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प्रश्नपुस्तिका क्रमांक
Question Booklet No.

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

प्रश्नपुस्तिका सीरीज
Question Booklet Series
D

M.Sc (Electronics) Third Semester, Examination, February/March-2022
ELC-303(N)
Analog and Digital Communication System

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

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1. BPSK signal can be demodulated by using:
   (A) Low pass filters
   (B) A band pass filter
   (C) A high pass filter
   (D) None of these
2. A distorted signal of frequency f_m is recovered from a sampled signal if the sampling frequency f_s is:
   (A) $f_s > 2f_m$
   (B) $f_s < 2f_m$
   (C) $f_s = 2f_m$
   (D) $f_s \geq 2f_m$
3. Armstrong method is used for the generation of:
   (A) Direct FM
   (B) Indirect FM
   (C) SSB - SC
   (D) DSB - SC
4. Pre emphasis is done:
   (A) For boosting of modulating signal voltage
   (B) For modulating signals at higher frequencies
   (C) In FM before modulation
   (D) All of the above
5. Sensitivity is defined as:
   (A) Ability of receiver to amplify weak signals
   (B) Ability to reject unwanted signals
   (C) Ability to convert incoming signal into Image Frequency
   (D) Ability to reject noise
6. If the maximum instantaneous phase transition of a digital modulation techniques kept at 90°, the modulation will be organized as:
   (A) DPSK
   (B) QPSK
   (C) OQPSK
   (D) BPSK

7. Advantage of using direct method for generation of FM signal is:

(A) It gives high stability to FM signal frequency

(B) Distortion free FM signal is generated

(C) High power FM generation is possible

(D) None of the above

8. In Frequency Modulation:

(A) Amplitude of the carrier remains same

(B) Frequency of the carrier varies in accordance with the modulating signal

(C) The number of side bands are infinite

(D) All of the above

9. In Coherent demodulation technique of FSK signal can be affected using:

(A) Correlation receiver

(B) Bandpass filters and envelope detector

(C) Matched filter

(D) Discriminator detection

10. Pulse time modulation (PTM) includes:

(A) Pulse width modulation

(B) Pulse position modulation

(C) Pulse amplitude modulation

(D) Both (A) and (B)

11. In PWM signal reception, the Schmitt trigger circuit is used:

(A) To remove noise

(B) To produce ramp signal

(C) For synchronization

(D) None of the above

12. The bit rate of digital communication system is 34 M bits/sec. The Baud rate will be in QPSK modulation techniques:

(A) 8.5 M bits/sec

(B) 17 M bits/sec

(C) 32 M bits/sec

(D) 64 M bits/sec

13. For generation of FSK the data pattern will be:

(A) RZ pattern

(B) NRZ pattern

(C) Split – phase Manchester

(D) None

14. The techniques used for sampling are:

(A) Instantaneous sampling

(B) Natural sampling

(C) Flat top sampling

(D) All of the above

15. The number of bits used in 4096 level PCM system is:

(A) 12

(B) 16

(C) 20

(D) 10

16. Which of the following is not possible when the signal is analog?

(A) Phase shifting

(B) Equalization

(C) Modulation

(D) Data compression

17. What is the output voltage if the input voltage of a compander with a maximum voltage range of 1V and a μ of 255 is 0.25?

(A) 0 V

(B) 0.25 V

(C) 0.5 V

(D) 0.75 V

18. The process of signal compression and expansion used to reduce distortion and noise is called:

(A) Amplification

(B) Companding

(C) Compressing

(D) Modulating

19. Which pulse modulation technique is least expensive?

(A) PAM

(B) PPM

(C) PWM

(D) PCM

20. Which of the following is false with respect to pulse modulation?

(A) Less power consumption

(B) Low noise

(C) Degraded signal can be regenerated

(D) Can transmit analog as well as digital waves

21. Figure of merit is _____.

(A) Ratio of output signal to noise ratio to input signal to noise ratio

(B) Ratio of input signal to noise ratio to output signal to noise ratio

(C) Ratio of output signal to input signal to a system

(D) Ratio of input signal to output signal to a system

22. Which of broad classifications of noise are most difficult to treat?

(A) Noise generated in the receiver

(B) Noise generated in the transmitter

(C) External noise

(D) Internal noise

23. Which of the steps is not included in the process of reception?

(A) Encoding

(B) Decoding

(C) Demodulating

(D) Filtering

24. Which of the following statement is false?

(A) Modulation is used to separate different transmissions

(B) Modulation is used to ensure that wave is transmitted over long distances

(C) Modulation is used to reduce the bandwidth

(D) Modulation is used to allow the use of practical antennas

25. Which of the following statement is true?

(A) Random noise power is inversely proportional to bandwidth

(B) Flicker noise occurs at high frequency

(C) Noise mixers are caused by inadequate image frequency rejection

(D) A random voltage across a resistance cannot be calculated

26. What is Demodulation?

(A) Process of varying one or more properties of a periodic waveform

(B) Recovering information from a modulated signal

(C) Process of mixing a signal with a sinusoid to produce a new signal

(D) Involvement of noise

27. Which device is used for tuning the receiver according to incoming signal?

(A) Low pass filter

(B) High pass filter

(C) Zener diode

(D) Varactor diode

28. The ability of receivers to select the wanted signals among various incoming signal is called:

(A) Selectivity

(B) Fidelity

(C) Modulation

(D) Sensitivity

29. Amplitude Modulation suffers from_____.

(A) Side-band Suppression

(B) Intra Pulse Modulation

(C) Cross Modulation

(D) Carries Suppression

30. Over modulation results in_____.

(A) Distortion

(B) Weakness signal

(C) Strengthens the signal

(D) Provides immunity to noise

31. Data transmitted for a given amount of time is called _____.

(A) Noise

(B) Power

(C) Frequency

(D) Bandwidth

32. If the transmitted power is 100KW then the field at a distance 'R' is 60mV/m. Suppose if the transmitted power is reduced to 50KW then the field at same distance 'R' will be equal to _____mV/m.

(A) 50

(B) 42

(C) 45

(D) 55

33. Noise gets mixed with signal at_____.

(A) Receiver

(B) Transmitter

(C) Channel

(D) Transducer

34. If the value of resistor becomes 16 times than its previous value, then its noise voltage will become _____TIMES.

(A) 16

(B) 8

(C) 4

(D) 2

35. An AM signal is represented by x (t)= (30 + 2 sin(700πt)) cos(2πt×102t)V. What is the value of modulation index?

(A) 0.7

(B) 0.066

(C) 0.234

(D) 0.567

36. Phase distortion is important in _____.

(A) Voice communication systems

(B) Color video receivers

(C) Audio receivers

(D) Radio reception

37. What is the two basic specifications of a receiver?

(A) Sensitivity and selectivity

(B) Superious response and tracking

(C) Signal and noise

(D) Number of convertors and number of Ifs

38. When two or more signals share a common channel, it is called_____.

(A) Sub channeling

(B) Channeling

(C) Switching

(D) Multiplexing

39. Noise performance of a square law demodulator of AM signal is?

(A) Better than that of synchronous detector

(B) Weaker than that of synchronous detector

(C) Better than that of envelope detector

(D) Weaker than that of envelope detector

40. What the main advantage of PCM?

(A) Can travel small distances

(B) Higher bandwidth

(C) Lower noise

(D) Good reception

41. What is the use of Companding?

(A) In PCM transmitters to allow amplitude limiting in the receivers

(B) In PCM receiver to overcome impulse noise

(C) To overcome quantizing noise in PCM

(D) To protect small signals in PCM from quantizing distortion

42. Pulse communication system that is inherently highly immune to noise is _____.

(A) PCM

(B) PPM

(C) PAM

(D) PWM

43. Which is the greatest disadvantage of Pulse Code Modulation?

(A) Highly prone to noise

(B) Cannot travel long distances

(C) Its inability to handle analog signals

(D) Large bandwidth is required for it

44. Quantization noise occurs in_____.

(A) Frequency Division Multiplexing

(B) Time Division Multiplexing

(C) Delta Modulation

(D) Amplitude Modulation

45. In NBFM, the modulation index is close to _____.

(A) 1

(B) 10

(C) 100

(D) Infinite

46. Envelope Detector is a /an _____.

(A) Coherent detector

(B) Asynchronous Detector

(C) Synchronous Detector

(D) Product Demodulator

47. For 100% modulation, power in each sideband is _____ of that of carrier in amplitude modulation.

(A) 50%

(B) 70%

(C) 40%

(D) 25%

48. What are the two major drawbacks of delta modulation?

(A) Slope Overload and Granular noise

(B) Slope Overload and Serration noise

(C) Serration noise and Granular noise

(D) Slope Overload and Channel Noise

49. If a FM signal having modulation index mf is passed through a frequency tripler, then the modulation index of output of frequency tripler is_____.

(A) mf

(B) 3mf

(C) 1/3 mf

(D) 1/9 mf

50. Calculate power in each sideband, if power of carrier wave is 176W and there is 60% modulation in amplitude modulated signal?

(A) 32 W

(B) 12.3 W

(C) 12 W

(D) 15.84 W

51. Guard bands are provided in FM signal to:
    (A) Prevent interference from adjacent channels
    (B) To increase the noise
    (C) To increase bandwidth
    (D) None of the above
52. Transit time noise is:
    (A) Low frequency noise
    (B) High frequency noise
    (C) Due to random behaviour of carrier charges
    (D) Due to increase in reverse current in the device
53. Figure of merit γ is:
    (A) Ratio of output signal to noise ratio to input signal to noise ratio
    (B) Ratio of input signal to noise ratio to output signal to noise ratio
    (C) Ratio of output signal to input signal to a system
    (D) Ratio of input signal to output signal to a system
54. Wide band FM has the characteristics:
    (A) The frequency sensitivity kf is large
    (B) Bandwidth is wide
    (C) Both (A) and (B)
    (D) None of the above
55. Advantage of using VSB transmission is:
    (A) Higher bandwidth than SSB
    (B) Less power required as compared to DSBSC
    (C) Both (A) and (B)
    (D) None of the above
56. Quadrature Amplitude Modulation (QAM) is:
    (A) Have same bandwidth used for two DSB-SC signals
    (B) Is also known as Bandwidth Conservation scheme
    (C) Is used in color television
    (D) All of the above

57. After passing the FM signal through mixer, what is the change in the frequency deviation Δ when the modulating frequency is doubled?

(A) Becomes 2 Δ

(B) Becomes Δ/ 2

(C) Becomes Δ

(D) Remains unchanged

58. Generation of SSB SC signal is done by:

(A) Phase discrimination method

(B) Frequency discrimination method

(C) Product modulator

(D) Both (A) and (B)

59. In Delta modulation:

(A) One bit per sample is transmitted

(B) All the coded bits used for sampling are transmitted

(C) The step size is fixed

(D) Both (A) and (C) are correct

60. What is the value of carrier frequency in the following equation for the FM signal?

v(t)= 5 cos(6600t+ 12 sin2500t):

(A) 1150 Hz

(B) 6600 Hz

(C) 2500 Hz

(D) 1050 Hz

61. The sequence of operations in which PCM is done is:

(A) Sampling, Quantizing, encoding

(B) Quantizing, encoding, sampling

(C) Quantizing, sampling, encoding

(D) None of the above

62. Limitations of Frequency discrimination method are:

(A) Cannot be used for video signals

(B) Designing of band pass filter is difficult

(C) Both (A) and (B)

(D) None of the above

63. Calculate the maximum frequency deviation for the FM signal $v(t) = 10 \cos(6000t + 5\sin 2200t)$:

(A) 2200 Hz

(B) 6000 Hz

(C) 1750 Hz

(D) 11000 Hz

64. Vestigial side band signals are detected by:

(A) Filters

(B) Synchronous detection

(C) Balanced modulator

(D) None of the above

65. Examples of low level modulation are:

(A) Square law diode modulation

(B) Switching modulation

(C) Frequency discrimination method

(D) Both (A) and (B)

66. The ratio of maximum peak frequency deviation and the maximum modulating signal frequency is termed as:

(A) Frequency deviation

(B) Deviation ratio

(C) Signal to noise ratio

(D) Frequency spectrum

67. In Automatic gain control of the AM receiver:

(A) Gain of the receiver is adjusted

(B) The gain adjustment depends upon the strength of the received signal

(C) The output provided is a DC voltage

(D) All of the above

68. Power of white noise:

(A) Is infinite

(B) Is finite

(C) Is zero

(D) Depends on the frequency of the signal

69. The increase or decrease in the frequency around the carrier frequency is termed as:

(A) Figure factor

(B) Frequency deviation

(C) Modulation index

(D) Frequency Spectrum

70. In Adaptive Delta Modulation, the slope error reduces and:

(A) Quantization error decreases

(B) Quantization error increases

(C) Quantization error remains same

(D) None of the above

71. In Delta Modulation, the bit rate is:

(A) N times the modulating frequency

(B) N times the sampling frequency

(C) N times the nyquist criteria

(D) None of the above

72. Phase-locked loop can be used as:

(A) FM demodulator

(B) AM demodulator

(C) FM receiver

(D) AM receiver

73. In digital transmission, the modulation technique that requires minimum bandwidth is:

(A) Delta modulation

(B) PCM

(C) DPCM

(D) PAM

74. A system has a receiver noise resistance of 50 Ω. It is connected to an antenna with an input resistance of 50 Ω. The noise figure of the system is:

(A) 1

(B) 2

(C) 50

(D) 101

75. VCO is used to generate:

(A) Direct FM

(B) Indirect FM

(C) SSB-SC

(D) DSB-SC

76. The noise temperature at a resistor depends upon:

(A) Resistance value

(B) Noise power

(C) Both (A) and (B)

(D) None of the above

77. Noise with uniform power spectral density of N0 W/Hz is passed through a filter $H(\omega) = 2Exp(-j\omega td)$ followed by an ideal low pass filter of bandwidth B Hz. The output noise power in watts is:

(A) 2 N0B

(B) 4 N0B

(C) 8 N0B

(D) 16 N0B

78. The bit rate of a digital communication system using QPSK modulation techniques in 30 MBPS. So, The system:

(A) 60 Mbps

(B) The baud rate equal to 15 Mbps

(C) The baud rate equal to 30 Mbps

(D) The baud rate equal to 7.5 Mbps

79. Determine the Bandwidth of a FM wave when the maximum deviation allowed is 75KHz and the modulating signal has a frequency of 10 KHz :

(A) 170 KHz

(B) 200 KHz

(C) 100 KHz

(D) 1000 KHz

80. In a certain system, the signal power is 13 dBm and noise power is – 1 dBm. The SNR will be:

(A) 14 dB

(B) - 13 dB

(C) 12 dBm

(D) 12 dB

81. The noise due to random behaviour of charge carriers is:
    (A) Shot noise
    (B) Partition noise
    (C) Industrial noise
    (D) Flicker noise

82. The equations of the FM signal is $10 \sin[2\pi \times 106t + 5 \sin(2\pi \times 103t)]$. The modulating frequency is:
    (A) 106 Hz
    (B) 5 Hz
    (C) 103 Hz
    (D) 150 Hz

83. Spectral density of white noise is:
    (A) Uniform
    (B) Exponential
    (C) Gaussian
    (D) Poission

84. For a three stage cascade amplifier, calculate the overall noise figure when each stage has a gain of 12 dB and noise figure of 8dB:
    (A) 12
    (B) 24
    (C) 13.55
    (D) 8

85. In different types of Pulse Width Modulation:
    (A) Leading edge of the pulse is kept constant
    (B) Tail edge of the pulse is kept constant
    (C) Centre of the pulse is kept constant
    (D) All of the above

86. Quantizing noise can be reduced by increasing the number of samples per second. It is true:

(A) Yes, it is

(B) No, it is not

(C) Not necessarily

(D) None of these

87. Which gives maximum probability of error?

(A) ASK

(B) BFSK

(C) BPSK

(D) DBPSK

88. In an ADM system, the output signal amplitudes for 1's and 0's are:

(A) Fixed and the repetition rate is also fixed

(B) Fixed but the repetition rate is variable

(C) Variable and the repetition rates is also variable

(D) Variable but the repetition rate is fixed

89. If the deviation is 75 kHz and maximum modulating frequency is 5 kHz, what is the bandwidth of an FM wave?

(A) 80 kHz

(B) 160 kHz

(C) 40 kHz

(D) 320 kHz

90. The non-uniform quantization leads to:

(A) Reduction in transmission bandwidth

(B) Increase in maximum SNR

(C) Increase in SNR for low level signals

(D) Simplification of quantization process

91. In a DM system, the granular (idling)noise occurs when the modulating signal:
    (A) Increase rapidly
    (B) Remains constant
    (C) Decreases rapidly
    (D) The nature of modulating signal has nothing to do with this noise
92. In PCM system, output S/N increases:
    (A) Linearly with bandwidth
    (B) Exponentially with bandwidth
    (C) Inversely with bandwidth
    (D) None of these
93. What is the required bandwidth according to the Carson's rule, when a 100 MHz carrier is modulated with a sinusoidal signal at 1KHz, the maximum frequency deviation being 50 KHz.
    (A) 1 KHz
    (B) 50 KHz
    (C) 102 KHz
    (D) 60 KHz
94. Drawback of using PAM method is:
    (A) Bandwidth is very large as compared tomodulating signal
    (B) Varying amplitude of carrier varies the peak power required for transmission
    (C) Due to varying amplitude of carrier, it is difficult to remove noise at receiver
    (D) All of the above
95. The range of modulating frequency for Narrow Band FM is:
    (A) 30 Hz to 15 KHz
    (B) 30 Hz to 30 KHz
    (C) 30 Hz to 3 KHz
    (D) 3KHz to 30 KHz

96. What is the maximum frequency deviation allowed in commercial FM broadcasting?

(A) 100 KHz

(B) 75 KHz

(C) 15 KHz

(D) 120 KHz

97. Calculate the minimum sampling rate to avoid aliasing when a continuous time signal is given by $x(t) = 5 \cos 400\pi t$:

(A) 100 Hz

(B) 200 Hz

(C) 400 Hz

(D) 250 Hz

98. Disadvantages of FM over AM are:

(A) Prone to selective fading

(B) Capture effect

(C) Poorer signal to noise ratio at high audio frequencies

(D) All of the above

99. The modulation index of FM is given by:

(A) μ = frequency deviation/ modulating frequency

(B) μ = modulating frequency/ frequency deviation

(C) μ = modulating frequency/ carrier frequency

(D) μ = carrier frequency / modulating frequency

100. Which of the following gives the least probability of error?

(A) In Amplitude Shift Keying

(B) In Frequency Shift Keying

(C) In Phase Shift Keying

(D) In Differential Phase ShiftKeying

******

Rough Work / रफ कार्य

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1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
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