**Roll. No. .....**

**O.M.R. Serial No.** | | | | | | | | |

**Question Booklet Number**

# B.Sc. (SEM.-VI) (NEP) (SUPPLE.)EXAMINATION, 2024-25

# ELECTRONICS

## ( Communications Electronics )

| Paper Code | | | | | | | |
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| B | 1 | 4 | 0 | 6 | 0 | 1 | T |

**Question Booklet Series**

**A**

**Time : 1 : 30 Hours** **Max. Marks : 75**

**Instructions to the Examinee :**

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.
4. Four alternative answers are mentioned for each question as - A, B, C & D in the booklet. The candidate has to choose the correct / answer and mark the same in the OMR Answer-Sheet as per the direction :

***(Remaining instructions on last page)***

**परीक्षार्थियों के लिए निर्देश :**

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, उसे तुरन्त बदल लें।
4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

*(शेष निर्देश अन्तिम पृष्ठ पर)*

1. In amplitude modulation, the modulation index is defined as :
   (A) Ratio of carrier amplitude to message amplitude
   (B) Ratio of message amplitude to carrier amplitude
   (C) Product of carrier and message amplitude
   (D) Ratio of sideband power to carrier power
2. The bandwidth required for standard AM is :
   (A) Equal to the carrier frequency
   (B) Twice the message bandwidth
   (C) Half the message bandwidth
   (D) Four times the carrier frequency
3. In DSB-SC modulation, the carrier is :
   (A) Transmitted with full power
   (B) Completely suppressed
   (C) Partially suppressed
   (D) Used only for demodulation
4. The main advantage of DSB-SC over AM is :
   (A) Lower bandwidth requirement
   (B) Higher efficiency
   (C) Better noise immunity
   (D) Simpler demodulation
5. In SSB-SC modulation, the transmitted spectrum contains :
   (A) Carrier only
   (B) Upper sideband and carrier
   (C) Lower sideband and carrier
   (D) Only one sideband
6. The bandwidth required for SSB-SC is :
   (A) Equal to message bandwidth
   (B) Twice the message bandwidth
   (C) Half the carrier frequency
   (D) Four times message bandwidth
7. For AM with 100% modulation, the total power is :
   (A) Pc
   (B) 1.5 Pc
   (C) 2 Pc
   (D) 0.5 Pc
8. The efficiency of standard AM with 100% modulation is approximately :
   (A) 33%
   (B) 50%
   (C) 75%
   (D) 100%
9. In DSB-SC, the total transmitted power is :
   (A) Pc
   (B) Proportional to message signal power
   (C) Twice the carrier power
   (D) Zero

10. The method of demodulation used for AM is generally:
    (A) Product detector
    (B) Synchronous detector
    (C) Envelope detector
    (D) Phase discriminator
11. To demodulate DSB-SC signals, one needs:
    (A) Envelope detector
    (B) Synchronous demodulator
    (C) Tuned circuit
    (D) RC circuit
12. The major drawback of synchronous demodulation in DSB-SC is :
    (A) Carrier synchronization requirement
    (B) High noise
    (C) Bandwidth inefficiency
    (D) Phase distortion
13. In SSB demodulation, which method is commonly used ?
    (A) Product demodulator with carrier reinsertion
    (B) Envelope detector
    (C) Limiter detector
    (D) Ratio detector
14. The Power saving in SSB-SC compared to AM is :
    (A) 25%
    (B) 50%
    (C) 66%
    (D) More than 80%
15. The Aiken method is used for :
    (A) Generating AM
    (B) Generating SSB-SC
    (C) Power amplification
    (D) Frequency multiplication
16. The balanced modulator is used to generate :
    (A) Standard AM
    (B) DSB-SC
    (C) SSB-SC directly
    (D) Carrier signal
17. The phase-shift method is commonly used for generation of :
    (A) AM
    (B) DSB-SC
    (C) SSB-SC
    (D) FM
18. The filter method of generating SSB requires:
    (A) Low-pass filter
    (B) Band-pass filter
    (C) High-pass filter
    (D) Notch filter
19. Carrier leakage in DSB-SC occurs due to:
    (A) Imperfect balancing
    (B) Overmodulation
    (C) Bandwidth limitation
    (D) Phase distortion

20. The advantage of VSB (vestigial sideband) modulation over SSB is:
(A) No carrier requirement
(B) Lower bandwidth
(C) Easier filtering
(D) Higher power efficiency

21. The modulation index in AM is kept below 1 to :
(A) Save power
(B) Avoid distortion
(C) Increase efficiency
(D) Improve SNR

22. For 100% modulation in AM, the sideband power is :
(A) 50% of carrier power
(B) 100% of carrier power
(C) 25% of carrier power
(D) Equal to total power

23. In envelope detection, distortion occurs when :
(A) Modulation index > 1
(B) Modulation index < 0.5
(C) Carrier frequency is high
(D) Bandwidth is reduced

24. In frequency modulation, the parameter that varies in accordance with the message signal is :
(A) Amplitude of carrier
(B) Frequency of carrier
(C) Phase of carrier
(D) Power of carrier

25. The modulation index of FM is defined as :
(A) Ratio of frequency deviation to message frequency
(B) Ratio of message frequency to carrier frequency
(C) Ratio of message amplitude to carrier amplitude
(D) Product of deviation and carrier frequency

26. The instantaneous frequency in FM is equal to :
(A) Carrier frequency only.
(B) Carrier frequency + frequency deviation
(C) Message frequency only
(D) Carrier amplitude × message amplitude

27. The Carson's rule gives the bandwidth of FM as :
(A) $2\Delta f$
(B) 2fm
(C) $2(\Delta f + fm)$
(D) $\Delta f/fm$

28. Narrowband FM is defined when the modulation index is :
(A) Much greater than 1
(B) Equal to 1
(C) Much less than 1
(D) Zero

29. Wideband FM is defined when the modulation index is:
(A) Less than 0.5
(B) Equal to 1
(C) Much greater than 1
(D) Equal to 0

30. The typical bandwidth of NBFM is approximately :
(A) Twice the message bandwidth
(B) Equal to the message bandwidth
(C) Twice the carrier frequency
(D) Equal to frequency deviation

31. In NBFM, the spectrum contains :
(A) Infinite sidebands
(B) Carrier and two significant sidebands
(C) Carrier only
(D) Upper sideband only

32. Wideband FM is used in:
(A) Long-distance telegraphy
(B) AM broadcasting
(C) FM broadcasting and TV audio
(D) Single sideband communication

33. The main advantage of FM over AM is:
(A) Lower bandwidth
(B) Higher efficiency
(C) Better noise immunity
(D) Easier generation

34. The main disadvantage of FM is:
(A) Poor noise performance
(B) Requires larger bandwidth
(C) Carrier suppression
(D) Difficulty in demodulation

35. The method commonly used to generate FM is:
(A) Balanced modulator
(B) Armstrong method
(C) Phase-shift method
(D) Diode detector

36. Direct method of FM generation involves :
(A) Frequency multiplier
(B) Phase-locked loop
(C) Direct variation of carrier oscillator frequency
(D) Balanced modulator

37. Indirect method of FM generation (Armstrong method) involves :
(A) Amplitude modulation followed by detection
(B) Phase modulation and frequency multipliers
(C) Direct oscillator frequency variation
(D) Pulse modulation

38. Slope detector is used for :

(A) AM demodulation

(B) FM demodulation

(C) SSB demodulation

(D) DSB demodulation

39. A discriminator is a circuit used for:

(A) AM detection

(B) FM detection

(C) Carrier generation

(D) Noise filtering

40. In a ratio detector, the main advantage over slope detector is :

(A) Higher bandwidth

(B) Lower distortion and reduced amplitude sensitivity

(C) Better synchronization

(D) Carrier reinsertion

41. Phase-locked loop (PLL) FM demodulator works by:

(A) Tracking amplitude variations

(B) Synchronizing with instantaneous phase of FM signal

(C) Filtering out carrier

(D) Converting FM into AM

42. The noise performance of FM improves with:

(A) Decrease in deviation ratio

(B) Increase in deviation ratio

(C) Increase in carrier frequency only

(D) Decrease in message frequency

43. Pre-emphasis and de-emphasis in FM systems are used to:

(A) Reduce power consumption

(B) Improve noise performance

(C) Increase bandwidth

(D) Suppress carrier

44. Pulse Amplitude Modulation (PAM) is defined as:

(A) Modulation of the amplitude of carrier sine wave

(B) Modulation of the amplitude of pulses according to the message signal

(C) Modulation of the width of pulses

(D) Modulation of the position of pulses

45. In PWM, the parameter varied in proportion to the message signal is:

(A) Amplitude

(B) Frequency

(C) Width (duration) of pulses

(D) Position of pulses

46. In PPM, the parameter varied in proportion to the message signal is:
(A) Amplitude of pulses
(B) Width of pulses
(C) Position of pulses
(D) Frequency of carrier

47. The bandwidth requirement of PAM is:
(A) Same as message bandwidth
(B) Twice the message bandwidth
(C) Half of message bandwidth
(D) Independent of message bandwidth

48. One disadvantage of PAM is:
(A) Simple generation
(B) High noise susceptibility
(C) High bandwidth efficiency
(D) Good SNR performance

49. PWM signals have :
(A) Constant amplitude and variable width
(B) Variable amplitude and constant width
(C) Constant position and variable amplitude
(D) Variable frequency and constant width

50. In PPM, all pulses are of:
(A) Constant amplitude and width
(B) Variable amplitude and width
(C) Variable frequency
(D) Zero width

51. Which of the following modulation schemes requires synchronization at the receiver.?
(A) PAM
(B) PWM
(C) PPM
(D) All of the above

52. The power requirement of PAM depends upon:
(A) Peak message amplitude
(B) Pulse width
(C) Pulse repetition frequency
(D) All of the above

53. The main advantage of PWM over PAM is :
(A) Better noise immunity
(B) Lower complexity
(C) Lower bandwidth requirement
(D) Simpler demodulation

54. The demodulation of PAM is done using:
(A) Differentiator
(B) Low-pass filter
(C) Envelope detector
(D) Comparator

55. Which modulation scheme requires pulse width to be proportional to instantaneous amplitude of the message?
(A) PAM
(B) PWM
(C) PPM
(D) PCM

56. The demodulation of PWM can be done using :
(A) Differentiator followed by envelope detector
(B) Low-pass filter
(C) PLL
(D) Synchronous detector

57. Which scheme has constant envelope and hence better suited for nonlinear channels?
(A) ASK
(B) FSK
(C) PSK
(D) QPSK

58. The signal-to-noise ratio (SNR) performance is best in :
(A) PAM
(B) PWM
(C) PPM
(D) All are equal

59. The bandwidth of PWM is :
(A) Same as PAM
(B) Larger than PAM
(C) Smaller than PAM
(D) Zero

60. The main advantage of PPM is:
(A) Simpler demodulation
(B) Constant power transmission
(C) No need of synchronization
(D) Narrower bandwidth

61. In PAM, if the sampling rate is doubled, the bandwidth required is:
(A) Halved
(B) Doubled
(C) Same as before
(D) Zero

62. Which of the following has constant pulse amplitude ?
(A) PAM
(B) PWM
(C) PPM
(D) Both PWM and PPM

63. In CDMA, multiple users can transmit at the same time and frequency because:
(A) They use orthogonal or pseudo-orthogonal codes
(B) They use different time slots
(C) They use different carrier frequencies
(D) They transmit at low power

64. Which of the following has constant pulse amplitude ?

(A) PAM

(B) PWM

(C) PPM

(D) Both PWM and PPM

65. In Amplitude Shift Keying (ASK), the digital data is represented by:

(A) Changes in phase of carrier

(B) Changes in frequency of carrier

(C) Changes in amplitude of carrier

(D) Changes in bandwidth

66. ASK is highly susceptible to:

(A) Noise in amplitude

(B) Noise in frequency

(C) Phase distortion

(D) Timing jitter

67. In Frequency Shift Keying (FSK), the digital information is represented by:

(A) Amplitude variations

(B) Frequency variations

(C) Phase variations

(D) Duty cycle variations

68. In binary FSK, the two frequencies used to represent binary symbols are called:

(A) Carrier frequency and subcarrier

(B) Mark frequency and space frequency

(C) Upper and lower sidebands

(D) Pilot frequency and reference frequency

69. The minimum frequency separation in FSK to avoid interference is:

(A) Equal to symbol rate

(B) Twice the symbol rate

(C) Half the symbol rate

(D) Independent of symbol rate

70. In Phase Shift Keying (PSK), the digital data is transmitted by varying:

(A) Frequency of carrier

(B) Phase of carrier

(C) Amplitude of carrier

(D) Duty cycle of pulse

71. Binary PSK uses how many distinct phases?

(A) 1

(B) 2

(C) 4

(D) Infinite

72. The bandwidth efficiency of BPSK compared to ASK is:

(A) Lower

(B) Same

(C) Higher

(D) Infinite

73. Quadrature Phase Shift Keying (QPSK) transmits:
(A) 1 bit per symbol
(B) 2 bits per symbol
(C) 3 bits per symbol
(D) 4 bits per symbol

74. In QPSK, the carrier phase is shifted by:
(A) 45 degrees
(B) 90 degrees
(C) 180 degrees
(D) 360 degrees

75. The main advantage of QPSK over BPSK is:
(A) Lower noise
(B) Doubled data rate for same bandwidth
(C) Simpler demodulation
(D) Less complex receiver

76. In Differential PSK (DPSK), information is transmitted by:
(A) Absolute phase changes
(B) Frequency deviation
(C) Amplitude variation
(D) Difference between consecutive phases

77. The bit error rate (BER) performance of BPSK in AWGN channel is:
(A) Same as ASK
(B) Worse than FSK
(C) Best among ASK, FSK, PSK
(D) Same as QPSK

78. In BFSK, the demodulator commonly used is :
(A) Envelope detector
(B) Phase comparator
(C) Non-coherent energy detector
(D) PLL discriminator

79. In QPSK constellation diagram, the points are spaced at:
(A) 45-degree intervals
(B) 90-degree intervals
(C) 60-degree intervals
(D) 120-degree intervals

80. The bandwidth of BPSK is approximately:
(A) Equal to bit rate
(B) Half the bit rate
(C) Twice the bit rate
(D) Independent of bit rate

81. The bandwidth of QPSK is approximately:
(A) Equal to bit rate
(B) Half the bit rate
(C) Twice the bit rate
(D) Four times the bit rate

82. Which modulation requires coherent detection for proper demodulation ?
(A) ASK
(B) Non-coherent FSK
(C) BPSK
(D) On-off keying

83. Coherent detection requires:
(A) Carrier phase synchronization
(B) Frequency separation
(C) Noise immunity
(D) Simple envelope detector

84. A drawback of BPSK is:
(A) Low bandwidth efficiency
(B) High BER
(C) Requires coherent detection
(D) Low power efficiency

85. The spectral efficiency of QPSK compared to BPSK is:
(A) Half
(B) Same
(C) Double
(D) Infinite

86. The mapping of two bits into one QPSK symbol is called:
(A) Amplitude mapping
(B) Constellation mapping
(C) Quadrature mapping
(D) Bandwidth mapping

87. In Frequency Division Multiplexing (FDM), each user is allocated :
(A) A unique time slot
(B) A unique frequency band
(C) A unique code sequence
(D) A unique phase

88. In Time Division Multiplexing (TDM), multiple signals share the same channel by:
(A) Using different frequency bands
(B) Transmitting at different times
(C) Using different codes
(D) Using different polarizations

89. In Code Division Multiple Access (CDMA), different users are separated by:
(A) Different frequencies
(B) Different time slots
(C) Different spreading codes
(D) Different antennas

90. The main advantage of FDM is:
(A) Easy synchronization
(B) No guard bands required
(C) Simplicity of implementation for analog signals
(D) High spectral efficiency

91. A disadvantage of TDM is:
(A) Complexity in synchronization
(B) Requirement of guard bands
(C) Need for high bandwidth
(D) Noise sensitivity

92. In CDMA, the spreading of signal is achieved by:
(A) Frequency modulation
(B) Phase modulation
(C) Pseudorandom noise codes
(D) Pulse modulation

93. The term "chip rate" in CDMA refers to:
(A) Symbol rate of the message
(B) Bit rate of the user
(C) Rate of the spreading code
(D) Carrier frequency

94. One advantage of CDMA over FDM and TDM is:
(A) Better noise immunity and frequency reuse
(B) Less complex receivers
(C) No need for coding
(D) Smaller bandwidth requirement

95. In FDM, to avoid interference between channels, we use:
(A) Equalization
(B) Guard bands
(C) Spreading codes
(D) Phase synchronization

96. In TDM, if a user has no data to send during its slot:
(A) The slot remains unused
(B) The slot is reassigned dynamically in some systems
(C) Noise is transmitted
(D) It is given to another user permanently

97. CDMA uses which kind of spectrum technique?
(A) Frequency hopping
(B) Time hopping
(C) Spread spectrum
(D) Narrowband transmission

98. The main limitation of FDM in mobile communication is:
(A) Synchronization requirement
(B) Intermodulation distortion and limited spectrum
(C) Complexity of implementation
(D) High latency

99. The capacity of CDMA systems depends primarily on:
(A) Number of frequency channels
(B) Bandwidth of spreading code and interference level
(C) Number of time slots
(D) Guard band size

100. In TDM systems, frame synchronization is achieved by:
(A) Guard bands
(B) Inserting synchronization bits or patterns
(C) Using spreading codes
(D) Frequency shifting

## Rough Work

## Rough Work

**Example :**

**Question :**

Q.1 Ⓐ ● Ⓒ Ⓓ

Q.2 Ⓐ Ⓑ ● Ⓓ

Q.3 Ⓐ ● Ⓒ Ⓓ

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.

7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.

8. After the completion of the examination, candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.

9. There will be no negative marking.

10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.

11. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.

12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

**Impt. On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.**

**उदाहरण :**

**प्रश्न :**

प्रश्न 1 Ⓐ ● Ⓒ Ⓓ

प्रश्न 2 Ⓐ Ⓑ ● Ⓓ

प्रश्न 3 Ⓐ ● Ⓒ Ⓓ

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।

7. ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।

8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।

9. निगेटिव मार्किंग नहीं है।

10. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।

12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

**महत्वपूर्णः प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**