09/26

Question Booklet Alpha Code

A

Question Booklet Sl. No.

A

Total Number of Questions : 100 **Time : 90 Minutes**

Maximum Marks : 100

INSTRUCTIONS TO CANDIDATES

1. The Question Paper will be given in the form of a Question Booklet. There will be four versions of Question Booklets with Question Booklet Alpha Code viz. **A, B, C** & **D**.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the Question Booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a Question Booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same alpha code.
6. The Question Booklet will be sealed at the middle of the right margin. Candidate should not open the Question Booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him/her contains all the 100 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the Question Booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices **(A), (B), (C)** and **(D)** having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

A

1. Which among the following semiconductor materials exhibits the highest breakdown voltage in a PN junction diode for similar doping levels ?
   A) GaAs B) Ge C) Si D) GaN

2. The dynamic resistance of a forward-biased PN diode increases with
   A) Increasing the forward bias voltage B) Decreasing the DC bias current
   C) Increasing the doping concentration D) Reducing the temperature

3. Zener and Avalanche breakdown phenomena display opposite temperature coefficients because
   A) Zener breakdown has a negative temperature coefficient, while Avalanche breakdown has a positive temperature coefficient
   B) Zener breakdown has a positive temperature coefficient, while Avalanche breakdown has a negative temperature coefficient
   C) Both have positive temperature coefficients
   D) Both have negative temperature coefficients

4. For semiconductor diodes, the barrier potential decreases by approximately
   A) 2 mV for each °C rise in temperature
   B) 2 mV for each °C drop in temperature
   C) 0.7 mV for each °C rise in temperature
   D) 2 V for each °C rise in temperature

5. The average value of a half wave rectifier is
   A) $2\ Vm/\pi$ B) Vm/π C) $Vm/2$ D) $Vm/\sqrt{2}$

6. The switching time of an opto coupler decreases with
   A) Increase in collector current of the phototransistor
   B) Decrease in collector current of the phototransistor
   C) Increase in LED forward current
   D) Increase in temperature

7. Which parameter in a solar cell ensures the maximum number of photons of light energy reach the p-n junction ?
   A) High series resistance
   B) Anti Reflective Coating (ARC) and surface texturing
   C) Thick glass cover
   D) High doping concentration

8. Which material is most commonly used in Light Dependent Resistors (LDRs) due to its high photosensitivity in the visible spectrum ?
   A) Cadmium Sulphide (CdS)
   B) Silicon (Si)
   C) Germanium (Ge)
   D) Gallium Arsenide (GaAs)

9. Poor voltage regulation in voltage doublers can be improved with
   A) Increasing input frequency
   B) Using smaller capacitors
   C) Reducing diode forward voltage
   D) Using large value capacitors

10. The output current in a phototransistor depends on
   A) Temperature
   B) Reverse saturation current
   C) Light intensity
   D) Collector-emitter voltage

11. In a transistor amplifier circuit negative feedback _____ amplifier bandwidth.
   A) Decreases B) Increases C) Narrow D) No change

12. Fixed biasing circuit R_B = 330 K ohm. R_c = 15.5 K ohm, V_{cc} = 12 V and I_c = 3 mA. Determine V_{ce}.
   A) 7.5 V B) 11.3 V C) 8 V D) 10.1 V

13. In transistor configuration how β of a transistor is related to its α ?
   A) $\beta = \alpha / \alpha + 1$
   B) $\beta = \alpha / 1 - \alpha$
   C) $\alpha = \beta / 1 - \beta$
   D) $\alpha = \beta / \beta - 1$

14. An RC coupled amplifier has a voltage gain of 100 in the frequency range of 500 – 20 KHz. Calculate gain in dB.
   A) 10 B) 100 C) 40 D) 80

15. Field Effect Transistor (FET) is a _____ device.
   A) Voltage Control
   B) Current Control
   C) Voltage and Current Control
   D) None of the above

16. Which of the following oscillator provides high accuracy of oscillation ?
   A) Wein Bridge Oscillator
   B) Colpits Oscillator
   C) Hartley Oscillator
   D) Crystal Oscillator

17. Change in Gate to Source voltage of FET is 1 Volt and Change in Drain current is 1.5 mA. Determine the magnitude of transconductance.

A) 1.5 mS B) 0.5 mS C) 2 mS D) 2.5 mS

18. MOSFET's have an important property that they can be used as

A) A Resistor B) A Capacitor
C) An Amplifier D) All of the above

19. When emitter terminal of a Unijunction Transistor (UJT) is open the resistance of the base terminal is

A) Very low B) Very high
C) Low D) Moderate

20. VI Characteristics of a Unijunction Transistor (UJT), the region between the peak point and valley point is called

A) Saturation Region B) Cut-off Region
C) Negative Resistance Region D) Peak Point Voltage

21. Slew rate limits the op-amp's performance at

A) DC B) Low frequency
C) High frequency D) Zero

22. A Schmidt trigger circuit using an op-amp is mainly used for

A) Amplifying analog signals
B) Converting analog signals to digital pulses
C) Frequency multiplication
D) Phase shifting

23. In the functional block diagram of 555 timer, the discharge transistor is

A) PNP transistor connected to V_{cc}
B) NPN transistor connected to ground
C) FET connected to threshold pin
D) PNP connected to control pin

24. In an op-amp differentiator circuit, the input element is

A) Diode B) Transistor
C) Capacitor D) Inductor

25. LM317 has how many pins ?
    A) 2 B) 3 C) 4 D) 8

26. The reference voltage (V_{ref}) in a DAC is used to
    A) Set the output voltage range B) Stabilize the input
    C) Reduce power D) Control clock frequency

27. The output impedance of an ideal R – 2R ladder DAC is
    A) R B) 2R C) R/2 D) Infinite

28. The accuracy of ramp-type ADC mainly depends on
    A) Clock frequency and ramp linearity B) Comparator gain
    C) Input resistance D) Counter type

29. A higher number of bits in an ADC gives
    A) Lower resolution B) Higher resolution
    C) Slower conversion D) Lower accuracy

30. The conversion time of a successive approximation ADC depends on
    A) Input voltage magnitude B) Step size
    C) Number of bits and clock frequency D) None of these

31. Which impedance is defined as the impedance seen looking into the network with the other end terminated by the same impedance ?
    A) Iterative impedance B) Characteristic impedance
    C) Input impedance D) Output impedance

32. For symmetrical T networks, the characteristic impedance is
    A) Arithmetic mean of open and short circuit impedances
    B) Geometric mean of open and short circuit impedances
    C) Sum of all impedances
    D) Difference of all impedances

33. Which of the following affects the characteristic impedance Z_0 of a lossless transmission line ?
    A) Only resistance R B) Only inductance L and capacitance C
    C) Conductance G only D) Frequency only

34. A constant resistance equalizer typically results in
    A) Variable input impedance
    B) Constant input impedance over frequency range
    C) Variable power loss
    D) No frequency shaping

35. Which parameter is critical for designing attenuator resistor values in T and Pi networks ?
    A) Voltage swing
    B) Frequency of operation
    C) Characteristic impedance and attenuation level
    D) Temperature coefficient

36. What is the benefit of a Pi-pad attenuator over a T-pad attenuator ?
    A) Uses fewer components
    B) Better impedance matching at high frequencies
    C) Simpler design
    D) Higher power amplification

37. A filter designed to eliminate frequencies in a specific range while allowing others to pass is called
    A) Band-pass filter
    B) Band-stop filter
    C) Low-pass filter
    D) High-pass filter

38. Standing waves occur on a transmission line due to
    A) Perfectly matched load
    B) Reflections caused by load mismatch
    C) High voltage at the source
    D) Infinite line length

39. If SWR is greater than 1, it indicates
    A) No reflected wave
    B) Presence of reflected wave leading to standing waves
    C) Power supply failure
    D) Perfect transmission line operation

40. Which waveguide type typically supports guided light waves at optical frequencies ?
    A) Rectangular waveguide
    B) Circular waveguide
    C) Dielectric waveguide
    D) Coaxial cable

41. Which of the following microphone works using the principle of capacitance variation with sound ?

A) Carbon Microphone
B) Moving Coil Microphone
C) Ribbon Microphone
D) Condenser Microphone

42. The diaphragm of a moving coil microphone converts

A) Electrical energy into sound energy
B) Sound pressure into mechanical movement
C) Sound pressure into magnetic flux
D) Light energy into electrical signal

43. Which of the following is true about the diaphragm in a dynamic cone type loudspeaker ?

I. Made of paper, plastic or light metal.
II. Converts the motion of the voice coil into sound waves by vibrating air.
III. The narrow end (apex) of the cone is attached to the speaker frame.

A) I and II
B) I, II and III
C) II and III
D) I and III

44. Which of the following statements are true ?

I. Diaphragm of woofer is larger than midrange.
II. Powerful bass sounds are produced by tweeter.
III. The crossover network divides the signal into three frequency bands.

A) I and II
B) I, II and III
C) II and III
D) I and III

45. Which of the following statements are true ?

I. Rotation speed of a CD changes because it uses Constant Linear Velocity.
II. A CD uses a blue laser with wavelength of 700 nm.
III. CDs store digital data as tiny indentations (pits) and flat areas (lands) on the disc surface.
IV. The laser used in a DVD player has a wavelength of about 650 nm.

A) I and III only
B) I, II and IV only
C) II and IV only
D) All of the above

46. What is the gain of antenna with directivity of 10 and efficiency of 0.8 ?

A) 8
B) 12.5
C) 10
D) 0.8

47. Which of the following antenna that gives unidirectional radiation pattern ?
    A) End-fire array antenna
    B) Broadside array antenna
    C) Isotropic antenna
    D) Loop antenna

48. Which of the following statements are false about a Yagi-Uda antenna used as receiver ?
    I. Driven element is used to receive feed power.
    II. Director have a length equal to $\lambda/2$.
    III. The parasitic elements in a Yagi-Uda antenna are directly connected to the transmission line.
    A) I and II
    B) II and III
    C) I and III
    D) All of the above

49. What is skip distance in ionospheric propagation ?
    A) Maximum possible range of sky wave
    B) Minimum distance from transmitter where sky wave is received
    C) Distance between two ionospheric layers
    D) Distance of ground reflection

50. What is the MUF if the critical frequency of the F2 layer is 5 MHz and the angle of incidence is 60° ?
    A) 2.5 MHz
    B) 5 MHz
    C) 7.5 MHz
    D) 10 MHz

51. Maximum transmission efficiency of amplitude modulation is
    A) 33.33%
    B) 67.88%
    C) 73%
    D) 54.03%

52. The disadvantages of using balanced slope detector for demodulation of FM signal
    A) The detector operates only for small deviation in frequency
    B) Low pass filter of the detector produces distortion in the detection
    C) Both A) and B)
    D) None of the above

53. AM broadcast station transmits modulating frequency of 6 KHz. If carrier frequency is 820 KHz then frequency components in AM waves are
    A) 820 KHz only
    B) 6 KHz, 820 KHz, 826 KHz
    C) 820 KHz, 826 KHz, 814 KHz
    D) 826 KHz, 814 KHz

54. The intermediate frequency of a superheterodyne receiver is 455 KHz. If it is tuned to 1500 KHz the image frequency will be

A) 910 KHz B) 2410 KHz C) 1955 KHz D) 1045 KHz

55. The function of Compander in Communication system

A) Equalize SNR for both weak and strong signals

B) Increase amplification of the signal

C) Improve multiplexing

D) Improve A/D conversion

56. A single tone 5 KHz message signal is sampled with 9 KHz, 7 KHz and 12 KHz. Aliasing effect will be seen in the reconstructed signal when signal is sampled at

A) 7 KHz only B) 7 KHz and 9 KHz

C) 12 KHz only D) 7 KHz and 12 KHz

57. Indirect method of FM generation

i. Does not require the carrier oscillator to respond directly to the modulating signal.

ii. Use frequency multiplication.

iii. Generate stable FM signal.

iv. It involves a crystal oscillator, a phase modulator and frequency multiplier.

A) Only i B) Only i and ii

C) Only i, ii and iii D) All of the above (i, ii, iii and iv)

58. The disadvantages of frequency modulation over amplitude modulation are

A) Prone to selective fading

B) Capture effect

C) Poorer signal to noise ratio at high frequencies

D) All of the above

59. A PAM signal can be detected using

A) High pass filter B) Low pass filter

C) Band pass filter D) All pass filter

60. In Pulse Code Modulation if the number of quantization level is increased from 16 to 256 then the bandwidth requirement will approximately be

A) 2 times B) 4 times C) 3 times D) 16 times

61. Which modulation scheme is used in transmitting sound in the monochrome television transmission method ?
A) AM B) FM C) PM D) QAM

62. In a television transmission, which bandwidth-saving method is used in video modulation ?
A) SSB B) VSB C) DSBSC D) DSBFC

63. Colour-killer, kills the colour when
A) Colour burst signal is present B) Colour burst signal is absent
C) Colour is excessive D) Monochrome receiver is used

64. Which stages of the colour TV receiver controls contrast and brightness ?
A) Video detector B) Comb filter
C) Colour killer circuit D) Luminance amplifier

65. Sound intermediate frequency in monochrome TV receivers in India is
A) 38.9 MHz B) 38.9 KHz C) 33.4 MHz D) 33.4 KHz

66. Blind speed problem in radar is avoided using
A) Use of mono pulse B) Increase the gain
C) Vary the pulse repetition frequency D) Change the doppler frequency

67. If the peak power of the radar is increased 16 times and other parameters are constant, the range of the radar is
A) Increased by 2 times B) Increased by 4 times
C) Increased by 8 times D) Increased by 16 times

68. Plan Position Indicator (PPI) displays
A) Amplitude of received echoes B) Map of the target area
C) The target range, but not position D) The target position, but not range

69. Dispersion is
A) Bending of light as it passes through an opening in an obstacle
B) Light strikes a surface and is converted into heat
C) Separating light into each of its component frequencies
D) Light strike a substance which in turn emits light of its own at the same wavelength as the incident light

70. Which optical detector provides internal amplification using impact ionisation ?
    A) Photo transistor
    B) PIN diode
    C) Avalanche photo diode
    D) Photo detector

71. In an ISDN Basic Rate Interface (BRI), signalling information between the user and network is managed through
    A) B-channel
    B) D-channel
    C) Both B-channels alternately
    D) External control line

72. The “Index of Cooperation (IOC)” in facsimile transmission relates to
    A) Ratio between scanning line density and recording width
    B) Synchronization between sender and receiver
    C) Image contrast enhancement
    D) Signal-to-noise ratio during recording

73. Which recording method in a facsimile receiver gives high-quality reproduction and is often used in commercial fax machines ?
    A) Thermal recording
    B) Direct current recording
    C) Photographic recording
    D) Magnetic recording

74. A system transmits at a bit rate of 4 Mbps using raised cosine filtering with a roll-off factor of 0.25. The required minimum transmission bandwidth is approximately
    A) 2 MHz B) 2.5 MHz C) 3 MHz D) 4 MHz

75. If the number of symbols transmitted per second in a digital communication system is increased while each symbol still represents the same number of bits, then
    A) Bit rate remains constant but baud rate increases
    B) Both bit rate and baud rate increases
    C) Bit rate decreases but baud rate increases
    D) Bit rate increases but baud rate remains constant

76. For the Assertion (A) and Reason (R) given below, choose the correct alternative from the following :
    Assertion (A) : Equalizers are used in digital systems to reduce Inter-Symbol Interference (ISI).
    Reason (R) : Equalizers modify the frequency response of the channel.
    A) Both (A) and (R) are true and (R) correctly explains (A)
    B) Both (A) and (R) are true, but (R) does not explain (A)
    C) (A) is true, (R) is false
    D) Both (A) and (R) are false

77. Match the following digital codes with their descriptions :

Column A	Column B
a. Baudot code	1. Text 7-bit code
b. ASCII	2. Error correction code
c. EBCDIC	3. Teleprinter 5-bit code
d. Hamming code	4. IBM 8-bit code

Code :

A) a – 3, b – 1, c – 4, d – 2 B) a – 1, b – 4, c – 3, d – 2

C) a – 4, b – 1, c – 3, d – 2 D) a – 3, b – 2, c – 1, d – 4

78. The minimum hamming distance required to correct two errors and detect three is

A) 3 B) 4 C) 5 D) 6

79. In an ASK demodulator, the envelope detector primarily

A) Recovers the carrier phase for synchronization

B) Converts amplitude fluctuations into corresponding baseband signal

C) Maintains constant envelope for improved SNR

D) Reduces amplitude distortion caused by channel noise

80. Which of the following correctly describes a synchronous modem ?

A) Requires separate clock line B) Transfers data in asynchronous blocks

C) Does not use start/stop bits D) Both A) and C)

81. Geostationary satellites are located approximately

A) 3600 kilometers above the earth B) 36000 kilometers above the earth

C) 600 kilometers above the earth D) 400 kilometers above the earth

82. Kepler's third law states that

A) The orbit of a planet is an ellipse with the sun at one of the two focii

B) A line segment joining a planet and the sun sweeps out equal areas during equal intervals of time

C) The cube of a planet's orbital period is proportional to the square of the length of the semi major axis of its orbit

D) The square of a planet's orbital period is proportional to the cube of the length of the semi major axis of its orbit

83. The orbit which is below 1000 kilometer distance from the sea level is called

A) Medium Earth Orbit (MEO) B) High Earth Orbit (HEO)

C) Low Earth Orbit (LEO) D) Geosynchronous Earth Orbit (GEO)

84. Closest distance of the satellite orbit to earth is
A) Perigee B) Apogee C) Skip distance D) Focal length

85. Active satellites have
A) Power source B) Transponders
C) Signal Processing Unit D) All of the above

86. The sub system in satellite communication responsible for collecting data from on-board sensors to monitor the health and performance of a satellite is
A) Tracking sub system B) Command sub system
C) Telemetry sub system D) Earth station

87. INTELSAT stands for
A) International Telecommunication Satellite
B) Indian Telecommunication Satellite
C) Inter Telecommunication Satellite
D) None of the above

88. Geographical representation of satellite antenna radiation pattern is called
A) Spot B) Foot print C) Beam D) Region

89. Which of the following is a satellite earth station antenna ?
A) Helical antenna B) Toroidal antenna
C) Yagi-Uda antenna D) Cassagrain antenna

90. The unit which detects the satellite signal relayed from the feed and converts it to an electric current, amplifies and lower its frequency is
A) Satellite receiver B) LNA
C) Horn Antenna D) Dish

91. A simplified cellular telephone system primarily aims to
A) Increase base station size B) Enable frequency reuse across cells
C) Eliminate all interference D) Use only wired connections

92. CDMA allows multiple users on the same frequency using
A) Unique codes B) Time slots
C) Sectors D) Guard bands

93. Roaming in cellular systems allows
    A) Fixed location calls only
    B) Users to move between different networks
    C) No handoff
    D) Satellite-only access

94. Improving coverage and capacity in cellular systems includes techniques like
    A) Reducing frequency reuse
    B) Increasing tower height
    C) Cell splitting and sectoring
    D) Eliminating handoff

95. In GSM, radio subsystem uses
    A) Quadrature Phase Shift Keying (QPSK)
    B) Amplitude Shift Keying (ASK)
    C) CDMA
    D) Gaussian Minimum Shift Keying (GMSK)

96. For a cellular system with cluster size N = 7, if the total available channels are 395 and each cell is allocated the same number of channels, how many channels are available per cell ?
    A) 50 B) 56 C) 65 D) 70

97. The full form of GSM in the cellular service is
    A) Global System for Mobile Communications
    B) General Mobile System
    C) Global Mobile Satellite
    D) None of the above

98. In a hexagonal cellular system with a frequency reuse cluster size of 7, what is the co-channel reuse ratio (Q) ?
    A) 3.65 B) 4.0 C) 4.58 D) 5.34

99. Which interference type is mitigated by proper channel assignment ?
    A) Co-Channel Interference
    B) Adjacent Channel Interference
    C) Both A) and B)
    D) Neither A) nor B)

100. FDMA stands for
    A) Frequency Division Multiple Access
    B) Frequency Domain Multiple Access
    C) Full Division Multiple Access
    D) Fixed Division Multiple Access

Space for Rough Work