National Institute of Technology, Rourkela

Dept. of Comp. Sc. & Engg.,

Mid Sem Autumn Exam OCTOBER 2021

Course Name: Data Communications

Course Code: CS3001 Time: 2.0 Hours (9.00 to 11.00 AM) FM: 50

Date of Exam: 23rd OCT 2021

Instruction: (1) ANSWER ALL QUESTIONS
(2) Q1 through Q5 carries 10 marks each
(3) Answers should be brief and to the point

Q1. Answer the following briefly

(a) Differentiate between Data and Signal.
(a) Define: Channel Capacity, Quantization, Bandwidth & Stair Case Signal?
(b) Write the full forms of PCM, DM, ADM, ASK, BFSK, BPSK, OPSK, QAM, SAR
(d) Under what condition, the wired communication is preferred over wireless? Justify.
(e) Write the difference between Twisted Pair Cable and Optical Fibre.
(f) Differentiate between granular noise and slope overhead distortion.
(g) What are the components in a data communication system?
(h) What are the advantages of Delta Modulation (DM) over PCM? Give example application for DM & PCM.
(i) What happens when interference occurs at the receiver?
(j) Write at least one merit and one demerits of Successive Approximation Method of A to D conversion over PCM.

Q2. Select the correct answer with justification:

(i) Which type of data transfer allows simultaneous transfer of data:

(a) Serial (b) Synchronous (c) Asynchronous (d) None

(ii) Serial transmission can be?

(a) Synchronous (b) Asynchronous (c) Both (a) & (b) (d) None

(iii) Which type of communication needs n channels if n bits are to be transferred?

(iv) Which type of transmission needs Start, Stop and Gap between Start & Stop Bits

(v) Specify the type of data transmission between Keyboard and Computer.

(vi)Serial transmission without start bit, stop bit and gap between start and stop bits is known as ----------.

(vii) How many characters are sent using parallel transmission capable of transmitting 80 Kbps in each line?

(viii) In synchronous serial transmission, if we send 80 Kbps, we send ---------- characters per sec.

(a) 10000 (b) 40000 (c) 80000 (d) None

(ix) State TRUE or FALSE. "All secured communication systems are reliable". Justify.

(x) If the ASCII "m" character is received as "n", this is called ----------.

(a) A Single bit error (b) A burst Error (c) A Byte Error (d) Character error

Q3. Answer the following.

- **(i) A digital Signal has 200 bps data rate, what is the duration of bit interval?**
- **(ii) What is the impact on sampling at receiver for varying bit interval?**
- **(iii) An Amplitude of a signal can be measured in Volts, Amps, Watts and Angles. Sate whether TRUE or False.**
- **(iv) If the maximum amplitude of a signal is 10 Volts, What is the minimum amplitude value?**
- **(v) The ----- of a signal is expressed in seconds.**
  a. Amplitude b. Frequency c. Period d. Phase
- **(vi) Express 10 nano seconds in terms of second, microsecond and picosecond.**
- **(vii) What is the equivalent of 20 MHz in terms of Hz, KHZ and GHz?**
- **(viii) What is the bandwidth value when a sine signal is decomposed into two signals of frequency 10 and 90 respectively?**
- **(ix) A signal is decomposed into three sine waves with frequencies of 10, 20 and 30 Hz respectively. What is the bandwidth in Hz?**
- **(x) The bandwidth of a signal is 10 KHz. The frequency of the sine wave with highest frequency is 11Khz. What is the frequency in Hz with lowest frequency?**

Q4. Write the similarities & differences between the followings:

- **(i) Bit interval, Bit rate, Baud and Frequency.**
- **(ii) Infrared, Radio wave, Microwave and Satellite Communication.**
- **(iii) Synchronous, Asynchronous, Serial and Parallel Communication.**
- **(iv) Simplex, Half Duplex, and Full Duplex Communications.**
- **(v) Twisted Pair Cable, Coaxial and Optical Fibre Channels.**

Q5. Consider a Computer Network of 20 Computers to be used in a building where 2o users have to share Printers and Data base. Answer the following with proper justification.

(i) **Draw the architecture and topology of the Network with a neat diagram?**

(ii) **Specify the type of data transmission, transmission medium, protocol and standard to be adopted?**

(iii) **Specify the various constraints and limitations while installing?**

(iv) **Which techniques are to be adopted for reliable and secured data transmission?**

(v) **What type noises may be encountered? Which type of modulation is suitable?**

(vi) **How the tradeoff between cost overhead and performance can be balanced?**

(vii) **Draw a flow chart showing the detailed process of installation specifying the required hardware and softwares.**

(viii) **What is the major factor to address scalability?**

(ix) **How Collision free and Fault Tolerant measures are to be undertaken?**

(x) **Specify a scheme for active users to access a common shared channel for all 20 computers.**