Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: COMMUNICATION SYSTEMS [ELE 3103]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 31 December 2016** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. A signal $V_i = 10\cos 2000\pi t + 0.05\cos 200\pi t$ is amplitude modulated by a square law modulator. The non-linear device has the input-output characteristics $Vo = Vi + 0.01Vi^2$. The output of the square law device is passed through a BPF with frequency range 700 Hz to 1300Hz. Sketch the amplitude spectrum of the band pass filter output signal. **3**

1B. A signal $X_c(t) = 5[1 + 2\cos 2\pi f_m t]\cos 2\pi f_c t$ is to be demodulated. Check whether some of the following detectors can be used to demodulate: (i) an envelope detector, (ii) a coherent detector. Justify your answer. **4**

1C. For an AM super heterodyne receiver has a local oscillator frequency of 1355KHz. Determine the IF carrier upper side frequency and lower side frequency for an RF wave that is made up of a carrier , upper and lower side frequencies of 900KHz, 905KHz and 895KHz respectively. **3**

2A. Briefly describe the generation of DSBSC AM wave generation with neat block diagram and mathematical expressions. **3**

2B. Let $\cos(2\pi fct + \emptyset)$ denote the local carrier applied to the product modulator of SSB demodulator .Show the effect of the phase error $\emptyset$ in the coherent detector output. **3**

2C. Discuss in detail about the transmitter and receiver of BPSK scheme with block diagram. **4**

3A. Explain the system for obtaining flat top PAM modulated signal and the recovery of message signal from the PAM signal with mathematical expressions. **4**

3B. Assume an analog message signal is limited in its excursions to the range from -4 to +4 volts. If the step size is 1 volts and each quantization levels & corresponding codes are located at -3.5 (0), -2.5(1), -1.5(2), -0.5(3), 0.5(4), 1.5(5), 2.5(6), 3.5(7) volts, then find the Manchester encoded form of the PCM output for the given sample values.

Sample value: 1.3 3.6 2.3 0.7 -0.7 -2.4 -3.4 **3**

3C. In an indirect WBFM generator , the initial low frequency carrier is 200KHz frequency. The frequency deviation at the modulator=25Hz, Max frequency deviation =75KHz, Transmit carrier frequency= 102.4MHz, reference frequency applied to the mixer =7.024MHz. Choose the appropriate multiplier values for the circuit. **3**

4A. Consider the transmitted signal for a QPSK scheme as ,

$$si(t) = \left\{ \sqrt{\frac{2E}{T}} cos\left(2\pi f_c t + (2i-1)\frac{\pi}{4}\right) \right.$$

a)Find the set of orthonormal basis functions to represent this set of signals.
b)Obtain the signal coordinates with i=1,2,3,4, and then draw the signal constellation diagram **3**

4B. Evaluate the probability of error for sending 0 and receiving 1 in the ASK scheme **3**

4C. Consider the signal shown in figure Qn.4C

a) Plot the matched filter output as a function of time.
b) Determine the peak value of output.

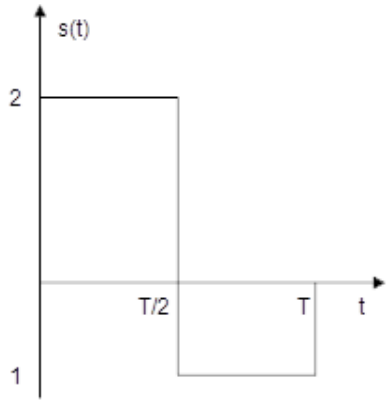

fig Qn.4C **4**

5A. For a convolutional encoder with n=2, k =1 ,K =3 and the generator polynomial coefficients (1 0 1) and (0 1 1), draw the convolutional encoder structure and obtain the complete trellis diagram upto 5 levels and then find the coded output for an input sequence (1 0 1 1 0) using the same. **4**

5B. For a (4,2) systematic linear block code, the parity matrix P is

$$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

a. For the message signal [1 0] compute the code word
b. Decode the received signal r=[1111] by finding the location of error. **3**

5C. Write short note on co channel interference and adjacent channel interference in cellular communication **3**