

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

T.B.C. : O-FTF-J-FUB

Test Booklet Series

Serial No.

58033



TEST BOOKLET

ELECTRONICS & TELECOMMUNICATION ENGINEERING

Paper II

Time Allowed : Two Hours

Maximum Marks : 200

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET *DOES NOT* HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES A, B, C OR D AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet.
4. This Test Booklet contains **120** items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer Sheet**. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong Answers :**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0.33)** of the marks assigned to that question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
 - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

1. Consider the following :

1. Oscillator
2. Emitter follower
3. Cascaded amplifier
4. Power amplifier

Which of these use feedback amplifiers ?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 4
- (d) 3 and 4

2. Why npn-transistors are preferred over pnp-transistors ?

- (a) Leakage current in npn-transistors is less than pnp-transistors
- (b) Mobility of majority carrier in npn-transistors is greater than the mobility of majority carrier in pnp-transistors
- (c) Bias voltage required in npn is less than in pnp-transistors
- (d) Bias voltage required in npn is greater than in pnp-transistors

3. Consider the following statements :

To draw a.c. equivalent circuit of a transistor, all

1. d.c. sources are shorted
2. a.c. sources are shorted
3. d.c. sources are opened
4. a.c. sources are connected to d.c. sources

Which of the above statements is/are correct ?

- (a) 2 and 4
- (b) 1 and 2
- (c) 1 only
- (d) 3 and 4

4. Which one of the following statements is *not* correct with regard to power amplifiers ?

- (a) The collector current is large
- (b) They are used as the front end of multi-stage amplifiers
- (c) They are used near the end of the multi-stage amplifiers
- (d) They have a high power rating

$$\left(> \frac{1}{2} W \right)$$

5. Consider the following statements regarding the class-B power amplifiers (Complementary symmetry type) :

1. The efficiency of the amplifier is higher than that of class-A amplifier.
2. The power output is low.
3. Cross over distortion is present.
4. The standby power dissipation is absent.

Which of the above statements are correct ?

- (a) 1, 2 and 3
- (b) 1, 2 and 4
- (c) 1, 3 and 4
- (d) 2, 3 and 4

6. Consider the following :

1. Distortion
2. Gain
3. Bias stabilization
4. Sensitivity
5. Frequency response

Which of these properties of the power amplifier one should concentrate upon while designing a good power amplifier circuit ?

- (a) 1, 2 and 3
- (b) 1, 3 and 5
- (c) 2, 3 and 4
- (d) 4 and 5

7. Consider the following :

1. Coupling capacitor
2. Emitter by-pass capacitor
3. Emitter to base diffusion capacitance of the BJT.
4. Stray capacitance of the circuit.

Which of these components in a R-C coupled amplifier control the lower cut-off frequency of the amplifier ?

- (a) 1 and 2
- (b) 2 and 3
- (c) 3 and 4
- (d) 1 and 4

8. Which one of the following is a regulated power supply ?

- (a) IC 555
- (b) IC 844
- (c) IC 3080
- (d) IC 723

9. Consider the following statements, regarding an OP AMP :

1. All types of negative feedback reduce non-linear distortion.
2. All types of negative feedback reduce the output offset voltage.
3. Non-inverting (current and voltage) feedback increases the input impedance.
4. Inverting (current and voltage) feedback decreases input impedance.

Which of the above statements is/are correct ?

- (a) 1 only
- (b) 2 and 3 only
- (c) 2 and 4 only
- (d) 1, 2, 3 and 4

10. Consider the following statements :

The bias stability of an emitter-bias amplifier circuit improves by

1. decreasing the value of R_B .
2. increasing the value of R_E .
3. decreasing the value of R_E .
4. increasing the value of R_B .
5. increasing the value of R_C .

Which of the above statements are correct ?

- (a) 1 and 2
- (b) 2 and 3
- (c) 3 and 4
- (d) 4 and 5

11. Which of the following will be true for a CE transistor amplifier if the emitter resistor value is made equal to zero ?

1. Its gain will increase.
2. Its stability will increase.
3. Its gain will decrease.
4. Its stability will decrease.

Select the correct answer from the codes given below :

- (a) 1 and 2
- (b) 2 and 3
- (c) 3 and 4
- (d) 1 and 4

12. Which one of the following circuits is used for converting a sine wave into a square wave ?

- (a) Astable multivibration
- (b) Monostable multivibration
- (c) Bistable multivibration
- (d) Schmitt trigger

13. Which of the transistor models is most preferred for the analysis of a transistor circuit both at mid-band and at high frequencies ?

- (a) h-parameter model
- (b) y-parameter model
- (c) s-parameter model
- (d) hybrid- π model

14. Which of the following describe the correct properties of an emitter follower circuit ?

1. It is a voltage series feedback circuit.
2. It is a current series feedback circuit.
3. Its voltage gain is less than unity.
4. Its output impedance is very low.

Select the correct answer from the codes given below :

- (a) 1, 3 and 4
- (b) 2, 3 and 4
- (c) 2 and 3 only
- (d) 2 and 4 only

15. Which one of the following type of negative feedback increases the input resistance and decreases the output resistance of an amplifier ?

- (a) Current series feedback
- (b) Voltage series feedback
- (c) Current shunt feedback
- (d) Voltage shunt feedback

16. Which one of the following oscillators is well suited for the generation of wide range audio-frequency sine waves ?

- (a) RC phase-shift oscillator
- (b) Wien-bridge oscillator
- (c) Col-pitts oscillator
- (d) Hartley oscillator

17. Consider the following statements about a good power supply :

1. The a.c. ripple should be high.
2. S_V , (Voltage stability factor) should be low
3. S_T , (Temperature stability factor) should be low.

Which of the above statements are correct ?

- (a) 1, 2 and 3
- (b) 2 only
- (c) 3 only
- (d) 2 and 3 only

18. Which of the following are the non-linear applications of OP amp ?

1. Current-to-voltage converter
2. Comparator
3. Peak detector
4. Limiter

Select the correct answer from the codes given below :

- (a) 1, 2 and 3
- (b) 2, 3 and 4
- (c) 1, 3 and 4
- (d) 1, 2 and 4

19. Consider a 565 PLL with $R_T = 10 \text{ k}\Omega$ and $C_T = 0.01 \mu\text{F}$. What is the output frequency of the V_{CO} ?

- (a) 10 kHz
- (b) 5 kHz
- (c) 2.5 kHz
- (d) 1.25 kHz

20. Which of the following does not show non-linear V-I characteristics ?

- (a) Schottky diode
- (b) Tunnel diode
- (c) Thermister, at a fixed temperature
- (d) p-n junction diode

21. Which of the following conditions must be satisfied for a transistor to remain under saturation ?

1. Its collector to base junction should be under forward bias.
2. Its collector to base junction should be under reverse bias.
3. Its emitter to base junction should be under reverse bias.
4. Its emitter to base junction should be under forward bias.

Select the correct answer from the codes given below :

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1 and 4

22. Which of the following Boolean algebra rules is correct ?

- (a) $A \cdot \bar{A} = 1$
- (b) $A + AB = A + B$
- (c) $A + \bar{A}B = A + B$
- (d) $A(A + B) = B$

23. What are the ultimate purposes of minimizing logic expressions ?

1. To get a small size expression.
2. To reduce the number of variables in the given expression.
3. To implement the function of the logic expression with least hardware.
4. To reduce the expression for making it feasible for hardware implementation.

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 2 and 3
- (c) 3 only
- (d) 3 and 4

24. Which of the following factors are responsible to design IC logic gates to operate at a fixed supply voltage of 5 volts ?

1. Low heating of IC logic gates.
2. Compatibility with other logic gates.
3. Satisfactory and safe operation.
4. Standardization from IC manufacturing point of view.

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 2 only
- (c) 2 and 3
- (d) 3 and 4

25. Which of the following statements is *not* correct ?

- (a) Propagation delay is the time required for a gate to change its state
- (b) Noise immunity is the amount of noise which can be applied to the input of a gate without causing the gate to change state
- (c) Fan-in of a gate is always equal to fan-out of the same gate
- (d) Operating speed is the maximum frequency at which digital data can be applied to a gate

26. Which junction has least junction capacitance ?

- (a) Alloy
- (b) Grown
- (c) Diffused
- (d) Point contact

27. Which of the following are universal gates ?

- 1. NAND
- 2. NOR
- 3. XOR

Select the correct answer from the codes given below :

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

28. Which of the following output configurations are available in a TTL gate ?

- 1. Open collector output
- 2. Totem-pole output
- 3. Tristate output

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

29. Which one of the following logic families can be operated using a supply voltage from 3 V to 15 V ?

- (a) TTL
- (b) ECL
- (c) PMOS
- (d) CMOS

30. Which of the following circuits come under the class of combinational logic circuits ?

- 1. Full adder
- 2. Full subtractor
- 3. Half adder
- 4. J-K flip-flop
- 5. Counter

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 3 and 4
- (c) 4 and 5
- (d) 1, 2 and 3

31. Consider a multiplexer with X and Y as data inputs and Z as control input. Z = 0 selects input X and Z = 1 selects input Y. What are the connections required to realize the 2-variable Boolean function $f = T + R$, without using any additional hardware ?

- (a) R to X, 1 to Y, T to Z
- (b) T to X, R to Y, T to Z
- (c) T to X, R to Y, 0 to Z
- (d) R to X, 0 to Y, T to Z

32. With which decoder it is possible to obtain many code conversions ?

- (a) 2 line to 4 line
- (b) 3 line to 8 line
- (c) not possible with any decoder
- (d) 4 line to 16 line decoder

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

List I (Application of Circuit)	List II (Circuit Name)
A. Divider	1. Astable multivibrator
B. Clips input voltage at two Predetermined levels	2. Schmitt trigger
C. Square wave generator	3. Bistable multivibrator
D. Narrow current pulse generator	4. Blocking oscillator

Code :

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 2 | 1 | 3 |
| (b) | 3 | 2 | 1 | 4 |
| (c) | 4 | 1 | 2 | 3 |
| (d) | 3 | 1 | 2 | 4 |

34. Consider the following statements :

For a master-slave J-K flip-flop,

1. the toggle frequency is the maximum clock frequency at which the flip-flop will toggle reliably.
2. the data input must precede the clock triggering edge transition time by some minimum time.
3. the data input must remain fixed for a given time after, the clock triggering edge transition time for reliable operation.
4. propagation delay time is equal to the rise time and fall time of the data.

Which of the above statements is/are correct ?

- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 3 and 4 only

35. Consider the following statements :

1. A flip-flop is used to store 1-bit of information.
2. Race-around condition occurs in a J-K flip-flop when both the inputs are 1.
3. Master-slave configuration is used in flip-flops to store 2-bits of information,
4. A transparent latch consists of a D-type flip-flop.

Which of the above statements is/are correct ?

- (a) 1 only
- (b) 1, 3 and 4
- (c) 1, 2 and 4
- (d) 2 and 3 only

36. Which of the following flip-flop is used as a latch ?

- (a) J K flip-flop
- (b) R S flip-flop
- (c) T flip-flop
- (d) D flip-flop

37. Which of the following conditions should be satisfied to call an astable multivibrator circuit using discrete components as a digital circuit ?

- 1. A flip-flop is always a digital circuit.
- 2. Only when we assign 1 and 0 to the high and low levels of the output, a flip-flop is called a digital circuit.
- 3. Only if the power supply voltage is maintained at +5 V or -5 V, it is called a digital circuit.
- 4. Only if it is in IC form, following the technology of IC manufacture, it is called a digital circuit.

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 2 and 3
- (c) 2 only
- (d) 3 and 4

38. Which of the following circuits come under the class of sequential logic circuits ?

- 1. Full adder
- 2. Full subtractor
- 3. Half adder
- 4. J-K flip-flop
- 5. Counter

Select the correct answer from the codes given below :

- (a) 1 and 2
- (b) 2 and 3
- (c) 3 and 4
- (d) 4 and 5

39. Consider the following statements regarding registers and latches :

- 1. Registers are made of edge-triggered FFs, whereas latches are made from level-triggered FFs.
- 2. Registers are temporary storage devices whereas latches are not.
- 3. A latch employs cross-coupled feedback connections.
- 4. A register stores a binary word whereas a latch does not.

Which of the above statements is/are correct ?

- (a) 1 only
- (b) 1 and 3
- (c) 2 and 3
- (d) 3 and 4

40. Which of the following capabilities are available in a Universal Shift Register ?

- 1. Shift left
- 2. Shift right
- 3. Parallel load
- 4. Serial add

Select the correct answer from the codes given below :

- (a) 2 and 4 only
- (b) 1, 2 and 3
- (c) 1, 2 and 4
- (d) 1, 3 and 4

41. Which of the following measurements can be done using a counter ?

1. Pulse duration
2. Interval between two pulses
3. Amplitude of the pulse
4. Rise time of a pulse

Select the correct answer from the codes given below :

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 4
- (d) 2 and 4

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

List I (Type of N-bit ADC)	List II (Characteristics)
A. Flash converter	1. Integrating Type
B. Successive approximation	2. Fastest converter
C. Counter ramp	3. Maximum conversion time = N bits
D. Dual slope	4. Uses a DAC in its feedback path

Code :

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

43. In which one of the following types of analog to digital converters the conversion time is practically independent of the amplitude of the analog signal ?

- (a) The dual slope integrating type
- (b) Successive approximation type
- (c) Counter ramp type
- (d) Tracking type

44. Consider the function $F(s) = \frac{\omega}{s^2 + \omega^2}$ where $F(s)$ is the Laplace transform of $f(t)$. What is the steady-state value of $f(t)$?

- (a) Zero
- (b) One
- (c) Two
- (d) A value between -1 and +1

45. The transfer function of a linear-time-invariant system is given as $\frac{1}{(s+1)}$.

What is the steady-state value of the unit-impulse response ?

- (a) Zero
- (b) One
- (c) Two
- (d) Infinite

46. What is the characteristic of a good control system ?

- (a) Sensitive to parameter variation
- (b) Insensitive to input command
- (c) Neither sensitive to parameter variation nor sensitive to input commands
- (d) Insensitive to parameter variation but sensitive to input commands

47. How can the bandwidth of a control system be increased ?
- By the use of phase lead network
 - By the use of phase lag network
 - By the use of both phase-lag and phase-lead network
 - By the use of cascaded amplifiers in the system
48. Which of the following may result in instability problem ?
- Large error
 - High selectivity
 - High gain
 - Noise
49. A negative-feedback closed-loop system is supplied to an input of 5 V. The system has a forward gain of 1 and a feedback gain of 1. What is the output voltage ?
- 1.0 V
 - 1.5 V
 - 2.0 V
 - 2.5 V
50. For what positive value of K does the polynomial
 $s^4 + 8s^3 + 24s^2 + 32s + K$
 have roots with zero real parts ?
- 10
 - 20
 - 40
 - 80
51. How many roots with positive real parts do the equation $s^3 + s^2 - s + 1 = 0$ have ?
- Zero
 - One
 - Two
 - Three
52. The characteristic equation of a control system is given as
 $s^4 + 8s^3 + 24s^2 + 32s + K = 0$.
 What is the range of values of K for this system to be stable ?
- $0 \leq K < 80$
 - $0 \leq K < 100$
 - $0 \leq K < 300$
 - $0 \leq K < 600$
53. Consider the equation
 $s^2 + 2s + 2 + K(s + 2) = 0$.
 Where do the roots of this equation break on the root loci plot ?
- 3.414
 - 2.414
 - 1.414
 - 0.414
54. How many number of branches the root loci of the equation
 $s(s + 2)(s + 3) + K(s + 1) = 0$
 have ?
- Zero
 - One
 - Two
 - Three

55. The characteristic equation of a control system is given as

$$s^4 + 4s^3 + 4s^2 + 3s + K = 0.$$

What is the value of K for which this system is marginally stable ?

(a) $\frac{9}{16}$

(b) $\frac{19}{16}$

(c) $\frac{29}{16}$

(d) $\frac{39}{16}$

56. Which of the following can be used as a tachogenerator in control systems ?

(a) Microsyn

(b) DC servomotor

(c) AC servomotor

(d) Magnetic amplifier

57. The transfer function of a controller is given as $K_p + K_d \cdot s$ where K_p and K_d are constants. What type of controller is this ?

(a) Proportional

(b) Proportional plus integral

(c) Proportional plus derivative

(d) Integral plus derivative

58. The transfer function of a controller is

given as $K_p + K_d \cdot s + \frac{K_i}{s}$ where K_p , K_d

and K_i are constants. What type of controller is this ?

(a) Proportional

(b) Proportional plus derivative

(c) Proportional plus integral

(d) Proportional plus integral plus derivative

59. In closed loop control system, what is the sensitivity of the gain of the overall system, M to the variation in G ?

(a) $\frac{1}{1 + G(s)H(s)}$

(b) $\frac{1}{1 + G(s)}$

(c) $\frac{G(s)}{1 + G(s)H(s)}$

(d) $\frac{G(s)}{1 + G(s)}$

60. Which of the following statements about the matched filter in a communication receiver are correct ?

1. Its impulse response depends on the signed shape.

2. It maximizes the SNR at the detection instant.

3. It produces ISI.

4. It may produce phase error if synchronization is improper.

Select the correct answer from the codes given below :

(a) 1 and 4 only

(b) 1 and 2 only

(c) 2, 3 and 4

(d) 1, 2 and 4

61. A single mode fibre does not suffer from which type of dispersion ?
- Waveguide dispersion
 - Material dispersion
 - Intermodal dispersion
 - Polarization mode dispersion
62. A balanced modulator is used in the generation of which of the following ?
- DSB-SC signal
 - FM signal
 - PM signal
 - PAM signal
63. An amplitude modulated signal occupies a frequency range from 395 kHz to 405 kHz. It can be demodulated by which of the following ?
- Using an envelope detector and filter
 - Multiplying with a 395 kHz local signal
 - Multiplying with a 405 kHz local signal
 - Low pass filtering with cut off at 400 kHz
64. An audio signal is band limited to 4 kHz. It is sampled at 8 kHz. What will be the spectrum of the sampled signal ?
- 4 kHz to 4 kHz
 - 8 kHz to 8 kHz
 - every $4n$ kHz and repeating
 - every ± 8 kHz and repeating as well as at zero (k integer)
65. A signal occupies a band 5 kHz to 10 kHz. For proper error free reconstruction at what rate it should be sampled ?
- 10 kHz
 - 20 kHz
 - 5 kHz
 - $(10 + 5) \times 2$ kHz
66. The spectral range of a band pass signal extends from 10 MHz to 10.4 MHz. What is the minimum sampling frequency required for reconstruction ?
- 20 MHz
 - 20.8 MHz
 - 20.4 MHz
 - 0.8 MHz
67. An audio signal is to be transmitted digitally. Which is the system best suited for good fidelity ?
- 8 bit PCM
 - 13 bit PCM
 - 32 bit PCM
 - PCM system with non-uniform quantizer
68. For good quality signal transmission all frequency components should have the same transmission delay, t_d and same phase shift- ϕ_s . What can be said about the statement ?
- Correct
 - True for t_d but not for ϕ_s
 - Not true for t_d but true for ϕ_s
 - Both t_d and ϕ_s are not involved in quality

69. Which of the following introduces mode partition noise ?

- (a) Coaxial line
- (b) Wave guide
- (c) Fibre transmission line
- (d) Both coaxial line and wave guide

70. Which of the following does not cause losses in optical fibre cables ?

- (a) Impurities
- (b) Microbending
- (c) Attenuation in glass
- (d) Stepped index operation

71. On which bands, do the optical fibres operate ?

- 1. Ultra violet band
- 2. Ultra high frequency band
- 3. Visible light band
- 4. Infra red band

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 1 and 2 only
- (c) 1, 2 and 3
- (d) 1, 3 and 4

72. Which one of the following photo-detector does not provide gain ?

- (a) Photo-transistor
- (b) Photo conductor
- (c) Avalanche photodiode
- (d) p-i-n photodiode

73. Consider the following statements :

In the case of space wave propagation, the signal strength at the receiver is

- 1. Directly proportional to transmitter and receiver heights.
- 2. Inversely proportional to distance between transmitter and receiver.
- 3. Directly proportional to frequency.

Which of the above statements is/are correct ?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 3 only

74. What was the first commercial geostationary communication satellite ?

- (a) INTELSAT 1
- (b) ECHO
- (c) INSAT-1A
- (d) SPUTNIK

75. What does a link budget for satellite communication include ?

- (a) Total cost of satellite
- (b) Cost of satellite plus launch vehicle
- (c) Signal and noise levels in dB
- (d) Margins of error permitted

76. Which one of the following is a transferred electron device ?

- (a) BARITT diode
- (b) IMPATT diode
- (c) TRAPATT diode
- (d) Gunn diode

77. Consider the transmission line of length 37.5 cm, which is terminated into zero resistance. This line is being excited by a source of 1 GHz which has an internal impedance of 50Ω . What is the input impedance of the line as seen by the source ?

- (a) 50Ω
- (b) Zero Ω
- (c) 100Ω
- (d) Infinite Ω

78. Which of the following is a microwave source with a 'cross-field' structure ?

- (a) Double cavity klystron
- (b) Reflex klystron
- (c) Magnetron
- (d) Travelling wave tube

79. Which of the following devices has the 'negative resistance' characteristic ?

- (a) Reflex klystron
- (b) Gunn diode
- (c) P-N-P transistor
- (d) Magnetron

80. Which of the following devices is a 'hot-electron' diode ?

- (a) Thermionic tube diode
- (b) Schottky-Barrier diode
- (c) Thomson-Deletion diode
- (d) Thermal electron diode

81. Which of the following uses 'transferred electron effect' for production of microwaves ?

- (a) Silicon
- (b) Germanium
- (c) Metal-semiconductor Junction
- (d) Gallium Arsenide

82. Which of the following is a microwave power amplifier ?

- (a) Gunn diode
- (b) Reflex klystron
- (c) Magnetron
- (d) Travelling wave tube

83. Consider the following statements :

The Klystron and travelling wave tube differ from each other,

1. In TWT the microwave circuit is non resonant.
2. In Klystron the microwave circuit is resonant.
3. TWT uses attenuator.
4. The wave in TWT is a non-propagating wave.

Which of the above statements are correct ?

- (a) 1 and 2 only
- (b) 3 and 4 only
- (c) 1, 2 and 3
- (d) 2, 3 and 4

84. Which device can detect the presence of both forward and backward waves in a waveguide ?

- (a) Filter
- (b) Detector
- (c) Directional coupler
- (d) Magic T

85. Which of the following modes can exist in a rectangular wave guide ?

- (a) TM_{10}
- (b) TE_{10}
- (c) TM_{00}
- (d) TM_{01}

86. Which of the following does not apply to Yagi-Uda antenna

- (a) High gain
- (b) Reasonably good bandwidth
- (c) Folded dipole
- (d) Parasitic elements

87. Which of the following antenna is obtained by modifying a wave guide ?

- (a) Microstrip Antenna
- (b) Helical Antenna
- (c) Horn Antenna
- (d) Dipole Antenna

88. Which of the following is a circularly polarized antenna ?

- (a) Horn
- (b) Dipole
- (c) Helical
- (d) Pyramidal

89. Which of the following antennas uses a number of varying length parallel elements ?

- (a) Helical antenna
- (b) Pyramidal Horn
- (c) Corner reflection antenna
- (d) Yagi-Uda antenna

90. The following components are used to measure power output of a 2 kW TWT amplifier :

1. TWTA
2. Low pass / high pass filter
3. 20 dB attenuator
4. 40 dB directional coupler with matched load
5. Power meter

What is the correct sequence of connection of these components ?

- (a) 2 - 4 - 1 - 3 - 5
- (b) 1 - 3 - 4 - 2 - 5
- (c) 1 - 2 - 4 - 3 - 5
- (d) 2 - 4 - 1 - 5 - 3

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

List I
(Microwave
Measuring
Instruments)

List II.
(Measurements
effected)

- | | |
|----------------------|----------------------------|
| A. Bolometer | 1. Reflection coefficients |
| B. VSWR meter | 2. Half power beam widths |
| C. Cavity wave meter | 3. Microwave power |
| D. Pattern recorder | 4. Microwave frequency |

Code :

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 1 | 4 | 3 |
| (b) | 3 | 1 | 4 | 2 |
| (c) | 2 | 4 | 1 | 3 |
| (d) | 3 | 4 | 1 | 2 |

92. Which one of the following statements is correct ?

- AGC in radio receivers will keep the total signal output fairly constant but the noise component will be reduced; with the result the $\frac{S}{N}$ ratio will improve
- AGC in radio receivers is a linear operation w.r.t. both signals and noise
- Sudden changes in the output while tuning, which may cause damage to the components, is an unavoidable feature of AGC
- AGC operation is independent of the filter components used in AGC circuit

93. Consider the following statements :

- Taking 2's complement is equivalent to sign change.
- In the 2's complement representation the most significant bit (MSB) is zero for a positive number.
- In a 4 bit binary representation of a binary number A, A + 1's complement of A = 2^4 .

Which of the above statements are correct ?

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

94. Consider the following statements :

- Strictly speaking C supports 1-dimensional arrays only.
- An array element may be an array by itself.
- Array elements need not occupy contiguous memory locations.

Which of the above statements is/are correct ?

- 1 only
- 2 only
- 1 and 2
- 2 and 3

95. What can be the maximum dimension of an array in C language program ?

- (a) 3
- (b) 4
- (c) 5
- (d) It is compiler dependent

96. With reference to C programming language, which of the following statements are correct ?

1. An identifier may start with an underscore.
2. An identifier may end with an underscore.
3. IF is a valid identifier.
4. The number of significant characters in an identifier is implementation dependent.

Select the correct answer from the codes given below :

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1, 2, 3 and 4
- (d) 3 and 4 only

97. How many distinct binary trees can be constructed with three nodes ?

- (a) 1
- (b) 2
- (c) 3
- (d) 5

98. Consider the following statements :

1. Internal sorting is used if the number of items to be sorted is very large.
2. External sorting is used if the number of items to be sorted is very large.
3. External sorting needs auxiliary storage.
4. Internal sorting needs auxiliary storage.

Which of the above statements are correct ?

- (a) 1 and 2
- (b) 2 and 3
- (c) 3 and 4
- (d) 2 and 4

99. Which of the following has a major role in implementation of function calls in C ?

- (a) Processor's registers
- (b) Data segment
- (c) The heap
- (d) System stack

100. Which one of the following algorithms design techniques is used in quick sort algorithm ?

- (a) Dynamic programming
- (b) Backtracking
- (c) Divide and conquer
- (d) Greedy

101. There are four different algorithms A1, A2, A3 and A4 to solve a given problem with the complexity order $\log(n)$, $\log(\log(n))$, $n \log(n)$ and $n/\log(n)$ respectively. Which is the best algorithm ?

- (a) A1
- (b) A2
- (c) A3
- (d) A4

102. Which of the following is/are correct statement(s) ?

- 1. Bus is a group of wires carrying information.
- 2. Bus is needed to achieve reasonable speed of operation.
- 3. Bus can carry data or address.
- 4. A bus can be shared by more than one device.

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 1 and 2 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

103. Which of the following are included in the architecture of a computer ?

- 1. Addressing modes, CPU
- 2. Instruction set, data formats
- 3. Secondary memory, operating system

Select the correct answer from the codes given below :

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 3 only

104. A 3×8 decoder with two enable inputs is to be used to address 8 blocks of memory. What will be the size of each memory block when addressed from a sixteen bit bus with two MSBs used to enable the decoder ?

- (a) 2 K
- (b) 4 K
- (c) 16 K
- (d) 64 K

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

List I
(Type of
Memory)

List II
(Used As)

- | | |
|---------------------------------|------------------|
| A. DRAM | 1. Cache memory |
| B. SRAM | 2. Main memory |
| C. Parallel Access
Registers | 3. BIOS memory |
| D. ROM | 4. CPU registers |

Code :

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 1 | 4 | 2 | 3 |
| (b) | 3 | 4 | 2 | 1 |
| (c) | 1 | 2 | 4 | 3 |
| (d) | 3 | 2 | 4 | 1 |

106. Which of the following are the memory performance parameters ?

1. Access time and latency
2. Block size and Block access time
3. Cycle time and Bandwidth

Select the correct answer from the codes given below :

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

107. What is the address space of 8086 CPU ?

- (a) One Megabyte
- (b) 256 Kilobyte
- (c) 1 K Megabytes
- (d) 64 Kilobytes

108. Which of the following counters can be used to divide the clock frequency of a microprocessor by 5 ?

- (a) 3 bit counter
- (b) 5 bit counter
- (c) mod 3 counter
- (d) mod 5 counter

109. Identification of highest priority interrupt can be achieved in a minimum time by which of the following schemes ?

- (a) Hardwired polling
- (b) Priority encoder circuit
- (c) Software polling
- (d) Subdivision of interrupt register into a number of sub-registers which are checked parallelly

110. Which one of the following is used as the interface chip for data transmission between 8086 and a 16-bit ADC ?

- (a) 8259
- (b) 8255
- (c) 8253
- (d) 8251

111. Which one of the following addressing modes is used in the instruction PUSH B ?

- (a) Direct
- (b) Register
- (c) Register indirect
- (d) Immediate

112. What is the purpose of a start bit in RS232 serial communication protocol ?

- (a) To synchronise receiver for receiving every byte
- (b) To synchronise receiver for receiving a sequence of byte
- (c) Acts as a parity bit
- (d) To synchronise receiver for receiving the last byte

113. The resolution of a DAC depends on which of the following ?

- (a) The number of bits
- (b) Monotonicity
- (c) Reference voltage
- (d) The values of resistance

114. What is the purpose of DMA facility in microprocessor based systems ?

- (a) To increase the speed of data transfer between the μP and the I/O devices
- (b) To increase the speed of data transfer between the μP and the memory
- (c) To increase the speed of data transfer between the memory and the I/O devices
- (d) To improve the reliability of the system

115. Personal computer cannot be used for which one of the following ?

- (a) Game playing
- (b) Weather forecasting
- (c) Office Automation
- (d) Home computing

Directions :

Each of the next Five (5) items consists of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answers to these items using the codes given below :

Codes :

- (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

116. Assertion (A) : A fixed bias BJT circuit exhibits better performance as compared to a self bias BJT circuit.

Reason (R) : A fixed bias BJT circuit uses less components as compared to a self bias BJT circuit.

117. Assertion (A) : The small signal analysis of a transistor amplifier is done to obtain the current gain, voltage gain and the conversion efficiency of an amplifier.

Reason (R) : The small signal analysis of a transistor amplifier uses the small signal parameters of the transistor.

118. Assertion (A) : A rectifier with inductor filter is more efficient for high load current.

Reason (R) : In rectifier with inductor filter we can use a larger choke to reduce ripple, larger choke will have higher dc resistance which will result in lower dc output voltage for higher load current.

119. Assertion (A) : It is not desirable to drive a transistor into hard saturation in high speed switching circuits.

Reason (R) : It may not be possible to bring it back to cut off state, if it is driven into hard saturation.

120. Assertion (A) : When all inputs of a NAND-gate are shorted to get a one input, one output gate, it becomes an inverter.

Reason (R) : When all inputs of a NAND-gate are at logic '0' level, the output is at logic '1' level.

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK