

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

PAPER-II

1. If R_s is the source resistance, the output resistance of an emitter-follower using the simplified hybrid model would be
 - a. $\frac{h_{ie} + R_s}{1 + h_{fe}}$
 - b. $\frac{h_{ie} + R_s}{h_{fe}}$
 - c. $R_s + \frac{1}{h_{fe}}$
 - d. $\frac{1}{h_{fe}}$
2. In order to rectify sinusoidal signals of mill volt range (< 0.6 V),
 - a. Bridge rectifier using diodes can be employed
 - b. Full - wave diode rectifier can be used
 - c. A diode is to be inserted in the feedback loop of an OP-AMP
 - d. A diode is to be inserted in the input of an OP - AMP
3. In the circuit shown in the figure,

The circuit is a differential amplifier with two input branches. The top input branch has a 2.5V source and a 1kΩ resistor. The bottom input branch has a 1.5V source and a 1kΩ resistor. The common-mode input is $V_m = 1$ V. The circuit is powered by +9V and -9V. The output of the top branch is connected to a Red LED, and the output of the bottom branch is connected to a Green LED.

 - a. Only red will glow
 - b. Only green will glow
 - c. Both red and green will glow
 - d. Neither red nor green will glow
4. In switching devices, gold doping is used to
 - a. Improve bonding
 - b. Reduce storage time
 - c. Increase the mobility of the carrier
 - d. Protect the terminals against corrosion
5. For the high-pass circuit to act as a differentiator, the time constant must be
 - a. Small
 - b. Very small in comparison to the time period of the input signal
 - c. Very high in comparison to the time period of the input signal (that is low-pass circuit)
 - d. Of moderate value
6. For transistor amplifier with self-biasing network, the following components are used:

$R_1 = 4k\Omega$, $R_2 = 4k\Omega$ and $R_e = 1k\Omega$

The approximate value of the stability factor 'S' will be

 - a. 4
 - b. 3
 - c. 2
 - d. 1.5
7. In a transistor amplifier, the reverse saturation current I_{co}
 - a. Doubles for every 10° C rise in temperature
 - b. Doubles for every 1° C rise in temperature
 - c. Increases linearly with temperature
 - d. Doubles for every 5° C rise in temperature
8. In a bi stable multivibrator, commutating capacitors are used to
 - a. Increase the base storage charge
 - b. Provide ac coupling
 - c. Increase the speed of response
 - d. Alter the frequency of the output
9. If a capacitor C is charged by a constant current I, then the rate of change of voltage with time is given by sweep speed equal to
 - a. C/I
 - b. IC
 - c. I/C
 - d. $\frac{1}{2}(I/C)$
10. A transistor amplifier has poles at

$$S_1 = -0.00245 \times 10^9 \text{ rad/s}$$

$$S_2 = -0.0748 \times 10^9 \text{ rad/s}$$

$$S_3 = 0.670 \times 10^9 \text{ rad/s}$$

$$S_4 = 4.38 \times 10^9 \text{ rad/s}$$

The upper 3 dB frequency of the amplifier will be

- S_1
 - $S_1 + S_2 + S_3 + S_4$
 - $S_1 + S_4$
 - S_4
11. In an LC filter, the ripple factor
- Increases with the load current
 - Increases with the load resistance
 - Remains constant with the load current
 - Has the lowest value
12. The ripple factor of a power supply is given by (symbols have the usual meaning)
- $\frac{P_{dc}}{P_{ac}}$
 - $\sqrt{\left(\frac{I_{rms}}{I_{dc}}\right)^2} - 1$
 - $\sqrt{\left(\frac{I_{th}}{I_{rms}}\right)^2} - 1$
 - $\frac{I_{dc}}{I_{rms}}$
13. A dc-to-dc converter having an efficiency of 80% is delivering 16W to a load. If the converter is generating an output of 200V from an input source of 20 V, then the current drawn from the source will be
- 0.1A
 - 0.5A
 - 1.0A
 - 10.0A
14. Higher order active filter are used for variable
- Bandwidth
 - Gain in the pass-band
 - Impedance
 - Roll-off rate
15. Wide-banding technique is employed in the
- Video amplifier of a TV receiver
 - IF amplifier of an FM receivers

- RF amplifier of an am receiver
- Input section of a communication receiver

16. Consider the following statements:

A class-B amplifier

- Is biased just at cut-off
 - Has a high theoretical efficiency of 78.5% because its quiescent current is low.
 - Is biased at the mid-point of load line
- Of these statements

- 2 and 3 are correct
- 1 alone is correct
- 2 alone is correct
- 1 and 2 are correct

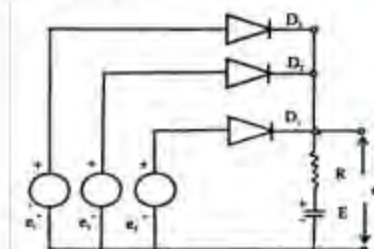
17. A Trans conductance amplifier has

- High input impedance and low output impedance
- Low input impedance and high output impedance
- High input and output impedances
- Low input and output impedances

18. The primary advantage of a crystal oscillator is that

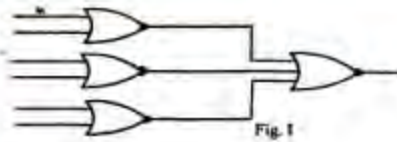
- It can oscillate at any frequency
- It gives a high output voltage
- Its frequency of oscillation remains almost constant
- It operates on a very low dc supply voltage

19. In the circuit shown in the figure, if $e_1 = 2V$, $e_2 = 5V$, $e_3 = 1V$ and $E = 2V$, then which one of the diodes will be conducting and what will be the e_0 ?

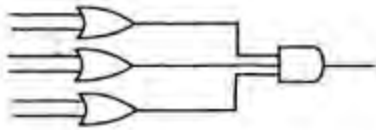


- $D_3; 1V$
- $D_1; 2V$
- $D_2; 5V$
- $D_1; 5V$

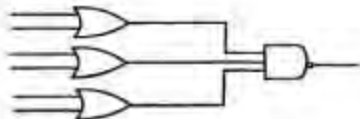
20. The circuit shown in Fig. 1 is equivalent to



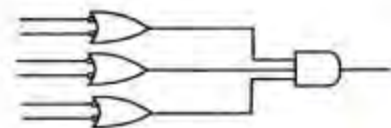
a.



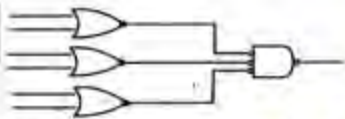
b.



c.

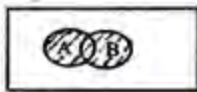


d.



21. The Venn diagram representing the Boolean expression $A + (A \cdot B)$ is

a.



b.



c.



d.



22. How many minterms (excluding redundant terms) does the minimal switching function

$$f(v, w, x, y, z) = x + yz \text{ originally have?}$$

- a. 16
b. 20
c. 24

d. 32

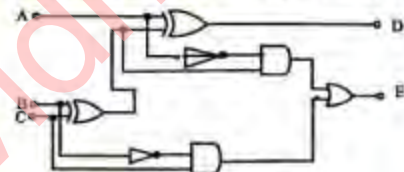
23. While obtaining minimal sum of products expression,

- a. All don't cares are ignored
b. All don't cares are treated as logic ones
c. All don't cares are treated as logic zeros
d. Only such don't cares that aid minimization are treated as logic ones

24. The complement of the Boolean expression $AB \cdot (BC + AC)$ is

- a. $(A + B) + (B + C) \cdot (A + C)$
b. $(A \cdot B) + (BC + AC)$
c. $(A + B) \cdot (B + C) \cdot (A + C)$
d. $(A + B) \cdot (B + C) \cdot (A + C)$

25. The circuit shown in the given figure is a



- a. Full adder
b. Full subtractor
c. Shift register
d. Decade counter

26. Match List- I with List- II and select the correct answer using the codes given below the Lists:

List I

- A. 45
B. 90
C. 180
D. 210

List II

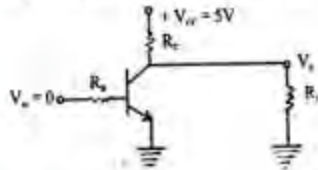
1. 10110100
2. 11010010
3. 01011010
4. 00101101
5. 10101000

Codes:

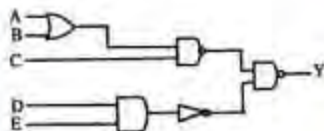
- | | A | B | C | D |
|----|---|---|---|---|
| a. | 3 | 4 | 5 | 2 |
| b. | 4 | 3 | 1 | 2 |
| c. | 4 | 3 | 5 | 2 |
| d. | 3 | 4 | 2 | 1 |

27. A transistor is operated as a non-saturated switch to eliminate
- Storage-time
 - Turn-off time
 - Turn-on time
 - Delay time

28. In the circuit shown-in the figure, if $R_L = R_C = 1\text{K}\Omega$, then the value of V_O will be



- 4.55 V
 - 2.5V
 - 1 V
 - zero
29. The output Y of the circuit shown in the figure is



- $(A+B)C+DE$
 - $AB+C(D+E)$
 - $(A+B)C+D+E$
 - $AB+C).DE$
30. TTL circuits with active pull-up are preferred because of their suitability for
- Wired-AND operation
 - Bus operated system
 - Wired logic operation
 - Reasonable dissipation and speed of operation

31. Consider the following statements regarding configuration of TTL devices:

- The output impedance of totem pole transistor is high.
- Open collector output devices have low switching speed.
- Power consumption of Scotty devices is high.
- Tri-state output devices have high switching speed.

Of these statements:

- 1 and 2 are correct
- 1, 3 and 4 are correct
- 2 and 3 are correct

32. Consider the following conditions:

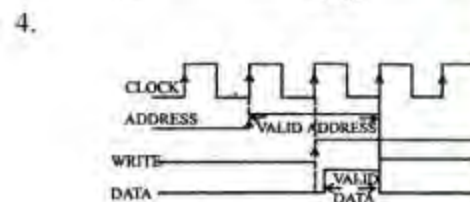
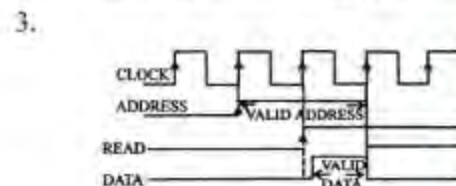
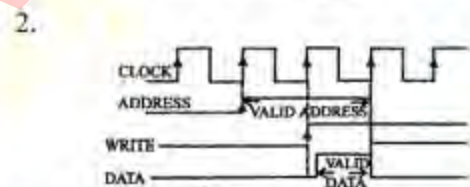
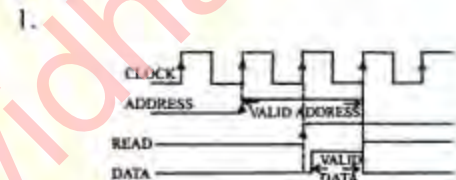
- $t_p < \Delta t$
- $\Delta t < T$
- $t_p > \Delta t$
- $\Delta t > T$

Where t_p = pulse width, Δt = propagation delay and T = clock period

The race-around condition in the flip-flop can be AVOIDED if conditions

- 1 and 2 are satisfied
- 1 and 4 are satisfied
- 2 and 3 are satisfied
- 3 and 4 are satisfied

33. Consider the following read and write cyclic:



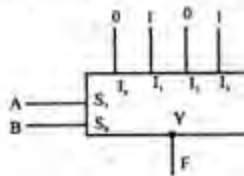
The combinations of read and write cycles of a typical microprocessor would include

- 1 and 2
- 1 and 4
- 2 and 3
- 3 and 4

34. In a $3\frac{1}{2}$ digit digital voltmeter, the largest number that can be read is

- 0999

- b. 1999
c. 4999
d. 9999
35. The resolution of an n -bit D/A converter with a maximum input of 5V is 5 mV. The value of ' n ' is
a. 8
b. 9
c. 10
d. 11
36. When two numbers are added in excess-3 code and the sum is less 9, then in order to get the correct answer it is necessary to
a. Subtract 0011 from the sum
b. Add 0011 to the sum
c. Subtract 0110 to the sum
d. Add 0110 to the sum
37. The function ' F ' implemented by the multiplexer chip shown in the figure is:



- a. A
b. B
c. AB
d. $AB+AB$
38. A zero - memory source generates two messages with probabilities 0.8 and 0.2. These are coded as 1 and 0. The code efficiency is
a. 0.2
b. 0.5
c. 0.7
d. 1.0
39. A communication channel with additive white Gaussian noise, has a bandwidth of 4kHz and an SNR of 15. its channel capacity is
a. 1.6 kbps
b. 16 kbps
c. 32 kbps
d. 256 kbps
40. The noise figure of an amplifier is 3 dB. Its noise temperature will be about
a. 145 K
b. 290 K

- c. 580 K
d. 870 K

41. Match List I with List II and select the correct answer using the codes given below the lists:

List I

- A. Frequency modulation
B. Double sideband suppressed signal Carrier
C. PCM
D. Amplitude modulation

List II

1. Envelope detection
2. Companding
3. Balanced modulator
4. Pre-emphasis and emphasis

Codes:

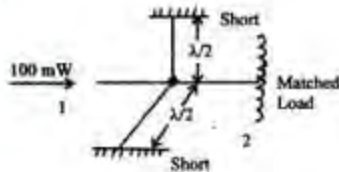
	A	B	C	D
a.	1	2	3	4
b.	1	2	4	3
c.	4	3	1	2
d.	4	3	2	1

42. The choice of the product RC in a simple envelope detector using a diode and an RC circuit is governed by
a. Both the lowest and the highest modulation frequencies
b. The depth of modulation and the lowest modulation frequency
c. The highest modulation frequency and the depth of modulation
d. The carrier frequency
43. In a communication system, each message (1 or 0) 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 will be
a. $3P_e^2 - 2P_e^3$
b. $1 - P_e^2 - P_e^3$
c. P_e^3
d. $P_e^2(1 - P_e)$
44. The Nyquist sampling rate for the signal $g(t) = 10 \cos(50\pi t) \cos^2(150\pi t)$, Where ' t ' is in second is

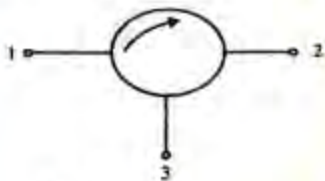
- a. 150 samples per second
b. 200 samples per second
c. 300 samples per second
d. 350 samples per second
45. For a given data rate, the bandwidth required with m -ary transmission is smaller than that for binary transmission by
a. $\log_2 m$
b. $\log_2 m / m$
c. $2 / \log_2 m$
d. $\log_2 m / 2$
46. Modems are used for data transmission telephone lines to
a. Increase the transmission capacity
b. Improve noise performance
c. Incorporate error control
d. Eliminate dc component in the transmitted signal
47. Four voice signals, each limited to 4 kHz and sampled at Nyquist rate, are converted into binary PCM signal using 256 quantization levels. The bit transmission rate for the time - division multiplexed signal will be
a. 8 kbps
b. 64 kbps
c. 256 kbps
d. 512 kbps
48. The input impedance of a S.C. loss -less line of length $\lambda / 8$ is
a. Zero
b. Resistive
c. Inductive
d. Capacitive
49. An FM signal with modulation index m_f is passed through a frequency Tripler. The modulation index of the output signal will be
a. m_f
b. $3 m_f$
c. $9 m_f$
d. $27 m_f$
50. Consider the following statements:
1. Protect the receiver when high power signal is transmitted
2. Enable the use of a common antenna for transmission and reception.
3. Allow the antenna to only receive when the signal is arriving.
4. Avoid noise interference in the radar system.
Of these statements
a. 1 and 2 are correct
b. 3 and 4 are correct
c. 1 and 4 are correct
d. 2 and 4 are correct
51. In radar systems, the term 'rat-race' is used in connection with
a. Modulator
b. Pulse characteristics
c. Receiver bandwidth
d. Duplexer
52. The type of radar that is used to eliminate clutter in navigational applications is
a. Pulse radar
b. Tracking radar
c. MTI radar
d. Monopulse radar
53. Which one of the following is capable of giving the highest data speed?
a. Coaxial cable link
b. Microwave LOS link
c. Microwave satellite system
d. Optical fiber system
54. Match List - I (Component) with List - II (Dominant TE Mode) and select the correct answer using the codes given below the
List I
A. Rectangular wave guide
B. Circular wave guide
C. Rectangular cavity
List II
1. TE_{101}
2. TE_{10}
3. TE_{111}
4. TE_{11}
Codes:

	A	B	C
a.	4	2	1
b.	2	1	3
c.	2	4	1

- d. 2 3 1
55. The major advantage of a TWT over a Klystron lies in its
- Higher bandwidth
 - Higher gain
 - Higher frequency
 - Higher output
56. The arrangement shown in the figure is that of a hybrid - T. When 100 mW of power is fed into the collinear port - 1, the power reflected back in port - 1 will be

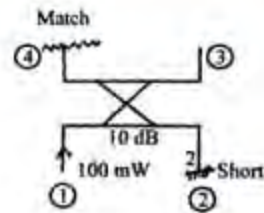


- Zero
 - 25 mW
 - 50 mW
 - 100 mW
57. A 3-port circulator is shown in the figure. Which one of the following scattering matrices relates to this circulator?



- $\begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 1 \end{bmatrix}$
- $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

58. An ideal 10dB directional coupler is shown in the given figure. The power. The power output at port -3 will be

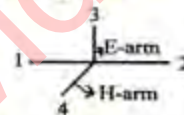


- 10 mW
- 15 mW
- 20 mW
- 25 mW

59. Which of the following relations would be true of the magic-tee shown in the given figure.

- $S_{13} = S_{23}$
- $S_{14} = S_{24}$
- $S_{12} = 0$
- $S_{34} = 0$

Select the correct answer using the codes given below:



Codes:

- 1,2 and 3
- 1,2 and 4
- 2,3 and 4
- 1,3 and 4

60. A circular waveguide carries TE_{11} mode whose radial electric field is given by

$$E_r = E_0 J_1(r) \sin \phi / m$$

Where 'r' is the radial distance in cm, from the waveguide axis.

The cut-off wavelength of the mode is

- 10 cm
- 3π cm
- 2π cm
- 8cm

61. The approximate thickness of the radome wall should be

- λ
- $\lambda/2$
- $\lambda/4$
- $\lambda/8$

62. Given that $\int_0^{\pi} \sin^4 \theta d\theta = 3\pi/8$, if the radiation intensity of an antenna is

proportional to $\sin^2 \theta$, where θ is the elevation angle the antenna directivity will be

- $8/3 \pi$
- $16/3 \pi$
- $4 \pi/3$
- $3 \pi/8$

63. Cassegrain feed is used with a parabolic reflector to

- Increase the gain of the system
- Increase the beam width of the system
- Reduce the size of the main reflector
- Allow the feed to be placed at a convenient point

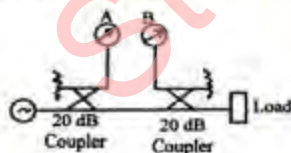
64. The following components are used to measure the output power of a 2kW traveling wave tube amplifier (TWT):

- TWTA.
- Low - pass filter/high-pass filter.
- Low - power 20 dB attenuator.
- 40 dB directional coupler with matched load.
- Power meter.

The correct sequence of the connection of these components is

- 1, 4, 2, 3, 5
- 1, 3, 4, 2, 5
- 1, 2, 4, 3, 5
- 1, 4, 3, 2, 5

65. In the reflect meter arrangement shown in the given figure, if the power meters A and B indicate 1 mW and 110 microwatts respectively, then the approximate VSWR on the line will be



- 1.5
- 2.0
- 2.5
- 3.0

66. A 10GHz signal propagates in a waveguide with a phase velocity of 4×10^8 m/s. if the signal produces a standing wave in the guide, then the distance between two successive minima will be

- 10mm

- 20mm
- 30 mm
- 40 mm

67. Match List - I with List - II and select the correct answer using the codes given below the lists:

List I (Transmission system)

- Rectangular Waveguide
- Circular Waveguide
- Coaxial Line
- Micro strip Line

List II (Mode)

- TE / TM
- TEM
- Quasi - TEM

Codes:

	A	B	C	D
a.	1	1	2	3
b.	1	2	2	3
c.	2	2	3	3
d.	3	1	2	2

68. In microwave communication links, when fading due to rain attenuation occurs, the techniques adopted for solving the problem would include

- Antenna replacement and feed correction
- Amplitude trimming and phase correction
- Polarization shifting and code diversity
- Path diversity and frequency diversity

69. In microwave communication, sometimes, microwave signals reach large distance by following the Earth's curvature. This phenomenon is called

- Troposphere scatter
- Faraday effect
- Ionosphere reflection
- Ducting

70. Consider the following statements about Lasers:

- Time coherence makes a laser beam ideally suited for space communications while space coherence makes it suitable for line communications.
- Solid state junction lasers produce diverging beams of elliptic cross-section.

3. Laser beams can be used to photograph a 3-dimensional object by storing both magnitude and phase of its diffraction pattern on a film.
4. High intensity of a laser beam is the result of its small cross-section.

Of these statements

- a. 1, 2, 3 and 4 are correct
- b. 1, 2 and 3 are correct
- c. 2 and 3 are correct
- d. 1 and 4 are correct

71. Two LOS antennas having power gains of G_1 and G_2 are separated by a distance 'L'. λ is the operating wavelength. If P_t is the transmitted power and P_r is the power received, then the ratio P_r/P_t will be proportional to

- a. $G_1 G_2 \left(\frac{L}{\lambda} \right)^2$
- b. $\frac{G_1}{G_2} \left(\frac{L}{\lambda} \right)^2$
- c. $\frac{G_2}{G_1} \left(\frac{L}{\lambda} \right)^2$
- d. $G_1 G_2 \left(\frac{\lambda}{L} \right)^2$

72. Consider the following statements regarding communication by geostationary satellites :

1. A back and forth telephone transmission involves nearly half a second.
2. Since the ground station antenna points towards a fixed direction, large corrections are necessary to compensate for orbital variation and atmospheric refraction.
3. Since the satellite antenna is limited in size, the earth area illuminated by the beam is also small.
4. As there is no Doppler shift, no correction for frequency is necessary.

Of these statements

- a. 1, 2, 3 and 4 are correct
- b. 1, 2 and 3 are correct
- c. 2 and 3 are correct
- d. 1 and 4 are correct

73. The decimal equivalent of the hexadecimal number $(3E8)_{16}$ is

- a. 1000
- b. 982
- c. 768
- d. 323

74. Consider the following statements:

1. JOVIAL is the language for real time systems.
2. MAD has been developed by academic institutional for educational purposes
3. FORMAC does symbol manipulation.

Of these statements

- a. 2 and 3 are correct
- b. 1 and 3 are correct
- c. 1 and 2 are correct
- d. 1, 2 and 3 are correct

75. An example of a valid array declaration in PASCAL is:

- a. VAR ABC : ARRAY [1,5] OF REAL
- b. VAR C : ARRAY [N...M, 1...10] OF REAL
- c. VAR P : ARRAY [8] OF INTEGER
- d. VAR X : ARRAY (2.....8) OF INTEGER

76. The C expression ++i equivalent to writing

- a. $i = i + 2$
- b. $i = i + 1$
- c. $i = i + i$
- d. $i = i + i + i$

77. Each instruction in an assembly program has the following fields:

1. Label field.
2. Mnemonic field.
3. Operand field.
4. Comment field.

The correct sequence / order of these fields is:

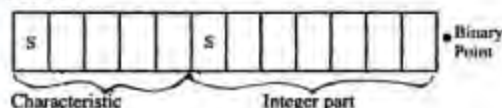
- a. 1, 2, 3, 4
- b. 1, 2, 4, 3
- c. 2, 1, 3, 4
- d. 2, 1, 4, 3

78. The number of distinct permutations of 1, 2, 3, ..., n obtainable by a stack is equal to the number of distinct binary trees with

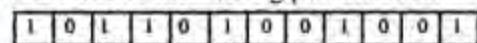
- a. n nodes
- b. 2n nodes
- c. 2n+1 nodes

d. $4n$ nodes

79. Consider a 12-bit word length computer with a floating point word as shown below:



The value of the floating point number



Will be

- a. 576
b. -576
c. $-9/64$
d. -9×10^{-6}
80. Asynchronous sequential circuits are seldom designed to operate in the pulse mode, because
- The amplitude of input pulses in a pulse mode is very critical
 - The duration of the input pulse in a pulse mode is very critical
 - Fundamental mode asynchronous circuit is cheaper than pulse mode asynchronous circuit
 - Fundamental mode asynchronous circuit has a higher speed of operation than the pulse mode asynchronous circuit
81. An interrupt in which the external device supplies its address as well as the interrupt request, is known as
- Vectored interrupt
 - Maskable interrupt
 - Polled interrupt
 - Non-maskable interrupt
82. In 8085 microprocessor, the value of the most significant bit of the result following the execution of any arithmetic or Boolean instruction is stored in the
- Carry status flag
 - Auxiliary carry status flag
 - Sign status flag
 - Zero status flag
83. Consider the following statements:
- A total of about one million bytes can be directly addressed by the 8086 microprocessor.
 - The 8086 has thirteen 16-bit registers.

3. The 8086 has eight flags.

4. Compared to 8086, the 80286 provides a higher degree of memory protection.

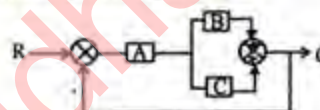
Of these statements

- 2, 3 and 4 are correct
- 1, 3 and 4 are correct
- 1, 2 and 4 are correct
- 1, 2 and 3 are correct

84. The interface chip used for data transmission between 8086 and a 16-bit ADC is

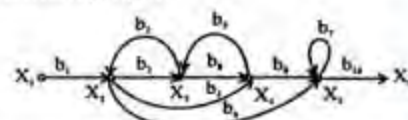
- 8259
- 8255
- 8253
- 8251

85. The transfer function of the system shown in the given figure is:



- $O/R = \frac{ABC}{1+ABC}$
- $O/R = \frac{A+B+C}{1+AB+AC}$
- $O/R = \frac{AB+AC}{ABC}$
- $O/R = \frac{AB+AC}{1+AB+AC}$

86. A signal flow graph is shown in the following figure:



Consider the following statements regarding the signal flow graph:

- There are three forward paths.
- There are three individual loops.
- There are two non-touching loops.

Of these statements

- 1, 2 and 3 are correct
- 1 and 2 are correct
- 2 and 3 are correct
- 1 and 3 are correct

87. The loop transfer function of a closed-loop system is given by

$$G(s)H(s) = \frac{K}{s^2(s^2 + 2s + 2)}$$

The angle of departure of the root locus at $s = -1 + j$ is

- zero
- 90°
- -90°
- -180°

88. In the field-controlled motor, the entire damping comes from

- The armature resistance
- The back emf
- The motor friction and load
- Feed resistance

89. Which of the following rotors are used in a two-phase ac servomotor?

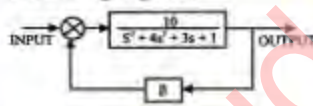
- Solid iron rotor.
- Squirrel cage rotor.
- Drag cup rotor.

Select the correct answer using the codes given below:

Codes:

- 1, 2 and 3
- 1 and 2
- 2 and 3
- 1 and 3

90. A closed-loop system is shown in the following figure:



The largest possible value of β for which this system would be stable is:

- 1
- 1.1
- 1.2
- 1.3

91. Which of the following effects are correct in respect of addition of a pole to the system loop transfer function?

- The root locus is pulled to the right.
- The system response becomes slower.
- The steady-state error increases.

Of the statements

- 1 and 2 are correct
- 1, 2 and 3 are correct
- 2 and 3 are correct

d. 1 and 3 are correct

92. The velocity error constant K_v of a feedback system with closed-loop transfer function

$$\frac{C(s)}{R(s)} = \frac{G(s)}{1 + G(s)H(s)}$$
 is

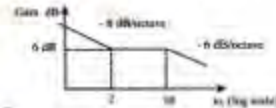
- $K_v = \lim_{s \rightarrow 0} sG(s)H(s)$
- $K_v = \lim_{s \rightarrow 0} \frac{G(s)}{1 + G(s)H(s)}$
- $K_v = \lim_{s \rightarrow 0} sG(s)$
- $K_v = \lim_{s \rightarrow 0} s(1 + G(s)H(s))$

93. The phase angle for the transfer function

$$G(s) = \frac{1}{(1 + sT)^2}$$
 at corner frequency is

- -45°
- -90°
- -135°
- -270°

94. The magnitude plot of a transfer function is shown in the figure



The transfer function in question is

- $\frac{4 \left(1 + \frac{s}{2}\right)}{s \left(1 + \frac{s}{10}\right)}$
- $\frac{4s \left(1 + \frac{s}{2}\right)}{\left(1 + \frac{s}{10}\right)}$
- $\frac{4(1 + 2s)}{s(1 + 10s)}$
- $\frac{4s(1 + 2s)}{(1 + 10s)}$

95. Consider the following Nyquist plot:



The feedback system will be stable if and only if the critical point lies in the region

- a. I (OP)
b. II (PQ)
c. III (QR)
d. IV (R to minus infinity)
96. Which one of the following statements regarding the stability of a feedback control system is correct?
a. Gain margin (GM) gives complete information about the relative stability of the system.
b. Phase margin (PM) gives complete information about the relative stability of the system.
c. GM and PM together give information about the relative stability of the system.
d. Gain cross-over and phase cross-over frequencies give the required information about the relative stability of the system.
97. The phase-lead network function

$$G_c(s) = \frac{s + \frac{1}{T}}{s + \frac{1}{aT}} \text{ where } a < 1$$
 Would provide maximum phase-lead at a frequency of
 a. $\frac{1}{T}$
 b. $\frac{1}{aT}$
 c. $\frac{1}{T\sqrt{a}}$
 d. $\frac{1}{a\sqrt{T}}$
98. The constant M loci plot is symmetrical with respect to
 a. Real axis and imaginary axis
 b. $M = 1$ straight line and the real axis
 c. $M = 1$ straight line and the imaginary axis
 d. $M = 1$ straight line
99. The settling time of a feedback system with the closed-loop transfer function

$$\frac{C(s)}{R(s)} = \frac{w^2}{s^2 + 2\zeta w_n s + w_n^2}$$
 is
 a. $t_s = 2 / (\zeta w_n)$
 b. $t_s = \zeta w_n / 2$
 c. $t_s = 4 / (\zeta w_n)$
 d. $t_s = 4 \zeta w_n$
100. In hydraulic controllers, the advantages of flapper valves over piston valves is the
 a. High sensitivity
 b. Better rigidity
 c. Higher hydraulic power control
 d. Control action being immune to friction and dirt
101. Assertion (A): Under certain conditions, one gets peaky response at high frequency in transformer coupled amplifiers.
Reason (R): High frequency model of transformer coupled amplifiers a resonant circuit.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
102. Assertion (A): A self-biased circuit has a better stability than a fixed bias circuit.
Reason (R): It provides negative feedback by the use of an additional resistor between the base and ground.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
103. Assertion (A): UJT is used in relaxation oscillators.
Reason (R): UJT has negative resistance region in its characteristics.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
104. Assertion (A): Miller sweep circuit provides a very linear saw tooth wave.
Reason (R): Miller sweep circuit is based on discharge of a capacitor by a current which is almost constant.

- a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
105. **Assertion (A):** In a switching regulator, cathode of a diode is connected to emitter of switching transistor and anode of the diode is grounded.
Reason (R): Switching regulator has an inductor and the diode provides a path for current through the inductor when the transistor is cut-off, thus avoiding inductive Kickback, which will otherwise damage the transistor.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
106. **Assertion (A):** The propagation delay of the emitter coupled logic is minimum.
Reason (R): The transistors used in this logic switch between cutoff and active regions.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
107. **Assertion (A):** Look-ahead carry adders are fast in operation.
Reason (R): Parallel-carry generation improves the speed of addition.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
108. **Assertion (A):** The race hazard problem does not occur in combinational circuits.
Reason (R): The output of a combinational circuit depends upon present inputs only.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
109. **Assertion (A):** The channel capacity of an infinite bandwidth channel is only finite.
Reason (R): Signal power is limited but noise power is not.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
110. **Assertion (A):** AM has better noise performance than FM.
Reason (R): AM results in an increase in signal power.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
111. **Assertion (A):** Digital communication needs some synchronization signals.
Reason (R): 'bit syn' signal is required in time division multiplexing to distinguish groups of data.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
112. **Assertion (A):** The geostationary orbit is the most widely used of all satellite orbits for communication purposes.
Reason (R): Because of its altitude, a geosynchronous satellite gives rise to long propagation delay.
 a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true but R is NOT a correct explanation of A
 c. A is true but R is false
 d. A is false but R is true
113. **Assertion (A):** A ferrite isolator is a non-reciprocal device.
Reason (R): An isolator uses the gyro magnetic resonance property of a ferrite, where the directions of spins of the

spinning electrons affect the propagation characteristics through the material.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true

114. Assertion (A): A ROM with an access time of the order of hundreds of nanoseconds is suitable for a control memory.

Reason (R): The time taken to execute an operation in a micro programmed computers is critically dependent on the access time of the control memory.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true

115. Assertion (A): High speed computers use dynamic RAMs in their memory system.

Reason (R): Dynamic RAMs require refreshing cycle.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true

116. Assertion (A): PC - XT is a personal computer.

Reason (R): PC - XT uses a floppy drive and also a medium-sized hard disc.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true

117. The Laplace transform of the impulse response of a system $G(s)$ is given by

$$C(s) = \frac{4}{s^2 + 2s + 4}$$

Assertion (A): The transform function of the system is $G(s) = \frac{4}{s^2 + 2s + 4}$

Reason (R): The transfer function of a system is the ratio of Laplace transform of

output to Laplace transform of input with initial conditions put to zero.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true

118. Assertion (A): For unity feedback control system with open-loop transfer function $G(s) = \frac{k}{s(s+2)}$, the settling time of the

step response is constant for all value of $K \geq 1$.

Reason (R): The real parts of the two roots for all values of $K \geq 1$ are fixed.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true

119. Assertion (A): Potentiometers cannot be used as error detectors in position control systems.

Reason (R): The resolution of a potentiometer places an upper limit on its accuracy.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true

120. A minimum phase system has a gain margin of 8dB and a phase margin of 21°

Assertion (A): The system is stable.

Reason (R): For a minimum phase system, both phase margin and gain margin must be positive for the system to be stable.

- a. Both A and R are true and R is the correct explanation of A
- b. Both A and R are true but R is NOT a correct explanation of A
- c. A is true but R is false
- d. A is false but R is true