



Name : .....  
 Roll No. : .....  
 Invigilator's Signature : .....

**CS/B.Tech (EEE)/SEM-8/EC-802F/2013**

**2013**

**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. Choose the correct alternatives for any *ten* the following :

$10 \times 1 = 10$

- i) Single side band system needs
  - a) more band width
  - b) higher power
  - c) complex receiver circuits, as compared to other type systems
  - d) none of these.
- ii) In commercial FM broadcasting, the maximum frequency deviation is normally
 

a) 5KHZ	b) 15KHZ
c) 75KHZ	d) 200KHZ.

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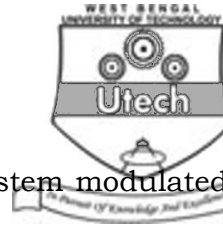
- iii) The signal to quantization noise ratio in PCM system depends upon
- a) sampling rate
  - b) no. of quantization levels
  - c) message signal band width
  - d) none of these.
- iv) A super heterodyne receiver with an I.F of 450 KHZ is tuned to a signal at 1200 KHZ. The Image frequency is
- a) 750KHZ
  - b) 900KHZ
  - c) 1650KHZ
  - d) 2100KHZ.
- v) Multiplexing technique that transmits analog signal is
- a) FDM
  - b) TDM
  - c) WDM
  - d) both (a) and (b).
- vi) The key circuit used in DPSK modulator is
- a) NAND GATE
  - b) XOR/XNOR GATE
  - c) OR GATE
  - d) NOR GATE.
- vii) Which one is most affected by noise ?
- a) PSK
  - b) ASK
  - c) FSK
  - d) DPSK.

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- viii) White noise is specified by
- a) Gaussian distribution
  - b) Rician distribution
  - c) Binomial distribution
  - d) Maxwell-Boltzmann distribution.
- ix) For video transmission of television, which of the following is used ?
- a) AM
  - b) DSB-SC
  - c) VSB
  - d) SSB-SC.
- x) The sharing of medium and its link by two or more devices is called
- a) Modulation
  - b) Encoding
  - c) Line coding
  - d) Multiplexing.
- xi) Hamming code is a method of
- a) Error detection
  - b) Error correction
  - c) Error encapsulation
  - d) Error detection and correction.

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- xii) The saving in power in a DSB-SC system modulated at 80 % is
- a) Nil                                      b) 80 %  
c) 75.76 %                                d) 50 %.

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. In context of communication why is carrier signal required ?  
What do you mean by modulation ? Describe why modulation is necessary for communication. 1 + 1 + 3
3. State and prove sampling theorem. What is Nyquist rate ? 4 + 1
4. A carrier signal  $A_c \cos W_c t$  is amplitude modulated by a message signal  $A_m \cos W_m t$ , where  $A_m < A_c$ .
  - a) Write down expression for the modulated signal.
  - b) Find  $W_c$ , so that the band-width of the transmitted signal is 1 percent of the carrier frequency  $W_c$ . 2 + 3
5. Write short note on transponder.
6. Briefly explain direct method of generation of FM. What is the main drawback of this kind of generation ? 4 + 1

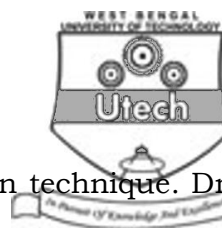
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**GROUP – C****( Long Answer Type Questions )**Answer any *three* of the following.  $3 \times 15 = 45$ 

7. a) Explain synchronous demodulation technique for DSB-SC signal. If phase and frequency discrepancy occur in the local carrier then which kind of difficulty you will face ?  $3 + 2 + 2$
- b) Explain the working principle of envelope detector. 4
- c) Determine the power content of the carrier and each of the sidebands for an AM signal with modulation index  $\mu = 0.6$  and total power of 500 watt. 4
8. a) Draw the block diagram of PCM system and briefly explain each unit. 4
- b) What is companding used in PCM ? Mention  $\mu$ -law and A-law.  $2 + 3$
- c) A binary channel with bit rate  $r_b = 36000$  bits per second is available for PCM voice transmission. Assume band width of the voice signal is 3.2KHZ. Find out approximate value of
- sampling frequency (fs).
  - no. of quantization level (q).
  - no. of bit require to represent each level (v).

 $2 + 2 + 2$

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9. a) Briefly explain Binary ASK modulation technique. Draw the wave form of ASK modulated signal. 2 + 2
- b) Explain generation and coherent detection of binary ASK technique. 3 + 3
- c) Draw signal space diagram for binary ASK signal. 2
- d) What are the advantage and disadvantage of DPSK over PSK ? 3
10. a) Explain the term 'selectivity', 'sensitivity', 'fidelity' of a receiver. 5
- b) Draw the block diagram of super heterodyne receiver and explain the function of each block. 6
- c) In a broadcast super heterodyne receiver having no RF amplifier, the loaded quality factor  $Q$  of the antenna coupling circuit is 455 KHZ. Then, what would be the image frequency and its rejection ratio for tuning at 1100 KHZ station. 4
11. a) Define information and Entropy. 2 + 2
- b) A source produces 4 symbols  $P$ ,  $Q$ ,  $R$  and  $S$  with probabilities  $1/6$ ,  $1/3$ ,  $1/4$ ,  $1/4$ . Find entropy of the source. 4

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c) What do you meant by channel capacity ? How is it depending on SNR ? 2 + 2

d) Encode the bit sequence 0101101 in the following form :

i) Unipolar NRZ

ii) Bipolar RZ

iii) Manchester 3

12. Write short notes on any three of the following : 3 × 5

a) Delta Modulator

b) Carson's rule

c) Armstrong method for FM generation

d) Modem

e) Transponder

f) FDM

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