

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019**

**Course Code: CS 307**

**Course Name: DATA COMMUNICATION**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 3 marks.*

Marks

- |   |   |     |
|---|---|-----|
| 1 | Describe simplex, half-duplex and full-duplex transmission modes with suitable examples.  | (3) |
| 2 | Identify the significance of Nyquist bandwidth and Shannon capacity formula in determining the performance of communication in a network. | (3) |
| 3 | Discuss time domain and frequency domain concept of a signal . Draw the frequency domain plot of a periodic signal.                       | (3) |
| 4 | How the twisting affects performance in twisted pair cable ?  | (3) |
|   |   | ()  |

**PART B**

*Answer any two full questions, each carries 9 marks.*

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|---|---|-----|
| 5 | a) What are the various transmission impairments and explain how they affect performance of a communication link?                     | (9) |
| 6 | a) Define Channel Capacity. Calculate the appropriate bit rate and signal levels for a channel with 100 Mhz bandwidth and SNR of 255. | (5) |
|   | b) Compare terrestrial and satellite microwave transmission.  | (4) |
| 7 | a) Explain the working principle of parabolic reflective antenna with suitable diagrams.  | (5) |
|   | b) For a parabolic reflective antenna with a diameter of 4 m, operating at 13 GHz, what is the effective area and the antenna gain?   | (4) |

**PART C**

*Answer all questions, each carries 3 marks.*

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|----|--|-----|
| 8  | Name any two line coding schemes which provide self-synchronization. Explain with reasoning. Draw the pattern for any one of such scheme for the following data: 10101111. | (3) |
| 9  | Explain how Statistical TDM utilizes channel bandwidth better than Synchronous TDM.  | (3) |
| 10 | How interference is avoided in frequency division multiplexing? Explain with suitable figures.   | (3) |

- 11 Explain SONET/SDH frame format. (3)

**PART D**

*Answer any two full questions, each carries 9 marks.*

- 12 a) Encode the bit stream **10101010** into the following line coding schemes assuming that the last signal level has been negative: (6)
- i) NRZ-I
  - ii) NRZL
  - iii) Manchester
  - iv) Differential Manchester
  - v) Bipolar AMI (Most recent preceding 1 bit has negative voltage)
  - vi) Pseudoternary (Most recent preceding 1 bit has negative voltage)
- b) Convert the bit stream 101010 in to analog signals by using ASK, Binary FSK and Binary PSK (3)
- 13 a) Explain Frequency Division Multiplexing process. (6)
- b) Discuss Digital Carrier Systems. (3)
- 14 a) With neat diagram, explain delta modulation technique. (6)
- b) Discuss wave length division multiplexing. (3)

**PART E**

*Answer any four full questions, each carries 10 marks.*

- 15 a) Differentiate Synchronous and Asynchronous transmissions (5)
- b) How errors are detected using parity checking? What are the limitations of parity checking? (5)
- 16 a) Using CRC, given the dataword 1010011110 and the divisor 10111 (10)
- i. Show the generation of the codeword at the sender site
  - ii. Show the checking of the codeword at the receiver site
- 17 a) An error detection and correction scheme has a minimum Hamming distance,  $d_{\min}=6$ . (5)
- i) How many bit errors can it detect?
  - ii) How many bit errors can it correct?
- b) What is the Hamming distance for each of the following codewords: (4)
- a. d (10000, 11000)
  - b. d (10101, 10010)

c. d (11111,11111)

d. d (000, 100)

- 18 a) Discuss Frequency hopping spread spectrum technique (10)
- 19 a) What is Circuit switching? Explain the three phases in Circuit switching with suitable diagrams. (10)
- 20 a) Compare and contrast Datagram and Virtual-circuit packet switched networks? (5)
- b) With the help of a neat block diagram, explain the structure of a packet switch. (5)