	Utech
Name:	
Roll No.:	A Spanie Of Exercising 2nd Explored
Invigilator's Signature :	

PRINCIPLES OF COMMUNICATION ENGINEERING

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

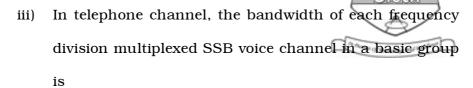
(Multiple Choice Type Questions)

 $1. \quad \hbox{Choose the correct alternatives for any $\it ten$ of the following:}$

 $10 \times 1 = 10$

- i) If the noise level of the signal is increased then capacity of a band limited AWGN channel
 - a) is increased
- b) is decreased
- c) remains constant
- d) none of these.
- ii) The modulation index of an AM wave is changed from 0 to 1. The transmitted power is
 - a) unchanged
 - b) halved
 - c) doubled
 - d) increased by 50 percent.

4151 [Turn over



a) 4 kHz

b) 5 kHz

c) 3 kHz

d) none of these.

iv) The intermediate frequency used for a superheterodyne AM receiver is

- a) 455 kHz
- b) 755 kHz
- c) 545 kHz
- d) 745 kHz.

v) If $f_{\rm m}$ is the frequency of the message signal then bandwidth of narrow band frequency modulated signal is

a) f_m

b) 2 f_m

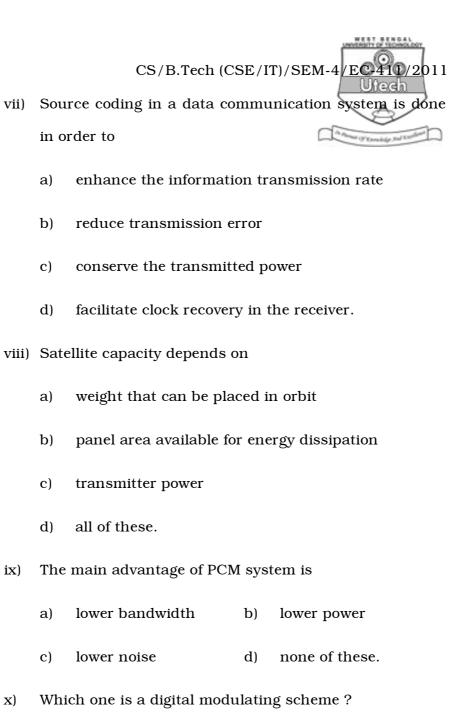
- c) infinity
- d) none of these.

vi) If an FM wave has been generated from the message signal m(t) then a PM wave can also the generated from

- a) $\int m(t) dt$
- b) $\frac{d}{dt}m(t)$
- c) $\left[m(t)\right]^2$

d) none of these.

4151



a)

b)

c)

d)

a)

b)

c)

d)

a)

c)

a)

c)

PCM

PPM

ix)

X)

b)

d)

PAM

PWM.



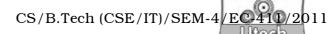
- xi) Entropy is basically a measure of
 - a) rate of information
 - b) average information
 - c) probability of information
 - d) disorder of information.
- xii) One of main functions of the RF amplifiers in a superheterodyne receiver is to
 - a) provide improved tracking
 - b) permit better adjacent channel rejection
 - c) increase the tuning range of the receiver
 - d) improve the reflection of the image frequency.
- xiii) If the incoming carrier frequency in a super-heterodyne receiver is $1100~\mathrm{kHz}$ with an intermediate frequency of $455~\mathrm{kHz}$, the image frequency is
 - a) 910 kHz
- b) 1555 kHz
- c) 2010 kHz
- d) none of these.
- xiv) In TV telecast, the sound signal is modulated in
 - a) VSB

b) SSB

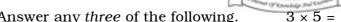
c) AM

d) FM.

4151 4



GROUP - B (Short Answer Type Questions)



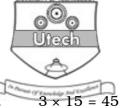
		Answer any <i>three</i> of the following. $3 \times 5 = 15$
2.	a)	What is the function of a transponder in satellite
		communication? 3
	b)	State the importance of 6/4 GHZ system. 2
3.	Enc	code the data stream 110100 using the following line
	cod	ing techniques :
	a)	Rz (polar)
	b)	Rz (bipolar)
	c)	NRZ (polar).
4.	a)	Define modulation. 2
	b)	Why is modulation needed in a communication
		system? 3
5.	a)	State sampling theorem. $2\frac{1}{2}$
	b)	What is aliasing ? $2\frac{1}{2}$

With a neat sketch describe the indirect method of FM 6. generation. 5



(Long Answer Type Questions)

Answer any three of the following.



- 7. a) Considering a sinusoidal modulating signal m (t) and carrier c (t), draw the following waveforms :
 - i) AM signal
 - ii) PM signal
 - iii) FM signal.

2 + 2 + 2

- b) Derive the general expression for PM and FM waves. Hence comment on the relationship between them. 8+1
- 8. a) Draw the circuit of a weighted resistor type D/A converter and explain its principle of operation. 2 + 5
 - b) What do you mean by geostationary satellite? 2
 - c) A 500 W carrier is modulated on a depth of 50%. Calculate the total power in the modulated wave in the following forms of AM:
 - i) DSB with full carrier
 - ii) DSB with suppressed carrier.

6

- 9. a) With the help of necessary diagrams explain the basic principle of operation of TDM. 3+5
 - b) Discuss the relative merits and demerits of ASK, PSK and FSK.

4151 6



- 10. a) Give a neat sketch of an envelope detector circuit and explain its principle of operation.
 - b) Consider a (7, 4) linear block code whose generator matrix is given below:

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

Find the code vector for a message 1011 and also the parity check matrix.

- c) Find the bandwidth of a commercial FM transmission, if frequency deviation is 75 kHz and modulating frequency is 15 kHz.
- 11. Write shot notes on any *three* of the following: 3×5
 - a) Ring modulator
 - b) Pulse modulation
 - c) Entropy
 - d) LEO and MEO
 - e) Delta modulation.