Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (BME)/SEM-5/BME-505/2009-10

2009

COMMUNICATION CIRCUITS AND SYSTEMS

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 the following : 10 × 1 = 10

   i) For critical modulation, the value of modulation index is

      a) < 1 b) = 1

      c) > 1 d) ~ 1.

   ii) Baseband transmission is the transmission of ..... signal.

      a) modulated b) carrier

      c) broadband d) information.

   iii) The angle modulation is

      a) only AM b) both PM & FM

      c) both AM & FM d) only FM.

iv) The single sideband power is

a) $(P_c m^2)/4$ b) $(P_c m^2)*4$

c) $(P_c m^3)/4$ d) $(P_c m^4)/4$.

v) In NBFM phasor diagram the resultant has ..... amplitude with carrier but/and ..... phase.

a) same, in b) different, out of

c) different, in d) same, out of.

vi) PLL is the application of

a) amplitude demodulator

b) frequency demodulator

c) amplitude modulator

d) frequency modulator.

vii) TRF works in the range of

a) 535 — 1640 Hz b) 535 — 1640 MHz

c) 535 — 1640 KHz d) 535 — 1640 mHz.

viii) Class AB amplifier conducts for

a) 90°

b) greater than 180°

c) less than 360°

d) less than 360° but more than 180°.

ix) The length of antenna to transmit a signal must be at least

a) $\frac{1}{3}$rd wavelength b) $\frac{2}{3}$rd wavelength

c) $\frac{1}{4}$th wavelength d) none of these.

x) The minimum sampling frequency is called

a) Carlson frequency b) Pulse sampling rate

c) Nyquist sampling rate d) none of these.

GROUP – B
(Short Answer Type Questions)

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

2. An SSB transmitter produces a peak-to. peak voltage of 178 V across a 75 Ω antenna load. What is the value of peak envelope power (PEP) ? What are the applications of DSB and SSB signals ? 3 + 2

3. What are the advantages and disadvantages of FM over AM ? What are the lock range and capture range of PLL ? 2 + 3

4. Write the generation and detection of PSK.

5. What are the applications of telemetry ?

6. Explain briefly how the physiological signals can be transmitted over telephonic line.

7. a) What is companding ?

   b) With a suitable block diagram, explain the principle of DM. 2 + 3

GROUP – C
(Long Answer Type Questions)

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

8. Draw a block diagram of general communication system. Why is modulation necessary ? Explain the operating principle of any amplitude demodulator. Write a short note on superheterodyne receiver. 3 + 3 + 5 + 4

9. a) Briefly describe the generation of SSB (phasing) signal by balanced modulator.

   b) Write down the operating principle of VCO.

c) Suppose that on an AM signal, the V_{max} ($p-p$) value read from the graticule on the oscilloscope screen is 5·9 divisions and V_{min} ($p-p$) is 1·2 divisions.

i) What is modulation index ?

ii) Calculate V_c, V_m and m if the vertical scale is 2V per division. 5 + 5 + 5

10. Write down the sampling theorem. Explain the TDM with a neat sketch. Why is PCM necessary ? Explain the process of PCM with diagram. 3 + 5 + 2 + 5

11. What is power amplifier ? With a neat sketch explain the operating principle of Class *B* power amplifier. What are the advantages and limitations of tuned power amplifier ? 3 + 7 + 5

12. a) A video signal 5 MHz is to be transmitted through a PCM system. The signals are sampled at a rate of 20% more than the Nyquist rate. There are 1024 quantization levels. What will be the transmission rate ?

b) Draw ASK, FSK & PSK signals to transmit data stream 1111000111.

c) Explain the generation of ASK and FSK with expression. 3 + 6 + 6

13. a) State & explain sampling theorem.

b) Draw the block diagram of PAM transmitter & explain its working principle.

c) Explain the generation and demodulation of PWM signal. 3 + 6 + 6