

**MIZORAM PUBLIC SERVICE COMMISSION**  
**COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF**  
**INSPECTOR OF LEGAL METROLOGY UNDER FOOD, CIVIL SUPPLIES & CONSUMER AFFAIRS**  
**DEPARTMENT, GOVERNMENT OF MIZORAM, DECEMBER, 2018**

**ELECTRONICS & COMMUNICATION ENGINEERING**  
**PAPER - III**

Time Allowed : 2 hours

Full Marks : 200

*All questions carry equal marks of two (2) each.*  
*Attempt all questions.*

1. The information to be communicated in a data communication system is also called
  - (a) message
  - (b) transmission
  - (c) medium
  - (d) protocol
2. The standard voice frequency band is
  - (a) 300 Hz- 3400 Hz
  - (b) 3 KHz-30 KHz
  - (c) 20Hz-20 KHz
  - (d) 30 Hz-3000Hz
3. The maximum power efficiency of an Amplitude Modulator (AM) modulator is
  - (a) 25%
  - (b) 50%
  - (c) 33%
  - (d) 100%
4. In commercial TV transmission in India, video and voice signals are modulated respectively as,
  - (a) VSB and VSB
  - (b) VSB and SSB
  - (c) VSB and FM
  - (d) FM and VSB
5. Which of the following analog modulation scheme requires the minimum transmitted power and minimum channel band-width?
  - (a) VSB
  - (b) DSB-SC
  - (c) SSB
  - (d) AM
6. In digital communication system, the data transmission rate is specified in
  - (a) MHz
  - (b) Bits/sec
  - (c) Bytes/sec
  - (d) Bauds
7. Modulation is primarily accomplished to
  - (a) Produce sidebands
  - (b) Mix two waves of different frequencies
  - (c) Transmit audio-frequency signals over long distances
  - (d) Improve transmission efficiency

8. In communication systems, modulation is the process of
- (a) Improving frequency stability of transmitter
  - (b) Combining signal and radio frequency waves
  - (c) Generating constant frequency radio waves
  - (d) Reducing distortion in RF waves
9. In AM, the modulation index lies between
- (a) -1 and 1
  - (b) 0 and 1
  - (c) 1 and  $\infty$
  - (d)  $-\infty$  and  $\infty$
10. What is the assigned bandwidth of each of the channels in the AM broadcast band?
- (a) 5 kHz
  - (b) 15 kHz
  - (c) 10 kHz
  - (d) 200 kHz
11. Which filter is commonly used in SSB generation?
- (a) RC filter
  - (b) LC filter
  - (c) Mechanical filter
  - (d) LP filter
12. The signal  $\cos \omega_c t + 0.5 \cos \omega_m t \sin \omega_c t$  is
- (a) FM only
  - (b) AM only
  - (c) Both AM and FM
  - (d) Neither AM or FM
13. An amplifier has an output signal power of 10 W and an output noise power of 0.01 W. The signal-to-noise power ratio is
- (a) 10dB
  - (b) 20 dB
  - (c) 30 dB
  - (d) 60 dB
14. The spectral density of white noise
- (a) is constant
  - (b) varies with bandwidth
  - (c) varies with amplitude
  - (d) varies with frequency
15. In binary data transmission DPSK is preferred to PSK because
- (a) a coherent carrier is not required to be generated at the receiver
  - (b) for a given energy per bit, the probability of error is less
  - (c) the 180° phase shifts of the carrier are unimportant
  - (d) more protection is provided against impulse noise
16. Coherent demodulation of FSK signal can be detected using
- (a) correlation receiver
  - (b) band pass filters and envelope detectors
  - (c) matched filter
  - (d) discriminator detection
17. The amplitude spectrum of a Gaussian pulse is
- (a) uniform
  - (b) a sine function
  - (c) Gaussian
  - (d) an impulse function

18. A band limited signal is sampled at the Nyquist rate. The signal can be recovered by passing the samples through
- (a) an RC filter
  - (b) an envelope detector
  - (c) a PLL
  - (d) an ideal low-pass filter with the appropriate bandwidth
19. Flat top sampling of low pass signals
- (a) gives rise to aperture effect
  - (b) implies oversampling
  - (c) leads to aliasing
  - (d) introducing delay distortion
20. Compression in PCM refers to relative compression of
- (a) higher signal amplitudes
  - (b) lower signal amplitudes
  - (c) lower signal frequencies
  - (d) higher signal frequencies
21. The signal to quantization noise ratio in an n-bit PCM system
- (a) depends upon the sampling frequency employed
  - (b) is independent of the value of 'n'
  - (c) increasing with increasing value of 'n'
  - (d) decreases with the increasing value of 'n'
22. In delta modulation, the slope overload distortion can be reduced by
- (a) decreasing the step size
  - (b) decreasing the granular noise
  - (c) decreasing the sampling noise
  - (d) increasing the step size
23. Boosting of higher frequency at the transmitter is done by using
- (a) De-emphasis
  - (b) AGC circuit
  - (c) Pre-emphasis
  - (d) Armstrong method
24. In PCM system, the amplitude levels are transmitted as 7-bit code words. The sampling is done at 10 kHz. The bandwidth of the system is
- (a) 10 kHz
  - (b) 20 kHz
  - (c) 35 kHz
  - (d) 70 kHz
25. Quantization noise can be reduce by
- (a) Using de-emphasis circuit
  - (b) Using RF amplifier in the receiver
  - (c) Increasing the number of quantization levels
  - (d) Sending sloping pulses
26. The number of bits per sample in a PCM is increased from 8 to 16. The bandwidth of the system will increase
- (a) 8 times
  - (b) 2 times
  - (c) Half times
  - (d)  $2^8$  times
27. For QPSK
- (a) Error rate is lower than 16 MPSK
  - (b) Error rate is higher than QASK
  - (c) Signals are in time Quadrature
  - (d) More-inter symbols interference compared to MSK

28. Digital modulation techniques are used in satellite communication system, because
- (a) They are easy to handle
  - (b) Large bandwidth utilization is possible
  - (c) They have a spectral efficiency
  - (d) They are less prone to interference
29. Time division multiplexing is used when the data to be transmitted is
- (a) Slow changing
  - (b) Of small bandwidth
  - (c) Slow changing and has a small bandwidth
  - (d) Fast changing and has a wide bandwidth
30. In high speed TDM, the channels are separated in the receiver employing
- (a) OR gate
  - (b) NAND gate
  - (c) NOR gate
  - (d) AND gate
31. Most commonly used antenna with television receivers
- (a) Loop antenna
  - (b) Rhombic antenna
  - (c) V-antenna
  - (d) Yagi- antenna
32. Medium waves travel as
- (a) Space waves
  - (b) Surface waves
  - (c) Sky waves
  - (d) None of these
33. High frequency waves follow
- (a) The ground wave propagation
  - (b) The line of sight direction
  - (c) The bend along the curvature of earth
  - (d) The ionosphere propagation
34. Microwave frequencies are normally regarded as those in the range of
- (a) 1 to 100 Hz
  - (b) 100 Hz to 1000 Hz
  - (c) 1 to 100 GHz
  - (d) 1 to 100 MHz
35. Which of the following is not a common microwave application?
- (a) Telephone
  - (b) Mobile radio
  - (c) Radar
  - (d) Satellite communication
36. Frequency bands under microwave frequency are
- (a) SHF and EHF
  - (b) VHF and SHF
  - (c) VLF, LF and EHF
  - (d) UHF, SHF and EHF
37. Which of the following does not cause losses in optical fibre cables?
- (a) Impurities
  - (b) Micro bending
  - (c) Attenuation in glass
  - (d) Stepped index operation
38. A fibre optic cable has the indices of refraction of core of 1.6 and of cladding of 1.4. For an angle of incidence  $70^\circ$ , the angle of return light ray will be
- (a)  $35^\circ$
  - (b)  $61^\circ$
  - (c)  $70^\circ$
  - (d)  $90^\circ$
39. Which of the following is capable of giving the highest data speed?
- (a) Coaxial cable link
  - (b) Microwave LOS link
  - (c) Microwave satellite system
  - (d) Optical fibre system

40. Which ionosphere layer is responsible for return of a radiation at frequency of 30 MHz?  
(a) D (b) E  
(c) F (d) All of these
41. The skip distance is  
(a) Same for each layer (b) Independent of frequency  
(c) Independent of the state of ionisation (d) Independent of transmitted power
42. Free space wavelength is  
(a) Greater than guided wavelength (b) Equal to guided wavelength  
(c) Lesser than guided wavelength (d) None of the above
43. The distortion in the transmission of carrier frequencies in an underground cable can be eliminated by using  
(a) Inductive loading (b) Resistive loading  
(c) Capacitive loading (d) Shielding
44. Microwave signal propagating along the curvature of earth is known as  
(a) Faraday effect (b) Ducting  
(c) Ionosphere reflection (d) Tropospheric scatter
45. Tropospheric scatter communication is used for which frequency band?  
(a) HF (b) VHF  
(c) UHF (d) VLF
46. A waveguide section in a microwave circuit acts as  
(a) LP filter (b) HP filter  
(c) Band pass filter (d) Band stop filter
47. The semiconductor diode which can be used in switching circuit in microwave range is  
(a) Gunn diode (b) Varactor diode  
(c) PIN diode (d) Tunnel diode
48. Reflex klystron oscillator uses  
(a) one cavity resonator (b) two cavity resonators  
(c) three cavity resonators (d) both (a) & (b)
49. Which mode has the lowest cut off frequency in circular wave guides?  
(a) TE<sub>01</sub> (b) TE<sub>11</sub>  
(c) TE<sub>20</sub> (d) TE<sub>21</sub>
50. A reflex klystron oscillator is a  
(a) high efficiency device (b) high power device  
(c) low power device (d) both (a) & (b)
51. In TM mode, if the direction of wave propagation is in 'z' direction, then:  
(a)  $H_y = 0$  (b)  $E_z = 0$   
(c)  $H_z = 0$  (d)  $E_y = 0$

52. The effective length of an antenna is measure of
- (a) Length of antenna neglecting fringing effect
  - (b) Effectiveness of the antenna as a radiator/collector of electromagnetic energy
  - (c) Power consumed by the antenna
  - (d) Range of the antenna
53. For a dipole antenna
- (a) The radiation intensity is maximum along the normal to the dipole axis
  - (b) The current distribution along its length is uniform irrespective of the length
  - (c) The effective length is equal to its physical length
  - (d) The input impedance is independent of the location of the feed point
54. TEM wave cannot propagate in which one of the following?
- (a) Two wire transmission line
  - (b) Coaxial cable
  - (c) Rectangular waveguide
  - (d) Micro-strip line
55. The dominant mode in a rectangular waveguide is  $TE_{10}$  because this mode has
- (a) No attenuation
  - (b) No cut-off
  - (c) No magnetic field component
  - (d) The highest cut-off wavelength
56. A cavity resonator can be represented by
- (a) An LC circuit
  - (b) An LCR circuit
  - (c) A lossy inductor
  - (d) A lossy capacitor
57. In a microwave magic T, E plane and H plane are
- (a) In phase
  - (b) Out of phase
  - (c) Isolated
  - (d)  $90^\circ$  out of phase
58. In TWT attenuator is used to
- (a) Help bunching
  - (b) Prevent oscillation
  - (c) Prevent saturation
  - (d) Increase gain
59. As an ideal local oscillator for microwave frequency measurements, the most suitable microwave source is a
- (a) Multi cavity magnetron
  - (b) Reflex klystron
  - (c) Double cavity klystron
  - (d) Travelling Wave Tube
60. In a microwave test bench, the microwave signal is amplitude modulated at 1 kHz because
- (a) To increase the sensitivity of the measurement
  - (b) To transmit the signal to a far-off place
  - (c) To study amplitude modulation
  - (d) As crystal detector fails at microwave frequencies
61. Convert the following number system:  
 $(101101)_2 = (?)_{10}$
- (a) 35
  - (b) 25
  - (c) 45
  - (d) 55

62. Convert the following number system:

$$(743)_8 = (?)_{10}$$

- (a) 483
- (b) 773
- (c) 373
- (d) 479

63. Convert the following number system:

$$(432)_5 = (?)_{10}$$

- (a) 115
- (b) 315
- (c) 125
- (d) 225

64. The interrupt lines in 8085 is

- (a) 8
- (b) 3
- (c) 5
- (d) 7

65. 8085 has five flags they are designated as

- (a) Z, CY, S, P and AC
- (b) CY, D, Y, S and P
- (c) CY, AC, D, E, and P
- (d) S, P, D, E and Y

66. In 8085 which addressing mode is also called inherent addressing?

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

67. In 8085 microprocessor system with memory mapped I/O, which of the following is true?

- (a) Devices have 8-bit address line
- (b) Devices are accessed using IN and OUT instructions
- (c) There can be maximum of 256 input devices and 256 output devices
- (d) Arithmetic and logic operations can be directly performed with the I/O data

68. ALU (Arithmetic and Logic Unit) of 8085 microprocessor consists of

- (a) Accumulator, temporary register, arithmetic and logic circuits
- (b) Accumulator, temporary register, arithmetic, logic circuits and five flags
- (c) Accumulator, arithmetic and logic circuits
- (d) Accumulator, arithmetic, logic circuits and five flags

69. The cycle required to fetch and execute an instruction in 8085 microprocessors is which one of the following?

- (a) Memory cycle
- (b) Clock cycle
- (c) Instruction cycle
- (d) Machine cycle

70. Where the result of an arithmetic and logical operation are stored ?

- (a) In accumulator
- (b) In cache memory
- (c) In ROM
- (d) In instruction registry

71. Processors of all computers, whether micro, mini or mainframe must have

- (a) Control unit
- (b) Primary storage
- (c) ALU
- (d) All of the above

72. Which of the following is not a kind of register?

- (a) Math processor
- (b) Flag
- (c) Accumulator
- (d) Segment

73. In a computer, set of electrical paths which is used to transfer data is called
- (a) Ports
  - (b) Monitors
  - (c) Bus
  - (d) Computer clock
74. Memory of computer which is used to speed up the computer processing is
- (a) BIOS
  - (b) Cache Memory
  - (c) RAM
  - (d) ROM
75. Computer address bus is
- (a) Bidirectional
  - (b) Unidirectional
  - (c) Multidirectional
  - (d) Circular
76. Each manufacturer of a microprocessor has devised a symbolic code for each instruction (written in hexadecimal code), called a
- (a) Mnemonic
  - (b) Low level code
  - (c) Microcode
  - (d) Microcontroller
77. A microprocessor operates in binary digits, 0 and 1, also known as \_\_\_\_\_.
- (a) Bytes
  - (b) Decimal number
  - (c) Octal number
  - (d) Bits
78. How many distinct binary trees can be constructed using three nodes?
- (a) 1
  - (b) 2
  - (c) 3
  - (d) 5
79. In an 8085 microprocessor, the shift registers which store the result of an addition and the overflow bit are, respectively
- (a) B and F
  - (b) A and F
  - (c) H and F
  - (d) A and C
80. A pulse train can be delayed by a finite number of clock periods using
- (a) A serial-in-serial-out shift register
  - (b) A serial-in-parallel-out shift register
  - (c) A parallel-in-serial-out shift register
  - (d) A parallel-in-parallel-out shift register
81. The initial content of a four bit register is 1000. What is the register content after it is shifted four times to the right, with the serial input being 111100?
- (a) 1111
  - (b) 1100
  - (c) 1000
  - (d) 0011
82. A semiconductor ROM is preferred to a semiconductor RAM because
- (a) ROM is cheaper than RAM
  - (b) ROM is faster
  - (c) Rom does not require power supply for their operations
  - (d) Programme stored in the ROM cannot be altered
83. A microprocessor has 24 address lines and 32 data lines. If it uses 10 bits of opcode, the size of its Memory Buffer Register is
- (a) 22 bits
  - (b) 24 bits
  - (c) 32 bits
  - (d) 14 bits

84. Four memory chips of  $16 \times 4$  sizes have their address bus connected together. This system will be of size
- (a)  $64 \times 4$  (b)  $16 \times 16$   
(c)  $32 \times 8$  (d)  $256 \times 1$
85. The address bus of Intel 8085 is 16-bit wide and hence the memory which can be accessed by this address bus is
- (a) 2 k bytes (b) 4 k bytes  
(c) 16 k bytes (d) 64 k bytes
86. An 8085 microprocessor based system uses a  $4K \times 8$ -bit RAM whose starting address is AA00H. The address of the last byte in this RAM is
- (a) 0FFFH (b) 1000H  
(c) B9FFH (d) BA00H
87. Why a ROM does not have data inputs?
- (a) It does not have a WRITE operations (b) Data inputs are integrated with data outputs  
(c) Data inputs are integrated with address inputs (d) ROM is sequentially accessed
88. A microwave antenna is used in radar for \_\_\_\_\_.
- (a) Data finding (b) Radiation finding  
(c) Direction finding (d) Both (a) and (c)
89. Microwave antenna is of \_\_\_\_\_.
- (a) Pattern type (b) Aperture type  
(c) Metallic type (d) None of these
90. The Klystron tube operates on which principle?
- (a) Velocity modulation (b) Current density modulation  
(c) Amplitude modulation (d) Frequency modulation
91. Typical power gain of TWT amplifier is
- (a) 1 to 5 dB (b) 50 to 300 dB  
(c) 100 to 400 dB (d) 20 to 40 dB
92. Measurement of VSWR gives the degree of mismatch between the load and the
- (a) Microwave components (b) Transmission line  
(c) Tubes (d) Waveguides
93. In electromagnetic waves, polarisation is
- (a) due to transverse nature of waves (b) always vertical in isotropic medium  
(c) due to longitudinal nature of waves (d) caused by reflection of waves
94. One of the following communication system is analog
- (a) PCM (b) Delta  
(c) Differential PCM (d) PAM
95. A group of 8 bits:
- (a) Digits (b) Nibble  
(c) Byte (d) Word

96. Modulation scheme which uses carrier phase shifting and synchronous detection to permit two DSB signals to occupy the same frequency band is called
- (a) NBFM
  - (b) CDMA
  - (c) QAM
  - (d) FDMA
97. Quantization process used in analog to digital conversion process is a
- (a) One-to-many mapping which causes loss of information
  - (b) Many-to-one mapping which causes loss of information
  - (c) One-to-one mapping
  - (d) Many-to-one mapping where the loss of information at the transmitter cannot be recovered at the receiver
98. In 8085, if the clock frequency is 5 MHz, the time required to execute an instruction of 18 T-states is
- (a) 3.0  $\mu$ s
  - (b) 3.6  $\mu$ s
  - (c) 4.0  $\mu$ s
  - (d) 6.0  $\mu$ s
99. Suppose that the modulating signal is  $m(t) = 2\cos(2\pi f_m t)$  and the carrier signal is  $X_c(t) = A_c \cos(2\pi f_c t)$ . Which one of the following is a conventional AM signal without over-modulation?
- (a)  $A_c m(t) \cos(2\pi f_c t)$
  - (b)  $[1 + m(t)] \cos(2\pi f_c t)$
  - (c)  $A_c \cos(2\pi f_c t) + 0.25 A_c \cos(2\pi f_m t) \cos(2\pi f_c t)$
  - (d)  $A_c \cos(2\pi f_m t) \cos(2\pi f_c t) + A_c \sin(2\pi f_m t) \sin(2\pi f_c t)$
100. In microwave system the function of mode filter is
- (a) to change mode of wave transmission
  - (b) to suppress modes with lower cut off frequencies
  - (c) to suppress modes with higher cut off frequencies
  - (d) both (a) & (c)

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