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## B.Tech DEGREE EXAMINATION, DECEMBER 2024

Fifth Semester

18ECC205J - ANALOG AND DIGITAL COMMUNICATION

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours

Max. Marks: 100

### PART - A (20 x 1 = 20 Marks)

Answer ALL Questions

Marks BL CO PO

- |  |                         |
|--|-------------------------|
| 1. When comparing with DSB-SC, balanced modulator has the following property?  | 1 1 1 1                 |
| A) Periodicity   | B) Scaling              |
| C) Shifting  | D) Linearity            |
| 2. The envelope of the AM voltage is   | 1 2 1 1                 |
| A) $e = A \cos \omega_c t$   | B) $e = 1/RC$           |
| C) $e = A(1 + m_a \cos \omega_m t)$  | D) $1/RC > \omega_m$    |
| 3. In which of the following modulation scheme, it is possible to reduce the bandwidth and power requirement?                                    | 1 1 1 1                 |
| A) DSB-SC Modulation   | B) SSB-SC Modulation    |
| C) Amplitude Modulation  | D) Frequency Modulation |
| 4. 100 MHz carrier is frequency modulated by 10 kHz wave. For a frequency deviation of 500 kHz, calculate the modulation index of the FM signal. | 1 2 1 1                 |
| A) 100   | B) 70                   |
| C) 90  | D) 50                   |
| 5. Detection is same as  | 1 1 2 3                 |
| A) Modulation  | B) Mixing               |
| C) Filtering   | D) Demodulation         |
| 6. Signal transmission at high frequency and then process the signal at low frequency can be done by   | 1 2 2 3                 |
| A) De-Emphasis Circuit   | B) Pre-Emphasis circuit |
| C) Super Heterodyne Receiver   | D) Envelope Detector    |
| 7. In FM super heterodyne receiver, local oscillator, RF amplifier and mixer stages are tuned with the help of                                   | 1 1 2 3                 |
| A) Ganged Resistor   | B) Ganged Inductor      |
| C) Ganged Impedance  | D) Ganged Capacitor     |
| 8. Which of the following noise is produced due to random variations of electrons or holes   | 1 2 2 3                 |
| A) shot noise  | B) partition noise      |
| C) flicker noise   | D) distributed noise    |

9. In eye pattern, the rate of closure of eye pattern when the sampling time is varied indicates that 1 1 3 1  
 A) Productivity B) Sensitivity  
 C) Width D) Height
10. The signals which are obtained by encoding each quantized signal into a digital word is called as 1 2 3 1  
 A) PAM signal B) PCM signal  
 C) FM signal D) AM signal
11. Granular noise and Slope overload distortion occurs in 1 1 3 1  
 A) Delta modulation B) Pulse code modulation  
 C) QPSK modulation D) PSK modulation
12. In digital transmission, the modulation technique that requires the minimum bandwidth is 1 2 3 1  
 A) PCM B) PAM  
 C) DPCM D) Delta modulation
13. In which of the following, the frequency of the carrier signal is varied based on the information in a digital signal? 1 1 4 4  
 A) ASK B) FSK  
 C) PSK D) QAM
14. QPSK has \_\_\_\_\_ the bandwidth efficiency of BPSK. 1 2 4 4  
 A) Twice B) Same  
 C) Half D) Four times
15. Which of the following modulation scheme requires minimum power for transmission? 1 1 4 4  
 A) PSK B) QPSK  
 C) QAM D) BPSK
16. Quadrature amplitude modulation is a combination of 1 2 4 4  
 A) ASK and FSK B) ASK and PSK  
 C) FSK and PSK D) QPSK and FSK
17. Which filter is used to get the final Frequency Hopping Spread Spectrum signal? 1 1 5 2  
 A) Low pass filter B) High pass filter  
 C) Band pass filter D) Band stop filter
18. Block codes are generated using 1 2 5 2  
 A) Generator polynomial B) Generator matrix  
 C) Generator co-efficient D) Generator codes
19. DSSS system spreads the baseband signal by \_\_\_\_\_ the baseband pulses with a pseudo noise sequence 1 1 5 2  
 A) Adding B) Subtracting  
 C) Multiplying D) Dividing
20. IEEE 802.11 uses 1 2 5 2  
 A) FHSS B) DSSS  
 C) OFDM D) BSS

**PART - B (5 x 4 = 20 Marks)**  
Answer ANY FIVE Questions

Marks BL CO PO

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|----|---|---|---|---|---|
| 21 | How the bandwidth requirement has been reduced in SSB-SC when compared with DSB-SC? | 4 | 3 | 1 | 1 |
| 22 | What are the various sources of noise? Explain.                                     | 4 | 2 | 2 | 3 |
| 23 | Differentiate between Pulse code modulation and Differential pulse code modulation. | 4 | 3 | 3 | 1 |
| 24 | Write a note on shannon capacitor theorem.  | 4 | 2 | 5 | 2 |
| 25 | What are the applications and advantages of Direct sequence spread spectrum?        | 4 | 2 | 5 | 2 |
| 26 | Define the term sampling and quantization in pulse code modulation.                 | 4 | 2 | 3 | 1 |
| 27 | Compare PSK, QPSK and $\pi/4$ QPSK modulation.                                      | 4 | 3 | 4 | 4 |

**PART - C (5 x 12 = 60 Marks)**  
Answer ALL the Questions

Marks BL CO PO

- |       |   |    |   |   |   |
|-------|---|----|---|---|---|
| 28 a. | Explain the amplitude modulation with its relevant waveforms.   | 12 | 2 | 1 | 1 |
|       | <b>(OR)</b>   |    |   |   |   |
| b.    | Discuss the demodulation process of AM waves using linear diode detector with its neat diagram.               | 12 | 2 | 1 | 1 |
| 29 a. | With a relevant block diagram, explain the AM super-heterodyne receiver.                                      | 12 | 2 | 2 | 3 |
|       | <b>(OR)</b>   |    |   |   |   |
| b.    | Explain in detail about the direct method of FM transmitter with its relevant block diagram.                  | 12 | 2 | 2 | 3 |
| 30 a. | Explain in detail about the differential pulse code modulation with its relevant encoder and decoder diagram. | 12 | 3 | 3 | 1 |
|       | <b>(OR)</b>   |    |   |   |   |
| b.    | Explain in detail about the Delta modulation and detection process with its relevant sketch.                  | 12 | 3 | 3 | 1 |
| 31 a. | Derive the expression for generation and signal space diagram of binary FSK.                                  | 12 | 3 | 4 | 4 |
|       | <b>(OR)</b>   |    |   |   |   |
| b.    | With a neat block diagram, explain the generation, signal space diagram and detection process in QAM.         | 12 | 3 | 4 | 4 |
| 32 a. | With the neat diagram explain the operation Frequency Hopped Spread Spectrum (FHSS) modulation.               | 12 | 2 | 5 | 2 |
|       | <b>(OR)</b>   |    |   |   |   |
| b.    | Explain in detail about the Orthogonal Frequency Division Multiplexing (OFDM).                                | 12 | 2 | 5 | 2 |

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