B.TECH. SEM -V ELECTRONICS ENGG.) 2014 COURSE
(CBCS) : SUMMER - 2018
SUBJECT: DIGITAL COMMUNCATION SYSTEMS

Day: **Wednesday** Time: **10.00 AM TO 01.00 PM**
Date: **23/05/2018** **S-2018-2354** Max. Marks: 60

N.B.:
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagrams **WHEREVER** necessary.
4) Answers to both the sections should be written in the **SEPARATE** answer book.

Q.1 Define cumulative distribution function (CDF). Explain its properties. **[10]**

OR

Probability density functions of a random variable 'X' is given by **[10]**

$$f_X(x) = \begin{cases} k\left(1-x^2\right) & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

then find i) k ii) CDF

Q.2 With the help of neat block diagram and waveforms describe the operation of Adaptive Delta modulation. List its advantages. **[10]**

OR

Derive an expression for the maximum output signal to noise ratio for sinusoidal modulation (DM). **[10]**

Q.3 List the desirable properties of Line codes. **[10]**

Given the binary sequence 011010110 , construct

1) Unipolar RZ
2) Unipolar NRZ
3) Polar NRZ
4) Polar RZ
5) Bipolar NRZ
6) Split phase Manchester
7) Polar quaternary

OR

With neat diagram explain the operation of scrambler and Unscramber. **[10]**

Q.4 With the help of block diagram and relevant expressions / waveforms explain QPSK transmitter and receiver. **[10]**

OR

a) Compare MSK and QPSK **(05)**

b) Determine the minimum bandwidth for a BPSK modulator with a carrier frequency of 40 MHz and an input bit rate of 500 kbps. **(05)**

Q.5 The parity check matrix of a (7,4) hamming code is given as follows: **(10)**

$$H = \left[\begin{array}{ccccccc} 1 & 1 & 1 & 0 & : & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & : & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & : & 0 & 0 & 1 \end{array}\right]$$

Calculate syndrome vector for single bit error.

OR

a) What are the Hamming codes? Explain its properties. **[05]**

b) Write a short note on Turbo codes. **[05]**

Q.6 With the help of neat block diagram and waveforms, explain the operation of slow frequency hopping spread spectrum system. **[10]**

OR

a) Explain the properties of PN sequence. **[05]**

b) With a neat diagram, illustrate the principle of TDMA. **[05]**

* * * * *