

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH/BME(O)/SEM-5/BME-505/2012-13

2012

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 : $10 \times 1 = 10$

i) An amplitude modulated current is given by

$$i = 100 [1 + 0.4 \sin 3140 t] \sin (6.28 \times 10^5 t)$$

The modulation index of the wave is

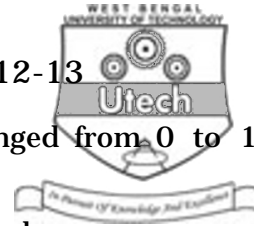
- a) 20% b) 40%
c) 60% d) 80%.

ii) 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.

5538(O)

[Turn over



- iii) The modulation index of AM is changed from 0 to 1. The transmitted powers is
- unchanged
 - halved
 - doubled
 - increased by 50%.
- iv) An FM signal with deviation Δf is passed through a mixer, and has its frequency reduced five-fold. The deviation in the output of the mixer is
- $5\Delta f$
 - $7\Delta f$
 - $\frac{\Delta f}{5}$
 - Δf .
- v) A signal of maximum frequency of 8 kHz is sampled at Nyquist rate. The time intervals between the two successive samples will be
- 62.5 μsec
 - 125 μsec
 - 1250 μsec
 - none of these.
- vi) The minimum sampling frequency is called
- Carlson frequency
 - Pulse sampling rate
 - Nyquist sampling rate.
- vii) If $m(t)$ be the message signal and f_c be the carrier frequency, then the following signal $s(t) = A_c \cos [2\pi f_c t + k_p m(t)]$ is
- AM
 - FM
 - PM
 - ASK.
- viii) SSB signal can be detected by
- Envelop detector
 - PLL
 - Synchronous detector
 - Foster silly discriminator.

- ## GROUP – B

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

- 5538(O)



GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Express modulation index in terms of maximum and minimum voltage of modulated signal.
- b) Draw AM signal for under-modulated and over-modulated signal. State the condition for these modulation.
- c) What is DSB-SC ? With neat diagram, show how DSB-SC signal can be generated using balanced modulator.
- d) Explain why SSB modulated signal cannot be demodulated by envelop detector. $3 + (3 + 3) + 3 + 3$
8. a) A video signals 5 MHz is to be transmitted through a PCM system. The signals sampled at a rate 20% more than the Nyquist rate. There are 1024 quantization level. What will be the transmission rate ?
- b) Draw ASK, FSK & PSK signal to transmit data stream 1111000111.
- c) Explain the generation of ASK and FSK with expression. $3 + 6 + 6$
9. a) Explain how telemetry can be applied in patient-care and sports.
- b) Explain with neat diagram, the working principle of successive approximation type A/D converter.
- c) What is image frequency ? Why does it occur ? How can it be rejected ? $(3 + 3) + 5 + (2 + 1 + 1)$
10. Write short notes on any *three* of the following : 3×5
 - a) FM demodulation using PLL
 - b) TDM
 - c) VSB
 - d) VCO.
11. 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. $3 + 6 + 6$

