ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2009

ANALOG COMMUNICATION

SEMESTER - 4

Time : 3 Hours] [Full Marks : 70

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) In TV broadcast, sound is modulated in

a) VSB b) FM

c) SSB d) DSBSC. ☐

ii) A balance modulator circuit is used to reject

a) carrier b) LSB

c) USB d) LSB and USB. ☐

iii) The PCM signal can be generated by amplitude modulating

a) PAM b) PPM

c) PWM d) PDM. ☐

iv) A station is tuned to frequency of 1600 kHz, the image frequency is

a) 1600 kHz b) 1145 kHz

c) 2055 kHz d) 2510 kHz. ☐

v) The standared IF value for AM receivers is

a) 455 kHz b) 455 MHz

c) 108 MHz d) 10·7 MHz. ☐

vi) A phase modulated wave has

a) no sideband b) infinite no of sideband

c) two sideband d) six sideband. ☐

vii) NBFM is

a) inferior to AM b) superior to AM

c) same as AM d) superior to WBFM. ☐

viii) Capture effect is active in

a) AM b) PAM

c) PCM d) FM. ☐

ix) Modern FM demodulators uses

a) only quadrature detector b) only PLL

c) both (a) and (b) d) diode detector. ☐

x) The no. of sidebands is WBFM is

a) 1 b) more than 1

c) infinity d) none of these. ☐

xi) A source X which produces five symbols with probabilities $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ and $\frac{1}{16}$. The source entropy is

a) 1·875 b/symbols b) 2·875 b/symbols

c) 3 b/symbols d) 5·5 b/symbols. ☐

xii) De-emphasis in FM system involves

a) compression of modulating signal

b) expansion of the modulating signal

c) amplification of lower frequency signal of modulating signal

d) amplification of higher frequency signal of modulating signal. ☐

xiii) QAM modulator needs a phase shifter of phase shift

a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$

c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$. ☐

xiv) The frequency deviation produced in a VHF carrier by a signal of 100 Hz is 50 kHz. The frequency modulation index is

a) 100 b) 250

c) 500 d) 750. ☐

xv) PAM signal can be demodulated by using

a) a low-pass filter b) a high-pass filter

c) a band-pass filter d) none of these. ☐

GROUP – B

(Short Answer Type Questions)

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

2. Explain Ring Modulator for AM generation in a double balanced modulator.

3. a) Define FM signal in time domain.

b) How can FM be generated using phase modulator circuit ? Explain using block diagram. 2 + 3

4. a) What do you mean by TDM ? Where is this concept used ?

b) Draw the PCM system block diagram. 3 + 2

5. What is a slope detector ? What are the problems of slope detectors and how is it overcome using a balanced slope detector ? 2 + 3

6. What are PWM and PPM ? Compare the performance of this two signals. 2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. a) What is pilot carrier in AM transmission ?

   b) What is modulation index of an AM signal ?

   c) Find out the maximum limit of transmission efficiency of an AM signal for a single tone message.

   d) Draw the schematic diagram of VSB modulator and explain. 2 + 2 + 5 + 6

8. a) Draw the block diagram of a superheterodyne receiver and explain its working principle.

   b) What is image frequency related to it ?

   c) Explain the 'Selectivity' parameter related to it. 10 + 2 + 3

9. a) Draw the schematic diagram of NBFM generation and explain.

   b) Explain the principle of FM wave generation using direct method. State the demerits of this method.

   c) Consider an angle modulated signal :

   $$y(t) = [\, 10 \cos [\, \omega_c t + 3 \sin (\omega_m t) \,].$$

   Assume Phase Modulation and f_m = 1 kHz.

   Calculate,

   i) frequency modulation index.

   ii) bandwidth when f_m is doubled. 5 + 5 + 5

10. a) State Channel capacity theorem.

b) What is meant by entropy of a source ?

c) What is source coding ? Why is it done ?

d) A source is generating 8 symbols with probabilities 0·25, 0·2, 0·2, 0·1, 0·1, 0·05, 0·05 and 0·05. Calculate the entropy and rate of information.

3 + 3 + (2 + 2) + 5

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

a) Foster Seeley Detector

b) VSB modulation

c) Super heterodyne receiver

d) Stereophonic FM transmitter and receiver

e) Direct method of FM generation.

END