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ELECTRONICS & TELECOMMUNICATION ENGINEERING

PAPER-II

1. A continuous signal has voltage range –2V to +2 V. If this is quantized to 8 bits, what does the resulting signal have?
   a. 255 levels of step size 4/255
   b. 25 levels of step size 4/8
   c. 8 bits plus 2 levels at –2 and +2 volts
   d. 8 bits per sample if properly sampled

2. Match List I (Theorem/Law) with List II (Specified Quantity) and select the correct answer using the code given below the Lists :

   List I
   A. Shannon source coding theorem Dimensionality
   B. theorem
   C. Wiener-Khintchine theorem
   D. Shannon-Hartley law

   List II
   1. Channel capacity
   2. Storage space of a signal
   3. Power spectral density of random process
   4. Optimum code length

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

3. Which $x(t) = \sin 2\pi\, 10^3\, t + 2 \sin 2\pi\ 660\, t$. At what sampling frequency should this signal be sampled to avoid aliasing?
   a. 2×660 Hz
   b. 2×1000 Hz
   c. 2 [1000 + 660] Hz
   d. 2 [1000 – 660] Hz

4. An analog signal has significant spectral components from 1 kHz to 5 kHz. What is the Nyquist sampling rate for this signal?
   a. 5 k samples/s
   b. 4 k samples/s
   c. 8 k samples/s
   d. 10 k samples/s

5. A composite signal $x_c(t)$ is expressed as:
   Which of the following methods can be employed to retrieve the sinusoidal component at ω_m from $x_c(t)$?
   a. An envelop detector, square law detector
   b. Only a discriminator
   c. Only a square law detector
   d. Only an envelope detector

6. Match List I (Type of Random Process) with List II (Property of the Random Process) and select the correct answer using the code given below the Lists:

   List I
   A. Stationary process
   B. Ergodic Process
   C. Wide sense
   D. stationary Process
   E. Cyclostationary Process

   List II
   1. Statistical averages are periodic in time
   2. Statistical averages are independent of time
   3. Mean and autocorrelation are independent of time
   4. Time averages equal corresponding ensemble average

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

7. A circuit produces an output $y(t) = a + bx(t)^2$ where $x(t)$ is its input. This circuit can produce which one of the following?
   a. Rectified output
   b. Pulse modulation
   c. Amplitude modulation
   d. Frequency modulation

8. In delta modulation, when is the slope overloading noise absent?

(h is the pulse height and sampled every T_s seconds, f(t) is the input signal, h and T_s are step-size of integration and sampling period, respectively) :

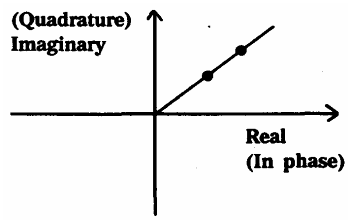
a. $\frac{df(t)}{dt} \leq (h/T_s)$

b. $\frac{df(t)}{dt} > (h/T_s)$

c. $\frac{df(t)}{dt} \leq (h/T_s)$

d. $\frac{df(t)}{dt} > (h.T_s)$

9.



The constellation diagram of a modem is shown in the figure given above. What does the modem use?

a. QAM
b. PSK
c. Both QAM and PSK
d. ASK

10. Which one of the following statements is correct?

The Shannon's channel capacity formula indicates that in theory :

a. by using proper channel codes, we can get an error- free transmission on a noisy channel
b. it is not possible to get an error-free transmission on a noisy channel, since there will always be some error in the detected signal for finite noise on any channel
c. it is true only for some wired channels and not wireless channels
d. it works only for analog signals and not for digital signals on any channel

11. Match List I (Programmable Logic Device) with List II (Function) and select the correct answer using the code given below the Lists :

List I

A. EPROM
B. PLA
C. GAL
D. PAL

List II

1. AND-gate programmable, OR-gate permanently hardwired
2. Both AND and OR gates programmable
3. AND-gate programmable, OUTPUT permanently hardwired but may be taken through Resister, or tristate gate
4. AND-gate permanently hardwired OR-gate programmable

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

12. Consider the following statements:

1. MOSFET ROMs have much larger capacities than those of the BJT ROMs.
2. BJT ROMs are faster than the MOSFET ROMs.
3. BJT RAM memories can be static or dynamic.

Which of the statements given above is/are correct?

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

13. Consider the following statements: A damper circuit

1. adds or subtracts a dc voltage to or from a waveform.
2. does not change the shape of the waveform.
3. amplifies the waveform.

Which of the statements given above are correct?

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

14. 12 MHz clock frequency is applied to a cascaded counter of modulus-3 counter, modulus-4 counter and modulus-5 counter.

What are the lowest output frequency and the overall modulus, respectively?

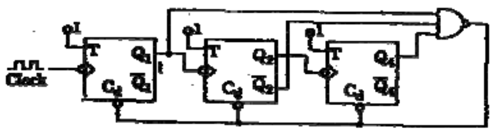
a. 200 kHz, 60

b. 1 MHz, 60

c. 3 MHz, 12

d. 4 MHz, 12

15.



The circuit given above is that of a :

a. Mod-5 counter

b. Mod-6 counter

c. Mod-7 counter

d. Mod-8 counter

16. A 1-bit full adder takes 20 ns to generate carry-out bit and 40 ns for the sum bit. What is the maximum rate of addition per second when four 1-bit full adders are cascaded?

a. 10^7

b. 1.25×10^7

c. 6.25×10^6

d. 10^5

17. Match List I (Type of flip-flop) with List II (Symbol) and select the correct answer using the code given below the Lists :

List I

A. T-flip-flop

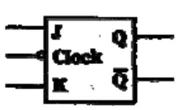
B. Level-triggered JK flip-flop

C. Leading edge- triggered JK flip-flop

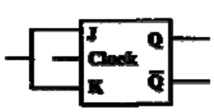
D. Trailing edge- triggered JK flip-flop

List II

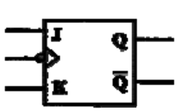
1.



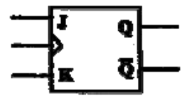
2.



3.



4.



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

18. Consider the following statements :

1. Infix, Prefix and Postfix notations for expressing sum of A and B are A+B, +AB, and AB+, respectively.
2. AVL tree is a binary tree in which the difference in heights between the left and the right sub tree is not more than one for every node.
3. Stack data structure is used to save and retrieve information in reverse order.
4. Queue data structure is known as LIFO.

Which of the statements given above are correct?

a. 1, 2 and 3

b. 2, 3 and 4

c. 1, 3 and 4

d. 1, 2 and 4

19. Consider the following statements is respect of the expression: A + XYZ (& A):

1. Result of expression may depend upon order of evaluation of operands of the operator '+'.
2. Result of expression would never depend upon order of evaluation of operands of the operator '+'.
3. XYZ is not a valid name of function

Which of the statements correctly defines temporal locality?

a. 1 only

b. 2 only

c. 1 and 3

d. 1, 2 and 3

20. Which one of the following correctly defines temporal locality?

a. Adjacent instructions for current instruction may be needed soon

b. Current instruction being fetched may be needed again soon

c. Instructions temporarily residing in memory

d. None of the above

21. Consider a function g which is taking a parameter f of type pointer to function. Which one of the following best describes the use of pointer to function?
   a. g can make modification in the definition of f and the change is visible after return from g.
   b. g can dynamically test f and modify it
   c. Functionality of g gets customized through functionality of f
   d. F can dynamically test g and modify it

22. A disc rotates at a speed of 7200 rpm. It has 4000 cylinders, 16 surfaces and 256 sectors per track. What is the average latency time of the disk?
   a. 8.33 ms
   b. 4.166 ms
   c. 41.66 ms
   d. 8.33 μs

23. Consider the following statements :
   1. Cache memory is low cost and fast memory
   2. Cache memory is fast but costly memory.
   3. Performance of cache during program execution is measured by hit ratio.
   4. Cache size is very large.

   Which of the following statements given above are correct ?
   a. 1 and 2
   b. 2 and 3
   c. 3 and 4
   d. 1 and 4

24. Consider the following statements :
   The SIM Instruction outputs the contents of accumulator to define :
   1. interrupt mask bit.
   2. interrupt pending bit.
   3. serial input data line.
   4. serial output data line.

   Which of the statements given above are correct ?
   a. 1 and 2
   b. 2 and 3
   c. 3 and 4
   d. 1 and 4

25. Match List I (2 Pins of 8086) with List II (Status) and select the correct answer using the code given below the Lists :

   List I

	BHE	A_0
A.	0	0
B.	0	1
C.	1	0
D.	1	1

   List II
   What is read/written ?
   1. 1 byte from/to odd address
   2. 1 byte from/to even address
   3. 1 16-bit word
   4. NOP

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

26. What is the number of machine cycles n, and the types of machine cycles carried out for PUSH B?
   a. n = 2, fetch and memory write
   b. n = 3, fetch and 2 memory write
   c. n = 3, fetch, memory write and read
   d. n = 3, fetch, and 2 memory read

27. The following sequence of instructions is executed by an 8085 microprocessor:

1000	LXI SP,	27 FF
1003	CALL	1006
1006	POP	H

   What are the contents of the stack pointer (SP) and the HL register pair after completion of execution of these instructions?
   a. SP = 27 FF, HL = 1003
   b. SP = 27 FD, HL = 1003
   c. SP = 27 FF, HL= 1006
   d. SP = 27 FD, HL = 1006

28. Which one of the following is not associated with a Logic analyzer?
   a. Delayed state
   b. Delayed sweep
   c. Disassembler
   d. Pre-triggering

29. Consider the following statements:

The analysis of oscillators based on typical semiconductor device cannot be extended at high frequency because:

1. is does not show negative mobility.
2. it does not show negative resistance.
3. the transit time between junctions becomes high
4. the junction capacitance becomes very large.

Which of the statements given above are correct?

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

30. The noise figure of a lossy network at room temperature equals the:

a. Gain of the network
b. Attenuation factor of the network
c. Equivalent noise temperature of the network
d. Input noise power

31. With regard to the filtering property, the lead compensator and the lag compensator are, respectively:

a. low pass and high pass filters
b. high pass and low pass filters
c. both high pass filters
d. both low pass filters

32. The transfer function of phase-lead compensator is given by $G(s) = \frac{1+aTs}{1+Ts}$, where T > 0, a > 1.

What is the maximum phase shift provided by this compensator?

a. $\tan^{-1}\left(\frac{a+1}{a-1}\right)$
b. $\tan^{-1}\left(\frac{a-1}{a+1}\right)$
c. $\cos^{-1}\left(\frac{a-1}{a+1}\right)$
d. $\sin^{-1}\left(\frac{a-1}{a+1}\right)$

33. Match List I (Compensation) with List II (Characteristic) and select the correct answer using the code given below the Lists :

List I

A. Lag
B. Lead
C. Lag-Lead
D. Rate

List II

1. Increases bandwidth
2. Attenuation
3. Increases damping factor
4. Second order

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

34. Consider the following statements :

The frequency response of a control system has very sharp cut off characteristics. This implies that:

1. it has large peak resonance.
2. it has large bandwidth.
3. it is a less stable system.

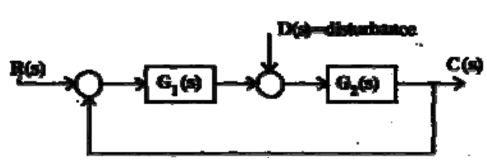
Which of the statements given above is/are correct?

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

35. For the minimum phase system to be stable:

a. Phase margin should be negative and gain margin should be positive
b. Phase margin should be positive and gain margin
c. Both phase margin and gain margin should be positive
d. Both phase margin and gain margin should be negative

36.



For the given system, how can the steady state error produced by step disturbance be reduced?

a. By increasing dc gain of $G_1(s)$ $G_2(s)$

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b. By increasing dc gain of $G_2(s)$

c. By increasing dc gain of $G_1(s)$

d. By removing the feedback

37. For a stable closed loop system, the gain at phase crossover frequency should always be :

a. > 20 dB

b. > 6 dB

c. < 6 dB

d. < 0 dB

38. Which one of the following methods can determine the closed loop system resonance frequency of operation?

a. Root locus method

b. Nyquist method

c. Bode plot

d. M and N circle method

39. If the gain of the open loop system is doubled, the gain margin of the system is :

a. not affected

b. doubled

c. halved

d. one fourth of original value

40. Which one of the following is not a property of root loci ?

a. The root locus is symmetrical about jω axis.

b. They start from the open loop poles and terminate at the open loop zeros.

c. The breakaway points are determined from dk/ds = 0.

d. Segments of the real axis are part of the root locus, if and only if, the total number of real poles and zeros to their right is odd.

41. Which one of the following expresses the time at which second peak in step response occurs for a second order system?

a. $\frac{\pi}{\omega_n \; 1-\zeta^2}$

b. $\frac{2\pi}{\omega_n \; 1-\zeta^2}$

c. $\frac{3\pi}{\omega_n\sqrt{1-\zeta^2}}$

d. $\frac{\pi}{\sqrt{1-\zeta^2}}$

42. With negative feedback in a closed loop control system, the system sensitivity to parameter variations:

a. Increases

b. Decreases

c. Becomes zero

d. Becomes infinite

43. An underdamped second order system with negative damping will have the two roots :

a. On the negative real axis as real roots

b. On the left hand side of complex plane as complex roots

c. On the right hand side of complex plane as complex conjugates

d. On the positive real axis as real roots

44. Match List I (System G(s)) with List II (Nature of Response) and select the correct answer using the code given below the Lists:

List I

A. $\frac{400}{s^2+12s+400}$

B. $\frac{900}{s^2+90s+900}$

C. $\frac{225}{s^2+30s+225}$

D. $\frac{625}{s^2+625}$

List II

1. Undamped
2. Critically damped
3. Underdamped
4. Overdamped

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

45. Given a unity feedback system with $G(s)=\frac{k}{s(s+4)}$, what is the value of k for a damping ratio of 0.5?

a. 1

b. 16

c. 4

d. 2

46. What is the steady state error for a unity feedback control system having $G(s)=\frac{1}{s(s+1)}$, due to unit ramp input?

a. 1

b. 0.5

c. 0.25

d. $\sqrt{0.5}$

47. Four signals $g_1(t)$, $g_2(t)$, $g_3(t)$ and $g_4(t)$ are to be multiplexed and transmitted. $g_1(t)$ and $g_4(t)$ have a bandwidth of 4 kHz, and the remaining two signals have bandwidth of 8 kHz. Each sample requires 8 bit for encoding. What is the minimum transmission bit rate of the system?

a. 512 kbps

b. 16 kbps

c. 192 kbps

d. 384 kbps

48. A 12 channel TOM system where each channel signal is 4 kHz is sampled at 8kHz. What is the bandwidth requirement?

a. 12 kHz

b. 12×4 kHz

c. 12×8 kHz

d. $12 \times 8 \times 4$ kHz

49. Which one of the following statements is correct?

a. Equalisation is required in telephone lines but not in wireless communication

b. Equalisation is required both in telephone lines and wireless communication

c. Equalisation is required in wireless communication whereas this is not required in telephone lines

d. Equalisation is not required in wireless communication since phase equalisation is required only when lines are used

50. Match List I (Different Fibre Generation) with List II (Optical Components Used) and select the correct answer using the code given below the Lists:

List I

A. First

B. Second

C. Third

D. Fourth

List II

1. Graded index multimode fibre and 1310 nm LD

2. Graded index multimode fibre and 850 nm LD

3. Step index monomode fibre and 1550 nm LD

4. Step index monomode fibre and 1310 nm LD

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

51. Maxwell's equations are obeyed by an EM wave while it is propagating :

a. Only in the free space

b. Only in water and free space

c. Only in ionosphere, water and free space

d. In all the solids, liquids, gases and all the media mentioned above at (a), (b) and (c)

52. Which one of the following antenna structures is best for generating a circularly polarized radiation?

a. Helical antenna

b. Log-periodic antenna

c. Rhombic antenna

d. Dipole antenna

53. A dispersive channel is one in which :

a. Phase velocity of signal depends upon frequency

b. Phase velocity of signal depends upon its electric field intensity in the medium

c. Phase velocity of signal depends upon its magnetic field intensity in the medium

d. Phase velocity of signal depends upon its amplitude in the medium

54. If a satellite is launched at an orbital radius of twice that of a geostationary satellite, how much time will the launched satellite take to travel around the earth?

a. 48 hrs

b. 12 hrs

c. 96 hrs

d. 6 hrs

55. Match List I with List II and select the correct answer using the code given below the Lists:

List I

A. Entropy coding

B. Channel capacity

C. Minimum length code

D. Equivocation

List II

1. McMillan's Rule
2. Redundancy
3. Shannon Fano
4. Shannon law

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

56. In a 500 × 500 matrix, 95% of the elements are zeros and these elements are randomly distributed. Which is an appropriate data structure to store this efficiently?

A. An array

B. A tree

C. A list

D. A stack

57. Match List I with List II and select the correct answer using the code given below the Lists :

List I

A. Immediate addressing

B. Implied addressing

C. Register addressing

D. Direct addressing

List II

1. LDA 30 SC
2. MOV A, B
3. LXI H, 2050
4. RRC

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

58. Match List I (Operator of C Language) with List II (Characteristic of the Operator) and select the correct answer using the code given below the Lists:

List I

A. ^

B. &

C. mod

D. ?

List II

1. Unary operator
2. Binary operator
3. Ternary operator
4. Invalid operator

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

59. What is the output of the following program?

```
# include < Stdio. h >
main ( )
{
float f;
f = 10/3;
print f("% f," 1);
}
```

a. 3.3

b. 3.0

c. 3

d. 0.3

60. If $(2.3)_{\text{base } 4} + (1.2)_{\text{base } 4} = (y)_{\text{base } 4}$; what is the value of y?

a. 10.1

b. 10.01

c. 10.2

d. 1.02

61. The number of 1 in 8-bits representation of –127 in 2's complement form is m and that in 1's complement form is n. What is the value of m : n ?

a. 2 : 1

b. 1 : 2

c. 3 : 1

d. 1 : 3

62. Given $(135)_{\text{base x}} + (144)_{\text{base x}} = (323)$base x

What is the value of base x ?

a. 5

b. 3

c. 12

d. 6

63. Which one of the statements concerning IC fabrication is not correct?

a. A typical wafer of doped Si may be 400 ELM thick, of diameter 5–15 cm. The purity of the water does not matter and can be even polycrystalline in nature.

b. Resistors are obtained by utilizing the bulk resistivity of one of the regions; for example, the DS channel of a MOSFET can serve as a resistor.

c. Semiconductors lack magnetic properties, so they cannot exhibit inductance. However, the inductors can be realized by combination of active and passive components.

d. In a reverse biased p-n junction, the positive and negative ions exist on opposite sides of the p-n junction; because of that a p-n junction behaves like a parallel plate capacitor.

64. Assertion (A) : Microstrip lines are preferred for antenna application.

Reason (R) : They have higher ‘Q’ and higher ‘Gain’.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

65. Assertion (A) : There is no overflow after an addition, if one number is positive and the other is negative.

Reason (R) : Adding a positive number to a negative number always produces a result which is smaller than the larger of the two.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

66. Assertion (A) : In a Darlington connection, two transistors are connected in cascade in common emitter configuration.

Reason (R) : The Darlington connection aims at making the current gain very high, almost equal to the product of beta of individual transistors.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

67. Assertion (A) : It is possible to use the technique of additive amplification to get a wide band amplifier.

Reason (R) : In additive amplifier, the overall gain of the amplifier is the sum of the gain of the individual amplifiers.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

68. Assertion (A) : The speed-power product is an important parameter for comparing various TTL series.

Reason (R) : A low value of speed-power product indicates that a propagation delay can be achieved without excessive power dissipation and vice-versa.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

69. Assertion (A) : In a step index fibre, for single mode operation, the fibre parameters should be tailored such that the V-parameter is less than 2.4048.

Reason (R) : Model fields of step index fibre are represented by Bessel functions $J_n(x)$ in the core and modified Bessel functions $K_n(x)$ in the cladding. The first zero for $J_1(x)$ falls at x = 2.4048.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

70. Assertion (A) : For optical communication, three communication wavelength windows are decided and they are located near 850 nm, near 1300 nm and near 1550 nm.

Reason (R) : At 850 nm the first semiconductor laser for optical communication was fabricated, at 1300 nm the fibre dispersion is minimum and at 1550 nm wavelength multiplexing is possible due to optical amplifiers.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

71. Assertion (A) : The self bias technique as used for a JFET cannot be used for establishing an operating point for the enhancement MOSFET.

Reason (R) : The voltage drop across R is such that it reverse biases the gate.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

72. Assertion (A) : The microprocessor based products used by the general consumer must comply FCC rules.

Reason (R) : FCC regulates the use of radio transmission.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

73. What is the effect of phase-lag compensation on the performance of a servo system?

a. For a given relative stability, the velocity constant is increased.

b. For a given relative stability, the velocity constant is decreased.

c. The bandwidth of the system is increased.

d. The time response is made faster.

74. Match List I (Frequency Response) with List II (Time Response) and select the correct answer using the code given below the Lists:

List I

A. Bandwidth

B. Phase margin

C. Response peak

D. Gain margin

List II

1. Overshoot

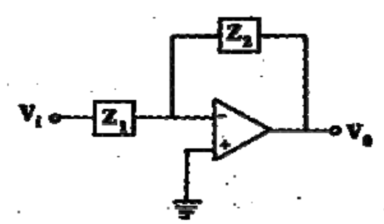
2. Stability

3. Speed of time response

4. Damping ratio

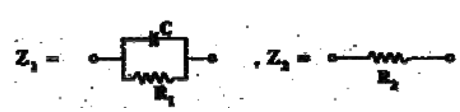
	A	B	C	D
a.	3	2	1	4
b.	1	4	3	2
c.	3	4	1	2
d.	1	2	3	4

75.

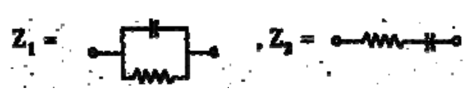


For which one of the following, given physical realization corresponds to PD controller?

a.

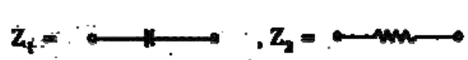


b.



c.

d.



76. Which one of the following is an advantage of a PD controller in terms of damping (δ) and natural frequency (ω_n)?

a. δ remains fixed but ω_n increases

b. δ remains fixed but ω_n decreases

c. ω_n remains fixed but δ increases

d. ω_n remains fixed but δ decreases

77. A transistor RC coupled amplifier is designed for a voltage and band gain of 20. But a measurement at a particular frequency shows the gain to be only 14. What is the likely phase shift at this frequency ?

a. 180^o

b. 135°

c. 90^o

d. 45^o

78. What is the value of R required to self bias an N channel JFET with V_P = –10 V, I_{DSS} = 40 mA and V_{GSQ} = –5 V?

a. 250 Ω

b. 500 Ω

c. 750 Ω

d. 1500 Ω

79. When a voltage divider biased amplifier has its Q-point near to the middle of the dc-load line, what is the maximum unclipped peak-to-peak output voltage?

a. V_{CEQ}

b. $I_{CQ}r_L$

c. $2\, I_{CQ}r_L$

d. $2V_{CEQ}$

80. f_T is the frequency at which the short circuit:

a. Common collector current gain has a magnitude of unity

b. Common base current gain has a magnitude of unity

c. Common emitter current gain has a magnitude of unity

d. Common emitter current gain has a magnitude of $1/\ \ 2$.

81. Match List I (Type of Amplifier) with List II (Property) and select the correct answer using the code given below the Lists :

List I

A. Single ended class A

B. Class AB push-pull

C. Class B push-pull

D. Class C

List II

1. Medium efficiency with minimum distortion

2. High efficiency with cross-over distortion

3. Harmonic generator with highest possible conversion efficiency

4. Poor conversion efficiency with minimum distortion

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

82. An SCR remains turned on if the anode current is more than the :

a. Break over current

b. Trigger current

c. Holding current

d. Threshold current

83. A cascaded amplifier comprises N identical non-interacting stages, each having a lower 3 dB frequency of f_L. If f_L^* is the lower 3 dB frequency of the cascaded amplifier, then which one of the following is correct?

a. $f_L^* = f_L$

b. $f_L^* = f_L /\ \ 2^{1/N} - 1$

c. $f_L^* = f_L \sqrt{2^{1/N} - 1}$

d. $f_L^* = f_L / N$

84. Consider the following statements :

1. To achieve wide bandwidth, a transistor with a small $C_{b'C}$ is chosen.

2. To achieve wide bandwith, a transistor with a small base spreading resistance is chosen.

3. To achieve wide bandwith, a transistor with a small base spreading resistance is chosen.

Which of the statements given above are correct?

a. 1 and 2

b. 2 and 3

c. 1 and 3

d. 1, 2 and 3

85. Three amplifiers each of gain (A_0/2) and producing a phase of 60^0 are connected in tandem. The feedback loop is closed through a positive gain of 0.008. What

should be the value of A_0 for the system to be oscillatory?

a. + 10

b. – 10

c. + 250

d. + 83.3

86. Match List I (Name of the Oscillator) with List II (Characteristics) and select the correct answer using the code given below the Lists :

List I

A. Colpitts Oscillator

B. Phase Shift Oscillator

C. Tunnel diode Oscillator

D. Relaxation Oscillator

List II

1. RC Oscillator

2. LC Oscillator

3. Negative resistance Oscillator

4. Sweep circuits

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

87. In a half-wave rectifier, if an a.c. supply is 60 Hz, then what is the a.c. ripple at output?

a. 30 Hz

b. 60 Hz

c. 120 Hz

d. 15 Hz

88. Consider the following statements :

A 4 : 16 decoder can be constructed (with enable input) by:

1. using four 2:4 decoders (each with an enable input) only.

2. using five 2:4 decoders (each with an enable input) only.

3. using two 3:8 decoders (each with an enable input) only.

4. using two 3:8 decoders (each with an enable input) and an inverter.

Which of the statements given above is/are correct?

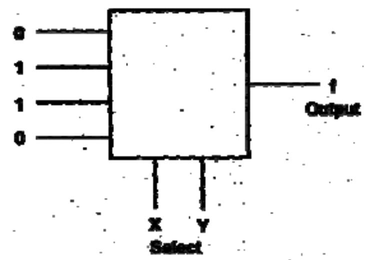
a. 2 and 3

b. 1 only

c. 2 and 4

d. None of the above

89.



What is the output f(x, y) of the multiplexeer resulting from the input logical values?

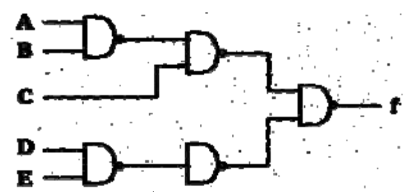
a. An EXOR gate

b. A NOR gate

c. An AND gate

d. A NAND gate

90.



Which one of the following functions is realized by the circuit shown above?

a. $(A + \overline{B})C + \overline{DE}$

b. $(A + B)C + D + E$

c. $AB + C + DE$

d. $AB + C(D + E)$

91. Which one of the following statements is not correct?

a. A full adder can be constructed using two half-adders and an OR gate.

b. Two four bit parallel adders can be cascaded to construct 8-bit parallel adder.

c. Ripple carry adder has addition time independent of the number of bits.

d. Catty look ahead is used to speed up the parallel addition.

92. Consider the following statements :

1. is a half-subtractor also.

2. has two outputs $C_H = x.y$ and

$S_H = x \oplus y$ for two inputs x and y.

3. has two outputs $C_H = x + y$ and

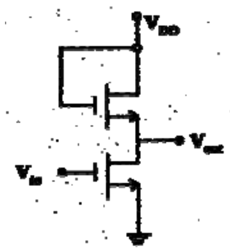
$S_H = x \oplus y$ for two inputs x and y.

4. is a combinational circuit.

Which of the statements given above is/are correct?

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

93.



In the circuit given above, both transistors have the same V_T. What is the approximate value of the highest possible output voltage V_{out} , if V can range from 0 to V_{DD} ? (Assume $0 < V_T < V_{DD}$)

a. $V_{DD} - V_T$
b. V_{DD}
c. V_T
d. 0

94.

wx \ yz	00	01	11	10
00			1	
01	1	1	1	
11		1	1	1
10		1		

What is the minimized logic expression corresponding to the given Karnaugh Map?

a. x z
b. wxy + wyz + w yz + wxy
c. wxy + wyz + w yz + w x y
d. xz + wyz + wxy + wxy + w yz

95. The Boolean function (x+y) ($\overline{x}$ +z) (y+z) is equal to which one of the following expressions?

a. (x+y) (y+z)
b. ($\overline{x}$ +z) (y+z)
c. (x+y) ($\overline{x}$ +z)
d. (x+y) (y+ $\overline{z}$)

96. AB + $\overline{A}$C = (A+C) ($\overline{A}$ + B)……

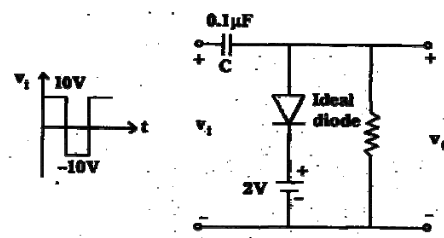
Which one of the following is the dual form of the Boolean identity given above?

a. AB + $\overline{A}$C = AC + $\overline{A}$ B
b. (A+B) = ($\overline{A}$+C) = (A+C) + ($\overline{A}$ + B)
c. (A+B) = ($\overline{A}$+C) = AC + $\overline{A}$ B
d. AB = $\overline{A}$C = AB + $\overline{A}$C + BC

97. A Gray code is a/an :

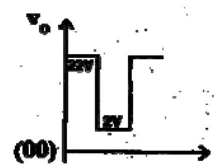
a. Binary weight code
b. Arithmetic code
c. Code which exhibits a single bit change between two successive codes
d. Alphanumeric code

98.

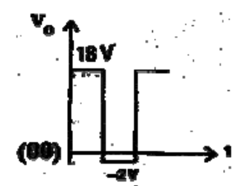


Select the correct output (v_0) wave-shape for a given input (v_1) in the clamping network given above:

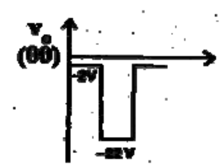
a.



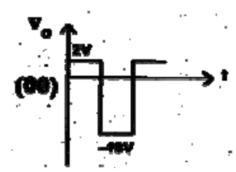
b.



c.



d.



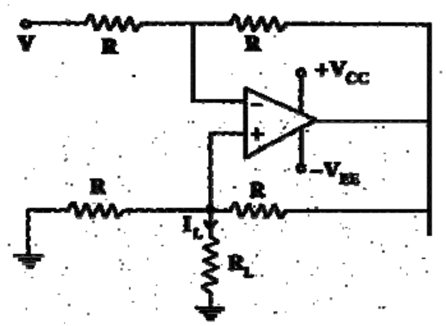
99. Pulses of definite width can be obtained from irregular shaped pulses :

a. When it is given as input to a monostable multivibrator
b. When it is given as triggering signal to a bistable multivibrator

c. When it is used as input to a Schmitt trigger

d. When it is used as input to a pulse transformer

100.



For the circuit given above, what is 1L equal to?

a. V/R_L

b. V/R

c. $\frac{V}{R+R_L}$

d. $\frac{V}{2R+R_L}$

101. For a given op-amp, CMRR = 10^5 and differential gain = 10^5. What is the common mode gain of the op-amp?

a. 10^{10}

b. 2×10^5

c. 10^5

d. 1

102. A half-wave rectifier having a resistance load of 1kΩ rectifiers an a.c. voltage of 325 V peak value and the diode has a forward resistance of 100 Ω. What is the RMS value of the current?

a. 295.4 mA

b. 94.0 mA

c. 147.7 mA

d. 208.0 mA

103. On which of the following parameters does the maximum range of detection (by radar) for an isolated objection space depend?

1. Wavelength (as , $\sqrt{\lambda}$)
2. Minimum detectable echo pulse power
3. Antenna gain (as reciprocal of gain)
4. Transmitted power
5. Radar cross section of the target

Select the correct answer using the code given below:

a. 1, 2 and 3

b. 2, 4 and 5

c. 3, 4 and 5

d. 1, 3 and 5

104. A four port ideal directional coupler with infinite directivity is characterized by a S-matrix given as :

a. $\begin{bmatrix} 0 & s_{12} & s_{13} & s_{14} \\ s_{21} & 0 & s_{23} & s_{24} \\ s_{31} & s_{32} & 0 & s_{34} \\ s_{41} & s_{42} & s_{43} & 0 \end{bmatrix}$

b. $\begin{bmatrix} 0 & s_{12} & 0 & s_{14} \\ s_{21} & 0 & s_{23} & 0 \\ 0 & s_{32} & 0 & s_{34} \\ s_{41} & 0 & s_{43} & 0 \end{bmatrix}$

c. $\begin{bmatrix} 0 & 0 & s_{13} & s_{14} \\ 0 & 0 & s_{23} & s_{24} \\ s_{31} & s_{32} & 0 & 0 \\ s_{41} & s_{42} & 0 & 0 \end{bmatrix}$

d. $\begin{bmatrix} s_{11} & s_{12} & 0 & 0 \\ s_{21} & s_{22} & 0 & 0 \\ 0 & 0 & s_{33} & s_{34} \\ 0 & 0 & s_{43} & s_{44} \end{bmatrix}$

(assuming that port 1, 2 are on one line, and port 3, 4 are on the auxiliary line)

105. Silicon and Germanium are not suitable for fabrication of laser diodes because :

a. Their absorption coefficients are very high

b. Their emission coefficients are very low

c. They have direct band gap

d. They have indirect band gap

106. Match List I with List II and select the correct answer using the code given below the Lists:

List I

A. VSWR meter

B. T-R tube

C. Reciprocity Theorem

D. Bolometer

List II

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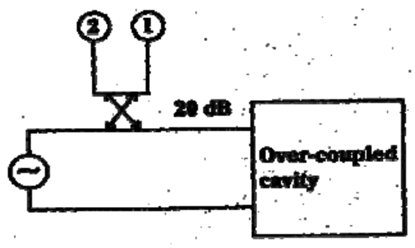
1. Antenna measurements
2. Microwave power measurements
3. Duplexers
4. Reflection Coefficient measurements

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

107.



In the system shown above, the input VSWR is 15 at resonance. If the power-meter 1 reads 1 mW, what is the reading on the power-meter 2?

a. 0.1 mW
b. 0.06 mW
c. 0.04 mW
d. 0.02 mW

108. Match List I (Antenna) with List II (Property) and select the correct answer using the code given below the Lists :

List I

A. Log periodic antenna
B. Helical antenna
C. Microstrip antenna
D. Dipole antenna

List II

1. Circular polarization
2. Wide bandwidth
3. Omni directional pattern
4. Compact and light weight

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

109. Match List I with List II and select the correct answer using the code given below the Lists:

List I

A. Helical antenna
B. Pyramidal horn antenna
C. Microstrip patch antenna
D. Sectoral horn antenna

List II

1. Fan-shaped beam, high power handling
2. Low bandwidth, low power handling
3. Narrow beam, high power handling
4. Circularly polarized beam, moderate power handling

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

110. For a parabolic reflector of 5 metre diameter, the far field pattern measurement at 6 GHz should be carried out a distance of at least:

a. 0.5 km
b. 10 km
c. 15 km
d. 20 km

111. A microstrip line of 50 ohm is terminated in $Z_L = 40 + j30\ \Omega$. What is the VSWR of the load?

a. 2.0
b. 1.8
c. 1.5
d. 1.3

112. In an air-filled waveguide of dimensions a cm $\times$ b cm, at a given frequency, the longitudinal component of electric field of TM_{32} mode is of the form:

$E_z = 20 \sin(60\pi x) \sin(60\pi y)$.

Which form would E_z have for the lowest order TM mode?

a. $E_z = 20 \sin(20\pi x)$
b. $E_z = 20 \sin(20\pi y)$
c. $E_z = 20 \sin(20\pi x) \sin(50\pi x)$
d. $E_z = 20 \sin(20\pi x) \sin(100\pi y)$

113. For a rectangular waveguide of dimensions:

$a\sqrt{3}$ cm $\times$ a cm, the cut off frequency for the TE_{10} mode is 2 GHz. What is the cut off frequency for TM_{11} mode in the waveguide?

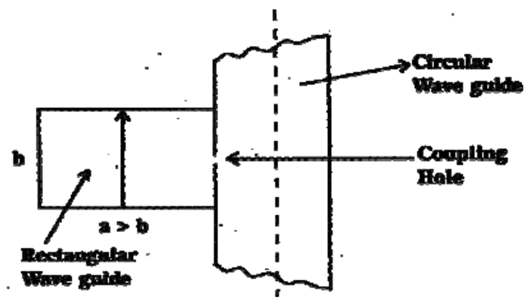
a. 1 GHz

b. 3.46 GHz

c. 4 GHz

d. 6 GHz

114.



If TE_{10} mode propagates in the rectangular waveguide, which is the lowest mode excited in the circular waveguide?

a. TE_{11}

b. TM_{11}

c. TE_{01}

d. TM_{01}

115. The Magic-T (or Tee) is commonly used in mixing, duplexing and impedance measurement at microwave frequencies. It is characterized by a S-matrix given as:

a. $\begin{bmatrix} 0 & s_{12} & s_{13} & s_{14} \\ s_{21} & 0 & s_{23} & s_{24} \\ s_{31} & s_{32} & 0 & s_{34} \\ s_{41} & s_{42} & s_{43} & 0 \end{bmatrix}$

b. $\begin{bmatrix} 0 & s_{12} & 0 & s_{14} \\ s_{21} & 0 & s_{23} & 0 \\ 0 & s_{32} & 0 & s_{34} \\ s_{41} & 0 & s_{43} & 0 \end{bmatrix}$

c. $\begin{bmatrix} 0 & 0 & s_{13} & s_{14} \\ 0 & 0 & s_{23} & s_{24} \\ s_{31} & s_{32} & 0 & 0 \\ s_{41} & s_{42} & 0 & 0 \end{bmatrix}$

d. $\begin{bmatrix} s_{11} & s_{12} & 0 & 0 \\ s_{21} & s_{22} & 0 & 0 \\ 0 & 0 & s_{33} & s_{34} \\ 0 & 0 & s_{43} & s_{44} \end{bmatrix}$

116. N represents the number of electron transit cycles in the drift space of a two cavity klystron amplifier. What is the phase difference between the input signal voltage and the output current of the amplifier?

a. $(\pi/2 - 2\pi N)$

b. $(\pi/2 + 2\pi N)$

c. $(\pi - 2\pi N)$

d. $(\pi + 2\pi N)$

117. Why is an attenuator used in a TWT?

a. To help bunching

b. To prevent oscillations

c. To prevent saturation

d. To increase gain

118. Match List I with List II and select the correct answer using the code given below the Lists :

List I

A. Reflex klystron

B. Double cavity klystron

C. Gunn diode

D. Magnetron

List II

1. Amplification
2. Mode-jumping
3. Electron bunching
4. Negative resistance

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

119. In the Gunn diode, out of its various modes of operation, one mode is independent of domain transit time and hence can be used at high frequency and for very high output powers. Which is this mode?

a. Transit time mode

b. Quenched domain mode

c. Delay domain mode

d. Limited space charge accumulation mode

120. A geostationary satellite located at about 35000 km from earth can cover:

a. Complete surface of the earth

b. One hemisphere in one pass

c. One side of the earth

d. An area depending on antenna used