

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018**

**Course Code: CS 307**

**Course Name: DATA COMMUNICATION**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 3 marks.*

Marks

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|---|--|-----|
| 1 | What are the three parameters that represent a general sine wave? Explain with suitable figures.               | (3) |
| 2 | Which wireless propagation is suitable for satellite communication? Justify your answer.                       | (3) |
| 3 | How the construction of optical fibre helps in reducing the interference? Draw the structure of optical fibre. | (3) |
| 4 | Discuss the significance of SNR in determining the performance of a data communication system.                 | (3) |

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**PART B**

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

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|---|---|-----|
| 5 | a) Explain the role of Shannon capacity formula in determining the channel capacity.  | (4) |
|   | b) Suppose the spectrum of a channel is between 3MHz and 4MHz and $SNR_{dB}$ is 24 dB. What is the capacity of the channel? Based on Nyquist's formula, how many signalling levels are required?                  | (5) |
| 6 | a) Explain different wireless propagation modes with suitable diagrams.   | (6) |
|   | b) Given a receiver with an effective noise temperature of 300 K and a 12-MHz bandwidth, what is the thermal noise level at the receiver's output?  | (3) |
| 7 | a) With the help of suitable diagrams, differentiate multi-mode and single-mode optical fibres. How are the rays propagated in step-index and graded-index multi-mode fibres?                                     | (6) |
|   | b) A signal travels from point A to point B through a transmission channel that has -0.4dB/km loss. If the signal at A has a power of 3mW, what is the power of the signal at point B which is 10 km away from A? | (3) |

**PART C**

*Answer all questions, each carries 3 marks.*

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|----|---|-----|
| 8  | Compare the terms signal element and data element with suitable diagrams.   | (3) |
| 9  | Show the equivalent square wave pattern of the bit string 00110101 using NRZ-I, NRZL and Manchester encoding schemes. | (3) |
| 10 | Which of the multiplexing technique is suitable for fiber-optics links? Explain                                       | (3) |

with reasoning.

- 11 How upstream and downstream data transfer is done in cable modem? (3)

**PART D**

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

- 12 a) What is the advantage of differential encoding? Discuss differential Manchester encoding scheme with example. (3)  
b) Explain the process involved in PCM with neat diagrams. (6)
- 13 a) Explain the process of statistical time division multiplexing. (7)  
b) Explain the necessity of pulse stuffing in synchronous time division multiplexing. (2)
- 14 a) Why you need scrambling in digital encoding? Explain any one scrambling technique. (7)  
b) What is the Nyquist sampling rate for a low pass signal with bandwidth of 300 Khz? (2)

**PART E**

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

- 15 a) Discuss the effect of timing error in asynchronous transmission. Draw suitable figures. (5)  
b) Which are the different types of errors? Explain with examples (2)  
c) Assuming even parity, find the parity bit for each of the following data : (3)  
i. 1010101 ii. 000000 iii. 10000101
- 16 a) Define Hamming distance and minimum Hamming distance? Calculate the pair wise Hamming distance and minimum Hamming distance among the following code words: 100000, 100110, 111101 (6)  
b) What should be the minimum hamming distance for detecting and correcting upto n number of errors? Discuss the reasoning with some example. (4)
- 17 Using CRC, given the dataword 11110000 and the divisor 10011 (10)  
i. Show the generation of the codeword at the sender site  
ii. Show the checking of the codeword at the receiver site
- 18 Explain direct sequence spread spectrum using BPSK with neat diagrams. (10)
- 19 a) Compare and contrast circuit switching and packet switching techniques (4)  
b) Describe the different types of switching fabrics used in Packet switches. (6)
- 20 Explain the datagram approach in packet switching. (10)

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