

## ELECTRONICS AND TELECOMMUNICATION ENGINEERING

## PAPER-II

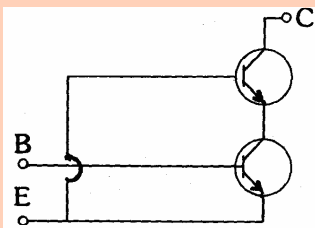
1. If  $\alpha = 0.995$ ,  $I_E = 10\text{mA}$  and  $I_{\infty} = 0.5\mu\text{A}$ , then  $I_{ceo}$  will be

a.  $25\mu\text{A}$   
 b.  $100\mu\text{A}$   
 c.  $10.1\mu\text{A}$   
 d.  $10.5\mu\text{A}$

2. The approximate value of input impedance of a common emitter amplifier with emitter resistance  $R_e$  is given by

a.  $h_{ie} + A_1 R_e$   
 b.  $h_{ie} + (1 + h_{fe}) R_e$   
 c.  $h_{ie}$   
 d.  $(1 + h_{fe}) R_e$

3. The circuit diagram shown in the figure consists of transistors in:

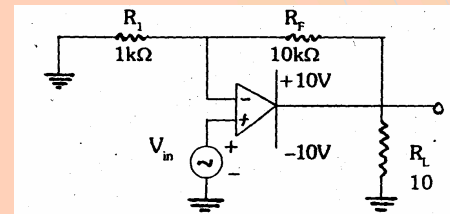


a. Parallel connection  
 b. Cascode connection  
 c. Darlington connection  
 d. Cascade connection

4. If an amplifier with gain of  $-1000$  and feedback of  $\beta = -0.1$  had again change of  $20\%$  due to temperature, the change in gain of the feedback amplifier would be

a.  $10\%$ .  
 b.  $5\%$   
 c.  $0.2\%$   
 d.  $0.01\%$

5. In the case of the circuit shown in the figure,  $V_{i0} = 10\text{ mV dc}$  maximum, the maximum possible output offset voltage  $V_{o0}$  caused by the input off set voltage  $V_{i0}$  with respect to ground is



a.  $60\text{ mV dc}$   
 b.  $110\text{ mV dc}$   
 c.  $130\text{ mV dc}$   
 d.  $150\text{ mV dc}$

6. Match List-I (Circuit) with List-II (Characteristic) and select the correct answer using the codes given below the Lists:

**List I**

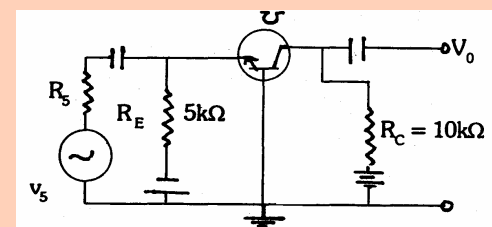
A. RC-coupled amplifier  
 B. Tuned amplifier  
 C. Chopper stabilized amplifier  
 D. Direct coupled amplifier

**List II**

1. Very low drift  
 2. Flat frequency response from zero frequency on wards  
 3. Flat frequency response with an upper and a lower cut-off frequency  
 4. Peak in gain frequency response

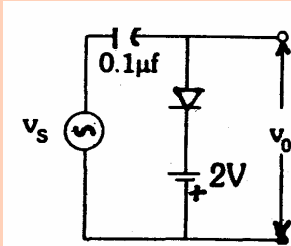
	A	B	C	D
a.	4	3	1	2
b.	3	4	2	1
c.	3	4	1	2
d.	4	3	2	1

7. The 'h' parameters of the circuit shown in the figure are:  $h_{ib} = 25\Omega$ ,  $h_{fb} = 0.999$  and  $h_{ob} = 10^{-6}$

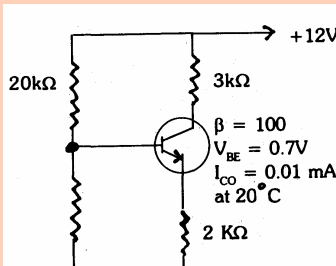


- a. 0.999
- b. 1.98
- c. 2.0
- d. 400

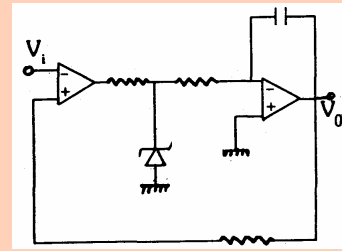
8. For an input of  $v_s = 5 \sin \omega t$ , (assuming ideal diode) the circuit shown in the figure will behave as a



- a. Clipper, sine wave clipped at  $-2V$
  - b. Damper, sine wave clamped at  $-2V$
  - c. Damper, sine wave clamped at zero
  - d. Volt clipper, sine wave clipped at  $2V$
9. In the case of the circuit shown in the figure, the collector current  $I_c$ , will be



- a. 2.26 mA
  - b. 1.85 mA
  - c. 0.375 mA
  - d. 0.185 mA
10. Consider the following statements regarding the time base voltage of an oscilloscope:  
It can be generated using
1. Miller sweep circuit.
  2. Boot-strap integrator circuit.
  3. Time-delay circuit.
  4. A controlled rectifier.
- Of these statements
- a. 1, 2 and 3 are correct
  - b. 1 and 2 are correct
  - c. 2 and 4 are correct
  - d. 1, 3 and 4 are correct
11. In order to obtain triangular pulses at the output of the circuit shown in the figure, the input should be



- a. Grounded
  - b. A square wave
  - c. A triangular wave
  - d. A trigger
12. The transfer function of an amplifier is given by

$$A_v = \frac{V_o}{V_s} = \frac{2810}{\left(1 + j \frac{f}{5.85 \times 10^5}\right) \left(1 + j \frac{f}{5.85 \times 10^6}\right)}$$

The high 3dB frequency of the amplifier will be approximately

- a. 5850 kHz
  - b. 585 kHz
  - c. 5850 Hz
  - d. 585 Hz
13. In the case of an amplifier, the normalized voltage gain is given by

$$\frac{A_v}{A_0} = \frac{1}{1 + \frac{R'}{R}} \cdot \frac{1 + j \frac{f}{f_0}}{1 + j \frac{f}{f_p}}$$

Where  $f_0$  is the zero frequency and  $f_p$  is the pole frequency. For a standard frequency response of the amplifier,

- a.  $f_p \gg f_0$
  - b.  $f_p = f_0$
  - c.  $f_p \ll f_0$
  - d.  $f_0 = 2f_p$
14. Match List I (Transistor parameter) with List II (Typical value and select the correct answer using the codes given below the lists:

**List I**

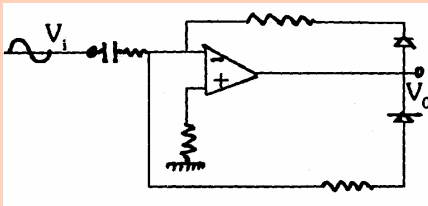
- A.  $f_{bb}$
- B.  $r_{be}$
- C.  $r_{ce}$
- D.  $C_{be}$

**List II**

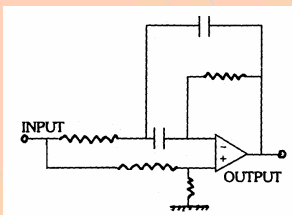
1. 80 k $\Omega$
2. 1 k $\Omega$
3. 100  $\Omega$
4. 100 pF
5. 3 pF

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

15. For a sinusoidal input, the circuit shown in the figure will act as a



- a. Pulse generator
  - b. Full-wave rectifier
  - c. Ramp generator
  - d. Voltage double
16. If the input ac is 10 V rms, the maximum voltage that will appear across the diode of a half-wave rectifier with a capacitor input filter will be
- a. 10 V
  - b. 14 V
  - c. 20 V
  - d. 28 V
17. The circuit shown in the figure represents a



- a. Low-pass
  - b. High-pass filter
  - c. Band-pass filter
  - d. Band-stop filter
18. The dissipation at the collector is zero in the quiescent state and increases with excitation in the case of a
- a. Class A series-fed amplifier
  - b. Class A transistor coupled amplifier
  - c. Class AB amplifier

d. Class B amplifier

19. Consider the following statements:

In order to increase the bandwidth of tuned amplifiers, one can use

1. Tuned circuit with inductance having high Q factor.
2. Double-tuned amplifier with two tuned circuits coupled by mutual inductance.
3. Staggered tuned amplifiers in which different tuned circuits which are cascaded are tuned to slightly different frequencies.

Of these statements

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

20. Consider the following statements:

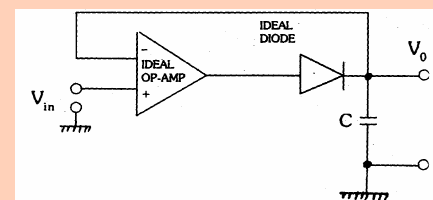
I : A differential amplifier is used at the input stage of an operational amplifier.

II: Differential amplifier have very high CMRR.

Of these statements

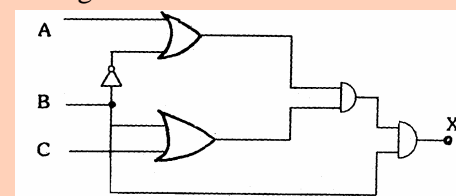
- a. Both I and II are true and II is the correct explanation of I
- b. Both I and II are true but II is not the ONLY explanation of I
- c. I is true but II is false
- d. I is false but II is true

21. The OP-AMP circuit shown in the figure is



- a. A sample/hold circuit
- b. A rectifier/ amplifier circuit
- c. A peak detector circuit
- d. An antilog amplifier circuit

22. The output X of the logic circuit shown in the figure is



- a.  $A+BC$

- b. BC
- c. AB
- d.  $AB+C$

23. Consider the Karnaugh map given below:

		$x_1x_2$			
		00	01	11	10
$x_3x_4$	00	1		D	D
	01		1	D	1
	11			D	1
	10	1	D	1	d

The function represented by this map can be simplified to the minimal form as

- a.  $\bar{x}_1\bar{x}_2\bar{x}_4 + x_2x_4 + x_1\bar{x}_3$
- b.  $\bar{x}_1\bar{x}_2\bar{x}_4 + x_2x_4 + x_1\bar{x}_2\bar{x}_3x_4$
- c.  $x_2x_4 + \bar{x}_2\bar{x}_4 + x_1\bar{x}_3$
- d.  $\bar{x}_1\bar{x}_2\bar{x}_4 + \bar{x}_1x_2x_3x_4 + x_1x_2x_3x_4 + x_1\bar{x}_2\bar{x}_3x_4$

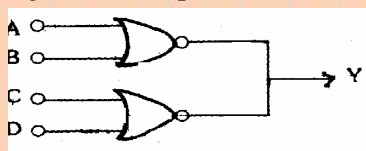
24. In a digital system, there are three inputs A, B and C. the output should be high when at least two inputs are high. The Boolean expression for the output is:

- a.  $AB + BC + AC$
- b.  $ABC + ABC\bar{C} + \bar{A}BC + A\bar{B}C$
- c.  $AB\bar{C} + A\bar{B}C + \bar{A}BC$
- d.  $A\bar{B} + B\bar{C} + \bar{A}C$

25. In digital circuits, Schottky transistors are preferred over normal transistor because of their

- a. Lower propagation delay
- b. Higher propagation delay
- c. Lower power dissipation
- d. Higher power dissipation

26. When two gates with open collector outputs are tied together as shown in the figure, the output obtained will be

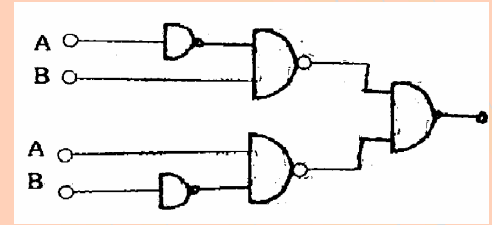


- a.  $\overline{A+B+C+D}$
- b.  $\overline{A+B+C+D}$
- c.  $(\bar{A}+\bar{B})+(\bar{C}+\bar{D})$
- d.  $(A+B)+(C+D)$

27. A full-adder can be made out of

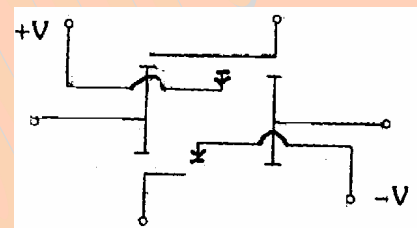
- a. Two half-adders
- b. Two half-adders and a NOT gate
- c. Two half-adders and OR gate
- d. Two half-adders and an AND gate

28. The circuit shown in the figure is functionally equivalent to



- a. NOR gate
- b. OR gate
- c. EX-OR gate
- d. NANAD gate

29. The schematic shown in the figure indicates



- a. CMOS NOR gate
- b. CMOS NAND gate
- c. CMOS AND gate
- d. CMOS transmission gate

30. Which of the following standard TTL parameter pairs are correctly matched?

1. Worst case high voltage at the input  
 $V_m \text{ min.} \dots\dots\dots 2 \text{ V.}$
2. Fan out  $\dots\dots\dots 40.$
3. Worst case output current at low level.  
 $J_{OL} \text{ max } \dots\dots\dots 16 \text{ mA.}$
4. Direct compatibility with CMOS  
 $\dots\dots\dots \text{Not possible}$

Select the correct answer using the codes given below:

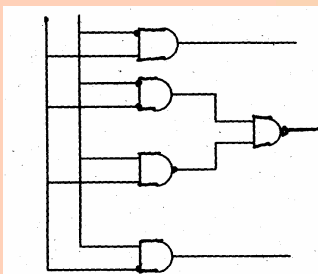
- a. 1, 2, 3 and 4
- b. 2 and 4
- c. 1, 2 and 3
- d. 1,3 and 4

31. For the design of a sequential circuit having nine states, the MINIMUM number of memory elements required is:

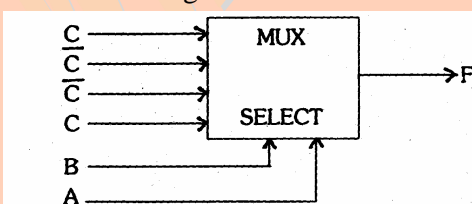
- a. 3

- b. 4  
c. 5  
d. 9
32. A 4-bit binary ripple counter uses flip-flops with a propagation delay time of 25 ns each. The maximum possible time required for change of state will be  
a. 25 ns  
b. 50 ns  
c. 70 ns  
d. 100 ns
33. A 12-bit ADC is employed to convert an analog voltage of zero to 10 volts. The resolution of the ADC is  
a. 2.44 mV  
b. 24.4 mV  
c. 83.3 mV  
d. 1.2 V
34. In a 4-bit weighted-resistor D/A converter, the resistor value corresponding to LSB is 16 k $\Omega$ . The resistor value corresponding to the MSB will be  
a. 1 $\Omega$   
b. 2 $\Omega$   
c. 4 $\Omega$   
d. 16 $\Omega$

35. The circuit shown in the figure is



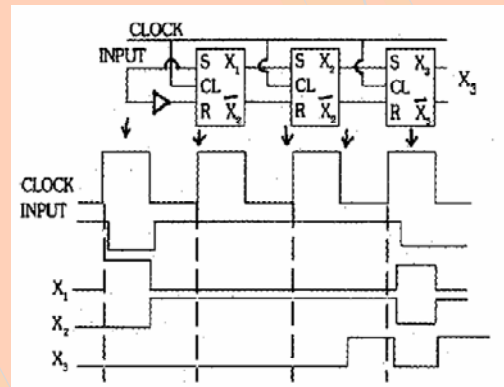
- a. An adder  
b. A subtractor  
c. Parity generator  
d. Comparator
36. The output 'F' of the multiplexer circuit shown in the figure will be



- a.  $AB + BC + CA + BC$

- b.  $A \oplus B \oplus C$   
c.  $A \oplus B$   
d.  $ABC + ABC + ABC + ABC$

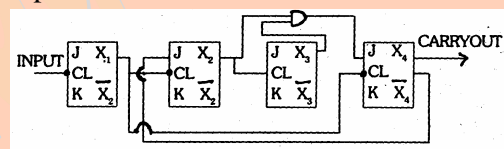
37. Shift register with associated waveform is shown in the following figure:



Which of these is/are correct?

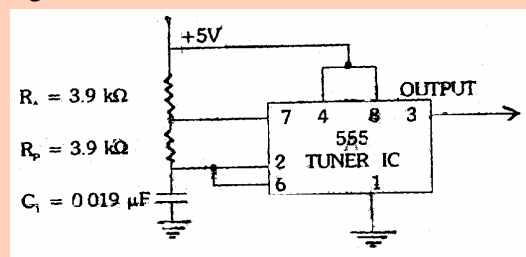
- a.  $X_1$  alone  
b.  $X_2$  alone  
c.  $X_3$  alone  
d.  $X_1, X_2$  and  $X_3$

38. The schematic shown in the figure represents a



- a. Divide by seven counter  
b. Divide by five counter  
c. Binary coded decimal counter  
d. Divide by twelve counter

39. The output of the circuit shown in the figure will be



- a. Delayed pulses  
b. Square waves  
c. Triangular waves  
d. Trapezoidal waves

40. Which one of the following is a correct set of specifications of one side of a 360 K floppy disc?

Number of tracks	Number of bits/inch	Number of sectors	Number of bytes/sector
------------------	---------------------	-------------------	------------------------

	40	4000	9	512
a.	80	2000	18	256
b.	60	3000	9	512
c.	40	1000	9	256

41. A binary symmetrical channel transmitting 1's and 0's with equal probability has an error rate of  $10^{-2}$ . The channel transmission rate (in bits/symbol) with then be
- 0.99
  - 0.919
  - 0.95
  - 1
42. A communication system is used to transmit one of 16 possible signals. Assume that transmission is accomplished by encoding the signals into binary digits. Further assume that signals are equally likely to occur. If each binary digit requires  $1\mu$  sec. for transmission, then how much information (in bits) is transmitted by the system in 8 microseconds?
- 8
  - 16
  - 4
  - 2
43. The noise figure of a receiver is 1.6. its equivalent noise temperature is
- 464.00 K
  174. 00 K
  - 108.75 K
  - 181.25 K
44. If in a particular digital communication application the receiver designed is an optimum coherent receiver, the channel noise is white and bits are transmitted using rectangular pulses, then which one of the following statements would be INCONSISTENT?
- The receiver is
- A correlator receiver
  - Matched filter receiver
  - An integrated and dump receiver
  - Sample, hold and dump receiver

45. Match List I (Modulation) with List II (Characteristic) and select the correct answer using the codes below the Lists:

**List I**

- AM
- FM
- Noise in FM
- Noise in AM and FM

**List II**

- Mobile communication
- Constant carrier frequency
- Triangular noise-power spectrum
- Rectangular noise-power spectrum

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

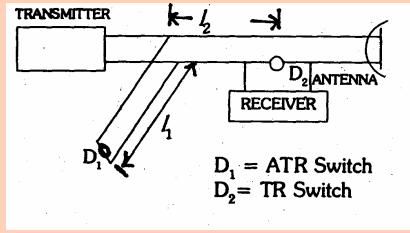
46. The bit rate of a digital communication system is 34 Mbit/s. The modulation scheme is QPSK. The band rate of the system is
- 68 Mbit/s
  - 34 Mbit/s
  - 17 Mbit/s
  - 8.5 Mbit/s
47. The use of non-uniform quantization leads to
- Reduction in transmission bandwidth
  - Increase in maximum SNR
  - Increase in SNR for low level signals
  - Simplification of quantization process
48. The baud rate is
- Always equal to the bit transfer rate
  - Equal to twice the bandwidth of an ideal channel
  - Not equal to the signaling rate
  - Equal to one-half the bandwidth of ideal channel
49. Which of the following pairs are correctly matched?
- Multiplexed telegraph .....FM.
  - Medium-wave radio propagation .....AM.
  - Television.....VSB.



4. Short-wave radio propagation.....AM.
- 2, 3 and 4
  - 2 and 3
  - 1,2 and 3
  - 1 and 4
50. A super heterodyne receiver has an IF of 465 kHz. If it is tuned to a station broadcasting at 500 kHz and its oscillator is operating at 965 kHz, then the 1430 kHz frequency would be the
- Adjacent channel frequency
  - Image frequency
  - Gyro frequency
  - Maximum usable frequency
51. In a 100 line exchange with 10 first selectors, the number of line finders required'
- Is 10
  - Is 100
  - Would depend upon the traffic flow
  - Is busy-hour calling rate
52. Consider the following statements:  
Traffic load on a telephone network depends on
- The rate of calls initiated by each subscriber
  - The number of subscribers on the network.
  - The average duration of each call.
- Of these statements:
- 2 and 3 are correct
  - 1 and 3 are correct
  - 1 and 3 are correct
  - 1, 2 and 3 are correct
53. In a carrier telephone system, a group occupies a frequency band of
- 36 to 48 kHz
  - 60 to 8kHz
  - 92 to 140 kHz
  - 140 to 172 kHz
54. Which of the following pairs of types of wave propagation and associated property are correctly matched.
- Surface wave ..... Vertical polarization.
  - Duct propagation .....Super refraction.
  - Sky wave ..... Critical frequency.
- Select the correct answer using the codes given below:
- 1, 2 and 3
  - 1 and 2
  - 1 and 3
  - 2 and 3
55. Two carriers 40 MHz and 80 MHz respectively are frequency modulated by a signal of frequency 4 KHz, such that the bandwidths of the FM signal in the two cases are the same. The peak deviation in the two cases are in the ratio of
- 1:4
  - 1:2
  - 1:1
  - 2:1
56. For reliable "beyond-the-horizon" microwave communication, without using repeaters, the frequency of choice would be:
- 1MHz
  - 30MHz
  - 2000 MHz
  - 30,000 MHz
57. Preset equalization follows the same processes as adaptive equalization except that the equalization is set prior to transmission and then updated during breaks in transmission using
- Special test sequences
  - Block codes
  - BCD
  - Correlators
58. In satellite communication, highly directional antennas are used to
- Direct the spot beam to a particular region of space on Earth
  - Strengthen the beam to overcome the cosmic noise
  - Make corrections in change of polarization of the beam
  - Select particular channel in transmission and reception
59. Consider the following statements:  
Losses in optical fibres are caused by

1. Impurities in the fibre material
  2. Micro bending
  3. splicing
  4. step index profile
- Of these statements
- a. 1,3 and 4 are correct
  - b. 2,3 and 4 are correct
  - c. 1,2 and 3 are correct
  - d. 1,2 and 4 are correct
60. Which one of the following is caused by reflection from stratified atmosphere or from the surface or land conditions along the path?
- a. Multipart fading
  - b. Selective fading
  - c. Duo fading
  - d. Reflection fading
61. The transit time (in cycles) for the electrons in the repeller-space of the relax klystron oscillator for sustaining oscillations is (in is any integer including zero)
- a.  $2(n-1)$
  - b.  $2n-1$
  - c.  $n+\frac{1}{2}$
  - d.  $n+\frac{3}{4}$
62. Which one of the following can be used for amplification of microwave energy?
- a. Traveling wave tube
  - b. Magnetron
  - c. Reflex klystron
  - d. Gunn diode
63. Guide wavelength ( $\lambda_g$ ) of a waveguide are related as
- a.  $\frac{1}{\lambda_g^2} = \frac{1}{\lambda_0^2} - \frac{1}{\lambda_c^2}$
  - b.  $\frac{1}{\lambda_0^2} = \frac{1}{\lambda_g^2} - \frac{1}{\lambda_c^2}$
  - c.  $\frac{1}{\lambda_c^2} = \frac{1}{\lambda_0^2} - \frac{1}{\lambda_g^2}$
  - d.  $\frac{1}{\lambda_g} = \frac{1}{\lambda_0} + \frac{1}{\lambda_c}$
64. A loss-less line having characteristic impedance  $Z_0$  is terminated in a pure reactance of value  $-jZ_0$ . The VSWR of the line will be
- a. 10
  - b. 2
  - c. 1
  - d. Infinite
65. A cylindrical cavity resonator has a diameter of 16 mm, what is the dominant resonant mode when the cavity length is (i) 20 mm and (ii) 15 mm?
- |               |            |
|---------------|------------|
| (i)           | (ii)       |
| a. $TE_{111}$ | $TM_{111}$ |
| b. $TM_{010}$ | $TE_{111}$ |
| (i)           | (ii)       |
| c. $TE_{111}$ | $TM_{010}$ |
| d. $TM_{111}$ | $TE_{010}$ |
66. In a circular waveguide with radius 'r' the dominant mode is
- a.  $TM_{01}$
  - b.  $TE_{01}$
  - c.  $TM_{11}$
  - d.  $TE_{11}$
67. Consider the following statements:  
In a magic tee.
1. The collinear arms are isolated from the E-arm.
  2. One of the collinear arms is isolated from the E-arm.
  3. One of the collinear arms is isolated from the H-arm.
- Of these statements
- a. 1 and 2 are correct
  - b. 1 and 3 are correct
  - c. 1 and 4 are correct
  - d. 2 and 3 are correct
68. Radiation from a helical antenna is
- a. Plane-polarized
  - b. Partially plane polarized
  - c. Circularly polarized
  - d. Elliptically polarized
69. For an open-ended rectangular waveguide antenna of size  $0.9'' \times 0.4''$ , excited in the  $TE_{10}$  (dominant)-mode at  $\lambda = 3cm$ , the gain is nearly
- a. 1.5



- b. 2.5  
c. 26.5  
d. 36.5
70. Consider the following statements regarding feed which is a key component of a reflector antenna as it has a decisive bearing on the overall performance:
1. For a horn-feed antenna, the reflector focus must coincide with horn-feed's phase centre, which for a wide-flare horn lies in the plane of the horn aperture.
  2. The feed must have minimal radiation outside the angular aperture of the reflector.
  3. In prime-focus of casse grain systems, the main or sub reflector should be in Fraunhofer zone of the feed antenna.
- Of these statements
- a. 1, 2, and 3 are correct
  - b. 1 and 2 are correct
  - c. 2 and 3 are correct
  - d. 1 and 3 are correct
71. On a slotted line terminated in a load, the minima of the standing wave pattern measured a square-law device, are located at (on a cm scale) 9.5, 11.0, 12.5 and 14.0. At 10.95 and 11.05 the detected levels being twice the minimum level, the VSWR on the line is
- a. 10
  - b. 20
  - c. 30
  - d. 50
72. A calorimetric measurement for average power of a signal gave a value of 400 W. The value was interpreted for peak power as 0.5 MW. Then the duty cycle of the signal is
- a. 0.08 per cent
  - b. 8 per cent
  - c. 40 per cent
  - d. 80 per cent
73. In microwave power measurement using bolometer, the principle of working is the variation of
- a. Inductance with absorption of power
  - b. Resistance with absorption of power
  - c. Capacitance with absorption of power
  - d. Cavity dimensions with heat enervated by the power
74. A micro strip line on alumina substrate  $\epsilon_r = 9$  has a zero thickness strip of width,  $W = 3$  mm. Substrate thickness  $h = 0.5$  mm. Assuming TEM wave propagation and negligible fringing field, the characteristic impedance of the line will be approximately
- a.  $10 \Omega$
  - b.  $21 \Omega$
  - c.  $26 \Omega$
  - d.  $50 \Omega$
75. As the operating frequency is increased, micro strip circuits suffer from undesirable effects which set an upper limit on the frequency. One of these is the lowest order TE transverse resonance that occurs for wide strips that form parallel plate waveguide with the ground plane. In view of this, consider a micro strip line with strip width  $w = 2.1$  mm, substrate permittivity of  $9\epsilon_0$  substrate thickness  $h = 1.0$  mm and  $d = 0.2 h$ , additional length that accounts for the fringing capacitance. The lowest order TE transverse resonance frequency will be
- a. 10GHz
  - b. 20GHz
  - c. 25 GHz
  - d. 30 GHz
76. A duplexer circuit with TR and ATR switches is shown in the figure. For a proper operation of the circuit, the values of lengths  $l_1$  and  $l_2$  should be
- 
- a.  $\frac{l_1}{\lambda/4} \frac{l_2}{\lambda/2}$
  - b.  $\frac{\lambda}{2} \frac{\lambda}{4}$
  - c.  $\frac{\lambda}{2} \frac{3\lambda}{4}$
  - d.  $\frac{\lambda}{8\lambda}$
77. Ionosphere propagation is not possible for microwaves because

- a. Microwaves will be fully absorbed by the ionosphere layers  
 b. There will be an abrupt scattering in all directions  
 c. Microwaves will penetrate through the ionosphere lawyer  
 d. There will be dispersion of microwave energy
78. In microwave radar, pulse repetition frequency is used to resolve range and Doppler ambiguities using  
 a. CW radar  
 b. Pulsed radar  
 c. Moving target indicator  
 d. Pulse- Doppler radar
79. The usable bandwidth of a microwave beacon transponder for 6/4 GHz satellite communication is generally  
 a. 360 MHz  
 b. 40 MHz  
 c. 36 MHz  
 d. 1 MHz
80. The octal equivalent of decimal  $1\frac{83}{512}$  is  
 a. 1.123  
 b. 1.321  
 c. 11.23  
 d. 13.21
81. Given that  $A = 20$  and  $B = -7$  in PASCAL, the results of  $A \text{ MOD } B$  is equal to  
 a. 6  
 b. 2  
 c. -1  
 d. 3
82. Consider the following assembly language program for string comparison:

REPE	CMPS	STRGI	STRG2
JNE	EXIT		
JMP	NEAR	PTE	SAME

The same result can be obtained by the following program that does use REP prefix:

```

NEXT:CMPS  STRGI,  STRG2
      JNE   EXIT
      .....
      JMP   NEAR  PTR  SAME
  
```

The missing instruction (denoted by dashed line ....) should be

- a. LOOP NEXT  
 b. JE NEXT  
 c. JMP NEXT  
 d. JNZ NEXT
83. In a completely connected graph having 'n' vertices, the total number of edges is equal to  
 a. N  
 b. 2n  
 c. 2n-1  
 d.  $\frac{n(n-1)}{2}$
84. The complexity Floyd's shortest path algorithm is  
 a.  $O(N)$   
 b.  $O(N^2)$   
 c.  $O(N^3)$   
 d.  $O(N^{3.81})$
85. Blocks search is used to locate a record in an ordered file consisting of N records. The optimum size of the block is  
 a.  $\sqrt{N}$   
 b.  $\sqrt[3]{N}$   
 c.  $N/2$   
 d.  $N/3$
86. if we use 3 bits in the instruction word to indicate if an index register is to be used and if necessary, which one is to be used, then the number of index registers to be used in the machine will be  
 a. 3  
 b. 6  
 c. 7  
 d. 8
87. In a multi-processor configuration, two coprocessors are connected to the host 8086 processor. The two co-processor instruction sets  
 a. Must be the same  
 b. May overlap  
 c. Must be disjoint  
 d. Must be the same as that of the host
88. An advantage of memory interlacing is that

- a. A larger memory is obtained
- b. Effective speed of the memory is increased
- c. The cost of the memory is reduced
- d. A non-volatile memory is obtained

89. Match List I (Request) with List II (Device) and select the correct answer using the codes given below the lists:

**List I**

- A. Interrupt
- B. Wait
- C. Hold

**List II**

- 1. I/O device
- 2. DMA controller
- 3. Memory

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

90. Consider the following statements:

- I: A 33 MHz 486 has a higher MIPS rating than a 33 MHz 386.
- II: A 33 MHz 486 has a higher MFLOPS rating than a 33 MHz 386

Of these statements

- a. Both I and II are true
- b. Both I and II are false
- c. I is true but II is false
- d. I is false but II is true

91. The Intel Pentium processor address bus consists of two sets of signals: 29 address line (A31:A3) and 8 Byte Enable (BE7#:BEO#) lines. If the address on address line (A31:A3) is 0000 0108 (H) and all Byte enable lines (BE7#:BEO#) are asserted, then the processor's intention is to address

- a. One byte at address 0000 0108 (H)
- b. Eight byte at locations 0000 0101 to 0000 0108 (H)
- c. Eight bytes at locations 0000 0108 (H) to 0000 010F (H)
- d. One byte at location 0000 010F (H)

92. A personal computer has typically

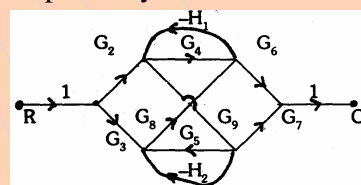
- a. 5 to 10 kilobytes of main memory

- b. 10 to 100 kilobytes of main memory
- c. 100 to 256 kilobytes of main memory
- d. 256 kilobytes to 1 megabyte of main memory

93. The sensitivity  $S_G^M$  of a system with the transfer function  $M = \frac{G}{1+GH}$  is given by

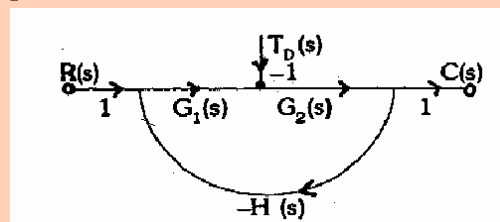
- a.  $\frac{1}{1+GH}$
- b.  $\frac{1+GH}{H}$
- c.  $\frac{1+G}{H}$
- d. H

94. In the case of the signal flow graph shown in the figure, the number of forward paths and the individual loops will be respectively



- a. 5 and 2
- b. 5 and 3
- c. 6 and 2
- d. 6 and 3

95. The signal flow graph of a closed-loop system is shown in the figure, where in, T represents the disturbance in the forward path:



The effect of the disturbance can be reduced by

- a. Increasing  $G_2(s)$
- b. Decreasing  $G_1(s)$
- c. Increasing  $G_1(s)$
- d. Decreasing  $G_1(s)$

96. Which of the following relate to rational transfer function of a system?

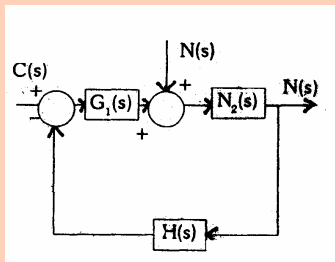
- 1. Ratio of Fourier transform of output to input with zero initial conditions.

2. Ratio of Laplace transform of output to input with zero initial conditions.
3. Laplace transform of system impulse response.
4. Laplace transform of system unit step response:

Select the correct answer using the codes given below:

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

97. The close-loop system shown in the figure is subjected to a disturbance  $N(s)$ . The transfer function  $\frac{C(s)}{N(s)}$  is given by

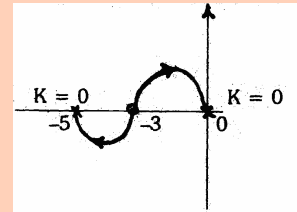


- a.  $\frac{G_1(s)G_2(s)}{1 + G_1(s)G_2(s)H(s)}$
- b.  $\frac{G_1(s)}{1 + G_1(s)H(s)}$
- c.  $\frac{G_2(s)}{1 + G_2(s)H(s)}$
- d.  $\frac{G_2(s)}{1 + G_2(s)G_2(s)H(s)}$

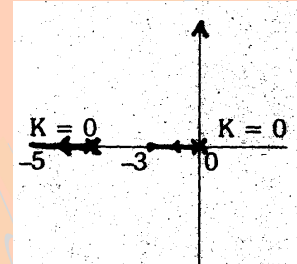
98. The value of  $K$  for which the unity feed back system  $G(s) = \frac{K}{s(s+2)(s+4)}$  crosses the imaginary axis is

- a. 2
- b. 4
- c. 6
- d. 48

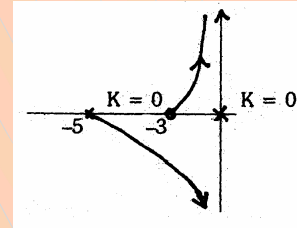
99. An open-loop 'transfer function is given by  $\frac{K(s+3)}{s(s+5)}$  its root-locus will be as in
- a.



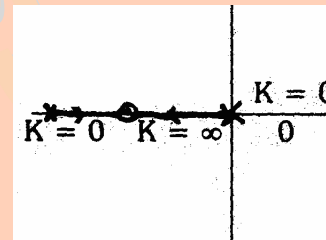
b.



c.



d.



100. Which of the following are the features of the breakaway point in the root-locus of a closed loop control system with the characteristic equation  $1 + KG_1(s)H_1(s) = 0$ ?

1. It need not always occur only on the real axis.
2. At this point  $G_1(s)H_1(s) = 0$ .
3. At this point  $dK/ds = 0$

Select the correct answer using the codes given below:

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

101. Which of the following components can be used as a rotating amplifier in a control system?

1. An amplidyne.

2. A separately excited dc generator.
3. A self-excited dc generator.
4. A synchronic

Select the correct answer using the codes given below:

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

102. While forming Routh's array, the situation of a row of zero indicates that the system

- a. Has symmetrically located roots
- b. Is not sensitive to variations in gain
- c. Is stable
- d. Unstable

103. In the case of a second order system described by the differential equation.

$$J \frac{d^2 \theta}{dt^2} + F \frac{d\theta_0}{dt} + K \theta_0 = K \theta_1$$

Where  $\theta_1$  and  $\theta_0$  are the input and output shaft angle, the natural frequency is given by

- a.  $\sqrt{\frac{K}{J}}$
- b.  $\sqrt{\frac{J}{K}}$
- c.  $\sqrt{KJ}$
- d.  $\sqrt{K-J}$

104. The Laplace transform  $F(s)$  of a function  $f(t)$  is given by

$$F(s) = \frac{10s(s+7)}{(s+1)(s+8)(s+10)}$$

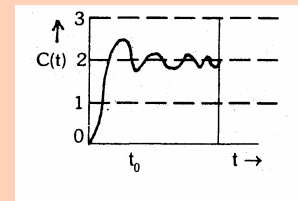
The initial and final values of  $f(t)$  will be respectively

- a. Zero and 1
- b. Zero and 10
- c. 10 and zero
- d. 70 and 80

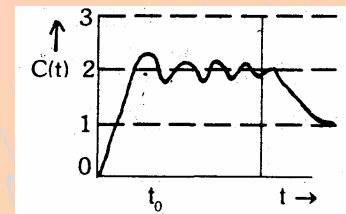
105. A second order under-damped system exhibited a 15% maximum overshoot on being excited by a step input  $r(t) = 2u(t)$ , and then attained a steady-state value of 2 (see figures given). If, at  $t = t_0$ , the input were changed to a unit step  $r(t) = u(t)$ .

then its time response  $C(t)$  would be similar to

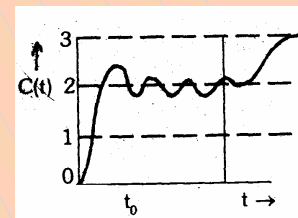
a.



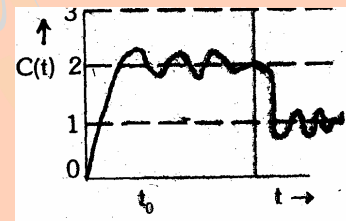
b.



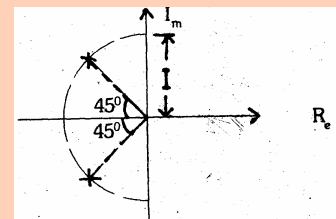
c.



d.



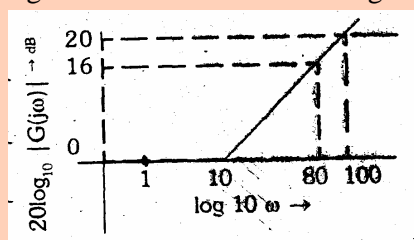
106. A transducer has two poles as shown in the figure. The zeros are at infinity. The steady state output of the transducer for a unit step input will be



- a.  $\frac{1}{4}$
- b.  $\frac{1}{2}$
- c.  $\frac{1}{\sqrt{2}}$
- d. 1

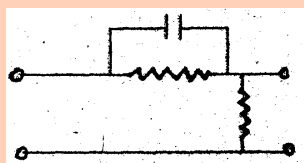


107. The log-magnitude Bode plot of non-minimum phase system is shown in the figure. Its transfer function is given by

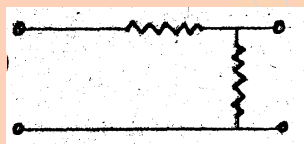


- $G(s) = \frac{s-10}{s+100}$
  - $G(s) = \frac{s-10}{s+10}$
  - $G(s) = \frac{s-10}{s-100}$
  - $G(s) = \frac{s+10}{s+100}$
108. Which one of the following is a phase-lead compensation network?

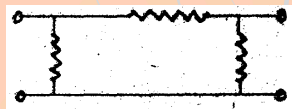
a.



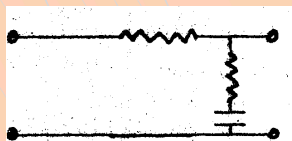
b.



c.



d.



109. A second-order overall transfer function is given by  $\frac{4}{s^2 + 2s + 4}$

Its resonant frequency is

- 2
- $\sqrt{2}$
- $\sqrt{3}$
- 3

110. **Assertion A:** The time response of the system  $G(s) = \frac{36}{s^2 + 36s + 36}$  to a unit input will NOT have any overshoot.

**Reason R:** A critically damped system does not have any overshoot to a unit step input.

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

111. **Assertion A:** The Nyquist stability criterion used the number of encirclements around the  $(-1+j0)$  point in the GH-plane to analyse the stability of a closed-loop system.

**Reason R:** The  $(-1+j0)$  point in the s-plane lies on the Nyquist path.

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

112. **Assertion A:** A synchro control transformer has nearly constant impedance across its rotor terminals.

**Reason R:** Rotor of a synchro control transformer is dumbbell shaped so-as to give uniform flux distribution.

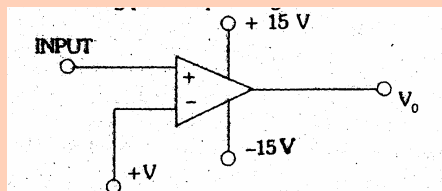
- Both A and R are true and R is the correct explanation of A
- Both A and R are true but R is NOT a correct explanation of A
- A is true but R is false
- A is false but R is true

113. **Assertion A:** A Darlington amplifier has a very low output impedance.

**Reason R:** The circuit has a very low external resistance  $R_E$  between emitter and ground.

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

114. **Assertion A:** The circuit shown in the figure produces repetitive narrow pulse when input is fed with sine or triangular waveform having peak amplitude greater than  $+V$  volts.



**Reason R:** The high gain OP-AMP produces voltages at two levels, if the input amplitude is greater than  $+V$ , then the output level is  $+15\text{ V}$  and it is equal to  $-15\text{ V}$  otherwise.

- 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:** The access time of the memory is the lowest in the case of DRAM.
- Reason R:** DRAM uses 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:** R-2R ladder type D/A converter has a higher speed of conversion than a weighted resistance D/A converter.
- Reason R:** R-2R ladder type D/A converter uses a smaller number of components than the weighted resistance D/A converter.
- 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. **Assertion A:** A p-channel MOSFET based transistor can turn on prematurely.

**Reason R:** Most contaminants in MOS fabrication are mobile positively charged ions and they get trapped between the gate and the substrate in a n-channel enhancement MOSFET. Whereas they are trapped on the other side of the substrate in the case of a p-channel enhancement MOSFET.

- 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:** The traveling wave tube is a wide band microwave amplifier if the helix is used as a slow-wave structure of the device.
- Reason R:** The phase velocity of the helix can be profiled along the length of the helix.
- 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:** The data bus and address bus of 8085 microprocessor are multiplexed.
- Reason R:** Multiplexing reduces the number of pins.
- 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. **Assertion A:** A half-adder is faster than a full-adder.
- Reason R:** A half-adder gives only one output while a full adder gives two outputs.
- 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