ?

- (1) Reduction in gain
- (2) Increase in bandwidth
- (3) Increase in distortion
- (4) Reduction in noise

64. The transfer function $(1 + 0.5s)/(1+s)$ represents

- (1) lag network
- (2) lead network
- (3) proportional network
- (4) lag-lead network

65. The open loop transfer function of a unity gain negative feedback control system is given by $G(s) = \frac{s^2 + 4s + 8}{s(s + 2)(s + 8)}$. The angle θ at which root locus approaches the zero of the system satisfies :

- (1) $|\theta| = \pi - \tan^{-1} \frac{1}{4}$
- (2) $|\theta| = \frac{3}{4}\pi - \tan^{-1} \frac{1}{3}$
- (3) $|\theta| = \frac{\pi}{2} - \tan^{-1} \frac{1}{4}$
- (4) $|\theta| = \frac{\pi}{4} - \tan^{-1} \frac{1}{3}$

66. The gain margin of the system $G(s) = \frac{k}{(s + 1)(s + 2)}$ is :

- (1) 0 dB
- (2) 1 dB
- (3) 20 dB
- (4) ∞ dB

67. A system with transfer function $G(s) = \frac{(s^2 + 9)(s + 2)}{(s + 1)(s + 3)(s + 4)}$ is excited by $\sin(\omega t)$. The steady state output of the system is zero at

- (1) $\omega = 1$ rad/sec
- (2) $\omega = 2$ rad/sec
- (3) $\omega = 3$ rad/sec
- (4) $\omega = 4$ rad/sec

68. A balanced modulator is used for the generation of which of the following ?

- (1) SSB signal
- (2) DSB full carrier signal
- (3) DSB SC signal
- (4) PAM signal

69. Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of 50 percent.

- (1) 83.3
- (2) 94.4
- (3) 50
- (4) 66.6

70. An analog signal $m(t)$ is confined to range $(-m_p, m_p)$ this range is divided in L zones, on quantizing the analog signal, the mean square quantizing error is

- (1) $\frac{m_p^2}{3L^2}$
- (2) $\frac{m_p^2}{3L}$
- (3) $\frac{m_p}{3L^2}$
- (4) $\frac{m_p}{3L}$

71. A receiver connected to an antenna whose resistance is 50Ω has an equivalent noise resistance of 30Ω . Calculate the receiver's noise figure in decibels.

- (1) 2.67
- (2) 1.6
- (3) 0.4
- (4) 2.04

72. The channel capacity of an ideal AWGN channel with infinite bandwidth is approximated as (where S is average signal power and $\frac{\eta}{2}$ is the double sided power spectral density of white Gaussian noise)

- (1) $1.44 \frac{S}{\eta}$ b/s
- (2) $\frac{S}{1.44 \eta}$ b/s
- (3) $1.44 \frac{\eta}{S}$ b/s
- (4) $2.88 \frac{S}{\eta}$ b/s

73. In a communication system each message (0 or 1) is transmitted three times in order to reduce the probability of error. The detection is based on the majority rule at the receiver. If p_e is the probability of bit error, the probability of error for this communication system is

- (1) $3p_e^2 - 2p_e^3$
- (2) $1 - p_e^2 - p_e^3$
- (3) p_e^3
- (4) $p_e^2(1 - p_e)$

74. The standard value of sampling rate for speech transmission is

- (1) 4K samples per sec.
- (2) 8K samples per sec.
- (3) 16K samples per sec.
- (4) 32K samples per sec.

75. For envelope detector based AM system, maximum value of power efficiency is :
- (1) 50% (2) 33.33%
 (3) 100% (4) 25%
76. For an angle modulated signal $x(t) = 3 \cos[2\pi 10^6 t + 2 \sin(2\pi 10^3 t)]$, what is the maximum frequency deviation ?
- (1) 2,000 Hz
 (2) 1,000 Hz
 (3) 5,000 Hz
 (4) 10,000 Hz
77. When β is the modulation index, then the bandwidth of full AM and FM signals are respectively (f_c = carrier frequency, f_m = baseband frequency)
- (1) $(f_c \pm f_m)$ and $(f_c \pm 2\beta f_m)$
 (2) $(f_c \pm f_m)$ and $(f_c \pm \beta f_m)$
 (3) $(f_c \pm 2f_m)$ and $(f_c \pm 2\beta f_m)$
 (4) $(f_c \pm 2f_m)$ and $(f_c \pm \beta f_m)$
78. A display screen consists of 2×10^6 picture elements and 16 brightness levels. The frames are repeated at the rate of 32 per second. All picture elements are assumed to be independent and all levels have equal likelihood of occurrence. The average rate of information conveyed by this display screen source is
- (1) 256 Mb/s (2) 128 Mb/s
 (3) 64 Mb/s (4) 32 Mb/s
79. Companding is used
- (1) to overcome quantizing noise in PCM
 (2) in PCM transmitters, to allow amplitude limiting in the receivers
 (3) to protect small signals in PCM from quantizing distortion
 (4) in PCM receivers, to overcome impulse noise
80. The Hartley – Shannon theorem sets a limit on the
- (1) highest frequency that may be sent over a given channel
 (2) maximum capacity of a channel with a given noise level
 (3) maximum number of coding levels in a channel with a given noise level
 (4) maximum number of quantizing levels in a channel of a given bandwidth
81. A super heterodyne receiver with an IF of 450 kHz is tuned to a signal of 1000 kHz, the image frequency is
- (1) 650 kHz (2) 2100 kHz
 (3) 1900 kHz (4) 1450 kHz

82. In a communication system the bit rate is f_b bits/sec, the BW for BPSK and QPSK signals are
- (1) f_b and $2f_b$ respectively
 - (2) $2f_b$ and f_b respectively
 - (3) $2f_b$ and $4f_b$ respectively
 - (4) $4f_b$ and $2f_b$ respectively
83. A binary source generates digits 1 and 0 randomly with probabilities 0.6 and 0.4 respectively. The probability that at least three 1s will occur in a five digit sequence is
- (1) 0.317 (2) 0.683
 - (3) 0.216 (4) 0.064
84. A signal carrier $c(t) = A \cos 2\pi f_c t + B \sin 2\pi f_c t$ is passed through an envelope detector. What is the magnitude of the output of envelope detector, at $t = 5$ sec ? Given $A = 6$, $B = 10$ & $f_c = 10^6$ Hz.
- (1) 12.95 (2) 100
 - (3) 11.66 (4) 6.4
85. Which of the following is worst affected by Noise ?
- (1) PPM (2) PCM
 - (3) PWM (4) PAM
86. A source produces three symbols A, B and C (with no inter-symbol interference) having marginal probabilities of 0.25, 0.25 and 0.5 respectively. Entropy of the source is :
- (1) 1.0 bit / symbol
 - (2) 1.25 bit / symbol
 - (3) 2.0 bit / symbol
 - (4) 1.5 bit / symbol
87. The propagation time from one earth station to another earth station via Geo-stationary satellite is approximately :
- (1) 125 msec (2) 150 msec
 - (3) 300 msec (4) 25 msec
88. Which of the following statement is true ?
- (1) Probability of error for M-ary FSK decreases as M increases
 - (2) Probability of error for M-ary PSK decreases as M increases
 - (3) M-ary FSK requires considerably lesser bandwidth in comparison with M-ary PSK
 - (4) Probability of error for M-ary FSK is independent of increase in M

89. Flat band voltage of MOSFET is defined as the applied gate voltage such that :

- (1) There is no band bending in the semiconductor.
- (2) Net space charge in this region.
- (3) Both (1) and (2)
- (4) None of these

90. The absorption coefficient of a semiconductor used for optoelectronic device is a very strong function of

- (1) photon energy and band-gap energy
- (2) temperature of atmosphere
- (3) phonon energy and lattice vibration
- (4) carrier diffusion length

91. The dominant operating process for LASER diode is :

- (1) Absorption
- (2) Spontaneous emission
- (3) Auger recombination
- (4) Stimulated emission

92. Arsenic and Boron are most important doping species in VLSI technology because of their :

- (1) highest ionization energy
- (2) highest solid solubility value
- (3) lowest ionization energy
- (4) lowest solid solubility limit

93. Early effect in a transistor is known as

- (1) Zener breakdown
- (2) Avalanche breakdown
- (3) Thermal breakdown
- (4) Reduction in width of base or base narrowing

94. Match the column I with column II and mark the correct option :

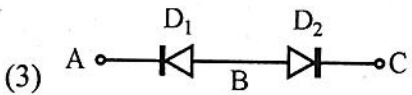
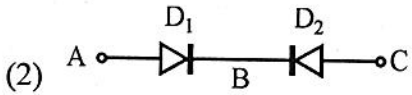
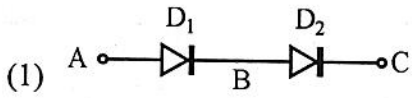
Column I	Column II
P. LED	1. Heavy Doping
Q. Avalanche photodiode	2. Coherent radiation
R. Tunnel Diode	3. Spontaneous emission
S. LASER	4. Current gain

	P	Q	R	S
(1)	1	2	4	3
(2)	2	3	1	4
(3)	3	4	1	2
(4)	2	1	4	3

95. Which of the following cannot be used as mask in MOS fabrication process ?

- (1) Silicon dioxide
- (2) Silicon nitride
- (3) Photoresist
- (4) Boron

96. As with other two terminal devices, diodes can be placed in series (or in parallel). Determine which one of the following configurations can conduct current from A \rightarrow C ?



(4) None of these

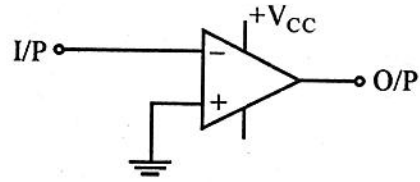
97. Which of the following statement is true for a Schottky barrier diode ?

- (1) Minority carrier device
- (2) Minority carrier storage time is infinite
- (3) Diffusion capacitance is associated when the device is forward biased
- (4) Majority carrier device

98. In p^+n junction under reverse bias, the magnitude of electric field is maximum at

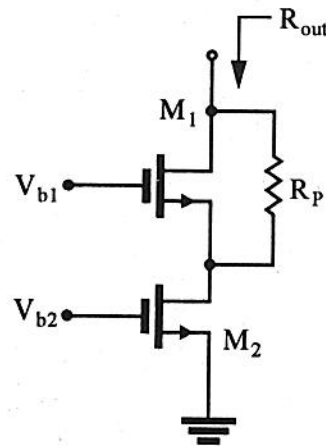
- (1) the edge of the depletion region on the p-side.
- (2) the edge of the depletion region on the n-side.
- (3) the p^+n junction
- (4) the centre of the depletion region on the n-side.

99. If the input to the circuit of figure is a sine wave the output will be



- (1) a half wave rectified sine wave
- (2) a full wave rectified sine wave
- (3) a triangular wave
- (4) a square wave

100. During manufacturing, a large parasitic resistor, R_p , has appeared in a cascade as shown in the figure below. Determine the output resistance.



- (1) $R_{out} = -g_{m2} (r_{o1} \parallel R_p) r_{o2}$
- (2) $R_{out} = -g_{m1} (r_{o2} \parallel R_p) r_{o1}$
- (3) $R_{out} = -g_{m1} (r_{o1} \parallel r_{o2}) R_p$
- (4) $R_{out} = -g_{m1} (r_{o1} \parallel R_p) r_{o2}$

रफ कार्य के लिए स्थान / SPACE FOR ROUGH WORK

—

