Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(EEE)/SEM-8/EC-802F/2012

2012

COMMUNICATION ENGG.

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. Answer any *ten* : $10 \times 1 = 10$

A) Choose the correct alternatives for the following :

i) In an NBFM, the highest modulating frequency is f_m. The bandwidth of the system will be

a) $6 f_m$ b) f_m

c) $2 f_m$ d) $4 f_m$.

ii) Recovering information from a carrier is known as

a) demultiplexing b) modulation

c) detection d) carrier recovery.

iii) A carrier is amplitude modulated to a depth of 40%. The increase in power is

a) 40% b) 20%

c) 16% d) 8%.

iv) Entropy is basically a measure of

a) rate of information

b) average information

c) probability of information

d) disorder of information.

v) The process of transmitting two or more information signals simultaneously over the same channel is called

a) TDM b) FDM

c) detection d) modulation.

vi) A DSB-SC signal is generated using the carrier $\cos\left(\omega_c t + \theta\right)$ and modulating signal $x(t)$. The envelope of the DSB-SC signal is

a) $x(t)$

b) $|x(t)|$

c) only positive portion $x(t)$

d) $x(t)\cos\theta$.

vii) A 4 GHz carrier is DSB-SC modulated by a low-pass message signal with maximum frequency of 2 MHz. The resultant signal is to be ideally sampled. The minimum frequency of the sampling in train should be

a) 4 MHz b) 8 MHz

c) 8 GHz d) 8·004 GHz.

viii) An FM signal with modulation index of 9 is applied to a frequency tripler. The modultion index in the output signal will be

a) 0 b) 3

c) 9 d) 27.

ix) In all pulse communication system, carrier

a) is necessarily a high repetition train of pulses

b) is necessarily a high frequency continuous *ac* signal

c) is either a train of pulses or continuous *ac* wave

d) none of these.

x) Quantization noise occurs in

a) TDM b) FDM

c) PCM d) PWM.

B) Fill in the blank :

xi) A 10 MHz carrier is frequency modulated by a sinusoidal signal of 500 Hz, the maximum frequency deviation being 50 kHz. The bandwidth required as given by teh Carson's rule is ..... .

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Discuss the advantage and disadvantages of Digital Communication over Analog Communication.
3. Distinguish between PAM, PWM and PPM.
4. For the data bit 10110001, draw the waveforms for ASK, FSK, PSK, QPSK.
5. Compare FDM with carrier multiplexing.
6. Define amplitude modulation and modulation index. Derive the expression between the output power of an AM transmitter and the depth of modulation. 2 + 3

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) State and prove sampling theorem. 5

   b) Discuss Time Division Multiplexing. 5

   c) Define line coding. Write the properties of line coding. 1 + 4

8. a) Explain coherent and non-coherent binary modulation techniques. 2

   b) Explain coherent binary ASK. 4

c) Briefly explain the differences between different modulation techniques. 3

d) Compare the bandwidth of QPSK system with that of BPSK system. 3

e) What is QAM system ? 3

9. a) What is Source Coding and what is its objective ? 2

b) Define Codeword length, Average codeword length, Code efficiency and Code redundancy. 4

c) A DMS (Discrete Memoryless Source) X has five equally likely symbols.

x) Construct a Shannon-Fano code for X and calculate the efficiency of the code. 3

y) Construct another Shannon-Fano code and compare the results. 3

d) Define and write the mathematical expression of Information Rate. 3

10. Draw the block diagram of PCM system (transmitter and receiver) and briefly explain the operation of each of the blocks. 6

Find out the signal to quantization noise ratio for this system. 4

Mention the advantages of DPCM, DM and ADM systems over PCM system. 5

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

a) Error Control Coding

b) Matched filter

c) Adaptive Delta Modulation

d) Entropy and its properties

e) Spread Spectrum Modulation.