**14685**

**B. Tech 4th Semester Examination**

**Digital Communication (O.S.)**

**EC-4010**

**Time : 3 Hours**                                    **Max. Marks : 100**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** (i)  The question pare consists of five sections A, B, C, D and E.

(ii)  Attempt five question in all selecting one question from section A, B, C and D.

(iii)  Section E is compulsory.

## SECTION - A

1.  A bandpass signal has a center frequency fo and extends from fo-5 kHz to fo+5kHz. The signal is sampled at a rate of fs = 25 kHz. As the center frequency varies from fo = 5 kHz to fo=50 kHz. Find the ranges of fo for which the sampling rate is adequate.                                    (15)

2.  In a binary PCM system, the output signal to quantization noise ratio is to be held to a minimum of 40dB. Determine the number of required levels and find the corresponding output signal to quantization noise ratio.                                    (15)

## SECTION - B

3.  The bit stream d(t) is to be transmitted using DEPSK. If d(t) is 001010011010, determine b(t). Show that after decoding using the circuit given below, the data d(t) is recovered.          (15)
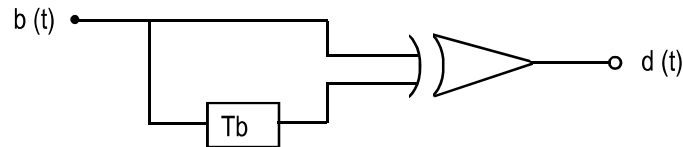
4.  Explain QPSK modulator, demodulator and bandwidth requirement for QPSK in detail. Also determine the bandwidth efficiency for QPSK modulator with $f_b$ = 10 mbps.                (15)

## SECTION - C

5.  A received signal is either +2V or –2V held for a time T. The signal is corrupted by a white gaussian noise of power spectral density $10^{-4}$ volts$^2$/Hz. If the signal is processed by an integrate and dump receiver, what is the minimum time T during which a signal must be sustained if the probability of error is not to exceed $10^{-4}$?                (15)

6.  What is an optimum filter & why it is called so? Derive an expression for the impulse response of the optimum filter. (15)

## SECTION - D

7.  A signal m(t), bandlimited to 4kHz is sampled at twice the nyquist rate and the samples transmitted by PCM. An output SNR of 47dB is required. Find the value of N and the minimum value of Si/$\eta$ if operation is above threshold?                (15)

8.  Explain the working of ISDN using a suitable diagram? Also list the applications of ISDN.                (15)

## SECTION - E (compulsory)

9.  (a)  What are the advantages and disadvantages of digital communication?

    (b)  Find the nyquist rate and nyquist interval of the signal m(t)=s cos1000 $\pi$t cos4000 $\pi$t.

(c)   What is QAM? How it is different from QPSK?

(d)   Compare the bandwidth requirements for various digital modulation techniques.

(e)   What is a matched filter? Discuss it by using its impulse response.

(f)   What is quantization noise? How it is generated and can be removed from the system?

(g)   What are various types of networks? Classify them on the basis of performance parameters.

(h)   Calculate signal to noise ratio in delta modulation and discuss its significance.

(i)   Compare delta modulation and adaptive delta modulation.

(j)   Design a digital communication system to locate a car at a distance of 100 kms.                    (10×4=40)