**DATA COMMUNICATION CT QUESTIONS: -**

*Combined by Arkajyoti Naskar with 69 others😉*

***CT-1: -***

**SET 1 -** *Baseline Wandering*, OSI model physical level working, unguided transmission, Fourier transform, *Attenuation* (Power calculation), Bit rate and baud rate related problems, *bandwidth requirement of PSK*

**SET 2 - X**

**SET 3 -** *baseline wandering*, *Manchester* and *disadvantage of optical fibre*, 4 parameters that determined efficiency of a dc system, *FSK implementation, measurement of ASK,* *QAM and PSK*, *attenuation* of signals.

**SET 4 -** Basic Implementation of PSK Concerns of Physical and data link layer. *Bandwidth of FSK*, Fourier Fourier series of x2, *Topology and types of basic topology*, Why Ring topology fails if one node collapses

**SET 5 -** Types of addresses in data comm and in which layers of OSI it is implemented, *Compare and contrast between RZ and AMI*, Self-synchronising signal.

**SET 6 -** 4 features of efficient data communication, *NRZ-L vs NRZ-I, advantages and disadvantages of optical fibre.*

**SET 7 -** Q1. Difference between logical, physical and port address. Explain their role in TCP/IP model. What half duplex and full duplex transmission model? Give one example of each. (6+4)

Q2. *What is baseline wandering? How does Manchester scheming overcome that?* The loss in a cable is usually defined in decibels per km (dB/km). If the signal at the beginning of a cable with −0.3 dB/km has a power of 5 mW, what is the power of the signal at 20 km? (2+4+4)

Q3. *Difference between baud rate and bit rate?* "Block code aid error synchronization"--Explain with a technique. For a sampled low-pass signal with bandwidth 400kHz and quantization level 512, calculate the digital bit rate of the signal. (2+5+3)

**SET 8 -** Half duplex and full duplex difference with example. Channel capacity for noise and noiseless mediums. Numerical - Point 1 to Point 2 have N amplifiers, each amplifier has gain of M db. The let power is 100 times the input power. If n<= m, what is. The maximum value of n?

*What is modulation rate?* *Contrast and compare PCM and DM.* Question of propagation time and transmission time from the slide, bandwidth, bit rate and size of message given.

Suggest a line encoding scheme which solves issue of synchronisation. *How scrambling helps in removing DC components*?

Numerical - ratio of signal to data element given. Data rate given. What is average baud rate?

**SET 9 -** How physical layer handles data rate, line organisation, synchronisation of bits, transmission modes?

*how scrambling solves DC components, NRZ-I and Manchester signal rate comparison,* show that Fourier series of even function contains only DC and cosine terms, *advantage and disadvantage of optical fibre, what is RF, why is it used widely in communication,* why X rays and gamma rays are theoretically better but not used practically in communication

**SET 10 -** *what is topology? name the four types of topologies.* If there are n devices in each of topology find the min number of cables required to build this topology. *If one node is failed then the whole ring topology failed - explain.* Find the number of bits, when signal level is given (Q1)

Signal energy gain/loss related problem relative power of signal is given. Find Fourier expression of f(x)=x if f(2π+x) =f(x). Given sample rate of a signal is 4000, find the bit rate. (Q2)

*QPSK*, Analog signal related problem - amplitude of analog signal is -40v to +40v, uniform amplitude is 10v find SNR(Q3)

***CT-2: -***

**SET 1-** *What is ARQ?* How does it help in flow control? problem with Stop and wait approach and how to resolve? *Synchronous TDM explanation and numerical. What is Checksum and numerical.*

*What do you mean by Redundancy in error detection and correction?*

**SET 2-**   1. *For Optical data what multiplexing we use, explain, state difference between synchronous TDM and Statistical TDM*. (6+4)

2. *Explain how you will guarantee for correct of 4bit in all cases of block coding,* *CRC numerical* (5+5)

3. *Explain FHSS with diagram, 12 packets are sent by go back n ARQ, in every 3rd packet data was lost so tell how many total packet is needed to transfer all the data from A to B(4+6)*

**SET 3-** *Find* *Checksum* (given 4digit hex code) then change the 4th hex code now detect the error. *CRC*- generate the parity bits for a data word and change a bit and check the received codeword detect the error.

*FHSS, DSSS, Define spread spectrum and its uses. Explain Stop and wait ARQ.*

*15 packets are to be sent by go and back N ARQ where the 4th packet is not transferred every time, find how many packets the sender sends, with diagram.*

*Explain Bandwidth utilization*

**SET 4-** Difference between linear block coding and cyclic coding? *Compare redundancy in error detection and correction. Which error cannot be detected in checksum.* consider class roll no as a list of 4bit numbers show how checksum works. How long will it take to transmit 1 million bits, distance is 5000km and propagation speed is 2\*10^8m/s and each packet contains 1000 bits in stop and wait ARQ. Explain design in Go-Back-N ARQ

**SET 5*-*** *Synchronous and Statistical TDM difference*. Given list of 5 4-bit numbers show how checksum works. Which error is undetectable by checksum.

*How many bits you need for (i) detection of k bit error, (ii) correction of m bit error on block encoding.* Criteria for good polynomial generator.

*Describe design of go-back-N protocol. Problem related to go-back-N protocol.* Implementation of a Go-Back-N ARQ given a number of packets to transfer

**SET 6-** *Redundancy, Checksum Calculation* and Verification, *Time Division Multiplexing* and related numerical problems, *bandwidth utilization techniques, stop-and-wait protocol*, numerical problem related to go-back-N protocol.

**SET 7-** *Explain Go Back N ARQ*. *11 data packets, if every 5th packet from A to B is lost, but no ACKs from B are lost, then how many frames are sent by A.*

*Difference between synchronous and statistical TDM. Explain error detection using checksum* technique using given set of numbers. If one of the numbers changes to something else, show how decoder will detect the error.

*Explain FHSS*. Generate codeword based on given message and generator polynomial. If left most bit is changed when transmitted then show how the detector will detect error.

**SET 8-** 1*.**How to guarantee correction of 4 errors in all cases of Block Coding.?* Explain with suitable examples. For the generator string 101010 and data string 10110011 find the *CRC* and transmitted string. (5+5)

*2. Discuss the design of Go-Back-N ARQ protocol. 13 data packets, if every 4th packet from A to B is lost, but no ACKs from B are lost, then how many frames are sent by A. (5+5)*

3. *Describe a digital multiplexing technique to combine several low-rate channels to a high-rate channel.* (With diagram). Four 1 Kbps connections are multiplexed together. A unit is 1 bit. Find

(a) duration of one bit,

(b) Transmission rate of the link,

(c) the duration of the time slot,

(d) the duration of a frame. (2+8)