



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech/EEE/NEW/SEM-6/EEE-605 B/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.*

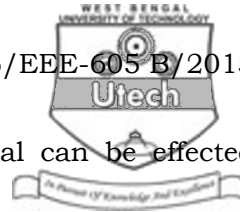
GROUP – A

(Multiple Choice Type Questions)

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

10 × 1 = 10

- i) The modulation index of an AM wave is changed from 0 to 1. The transmitted power is
 - a) unchanged
 - b) halved
 - c) doubled
 - d) increased by 50%.
- ii) DSB-SC signal can be demodulated using
 - a) a high pass filter
 - b) a phase discriminator
 - c) a PLL
 - d) an envelop detector.



- ix) Coherent demodulation of FSK signal can be effected using
- a) correlation receiver
 - b) bandpass filters and envelope detector
 - c) matched filter
 - d) discriminator detection.
- x) Which encoding method uses alternating positive and negative values of 1s ?
- a) NRZ
 - b) RZ
 - c) Manchester
 - d) AMI.
- xi) An analog signal is quantized using L levels, the signal to quantization noise varies
- a) Directly with L
 - b) Directly with L^2
 - c) Directly with L^3
 - d) None of these.
- xii) If maximum frequency present in one the modulating signal is 5kHz then which one violets sampling theorem ?
- a) $F_s = 7\text{kHz}$
 - b) $F_s = 12\text{kHz}$
 - c) $F_s = 15\text{kHz}$
 - d) $F_s = 20\text{kHz}$.



GROUP – B

(Short Answer Type Questions)

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

2. In context of communication why carrier signal is required ?
Draw the block diagram of component of communication system and briefly explain each unit. $1 + 4$
3. Define Noise ? Where it is most likely to affect the signal ?
AM broadcasting is more affected by Lightning Discharge compared to FM broadcasting. Justify your answer. $1 + 1 + 3$
4. a) What is eye pattern ?
b) How is it generated in CRO ?
c) What information we get from it. $1 + 2 + 2$
5. What do you mean by line coding ? What are different line coding techniques ? Write down properties of line coding ?
 $1 + 1 + 3$
6. Explain the principle of ISI and Nyquist criterion for distortionless baseband binary transmission.
7. A modulating signal is given by $V_m = 2 \sin (2\pi \times 500t)$ amplitude modulates a carrier signal given by $V_c = 10 \sin (2\pi \times 10^6t)$

Determine - a) Modulation index

b) frequency present in modulated signal

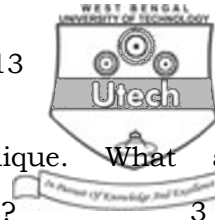
c) Total Transmission power.



GROUP – C
(Long Answer Type Questions)

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

8. a) What do you mean by sampling ? State and prove sampling theorem ? $1 + 1 + 3$
- b) What is Aliasing ? How you can avoid aliasing ? $2 + 2$
- c) What is Nyquist rate and Nyquist interval ? $1 + 1$
- d) What do you mean by Interpolation ? Derive Interpolation formula for reconstruction of a signal from its samples. $1 + 3$
9. a) What do you mean by Frequency Modulation (FM). If modulating signal is $A_m \cos \omega_m t$ and carrier signal is $A_c \cos \omega_c t$, then draw time domain description of FM signal. $1 + 3$
- b) Explain FM demodulation scheme using PLL. Mention the advantage of PLL demodulator. $5 + 1$
- c) A carrier is frequency modulated by a sinusoidal modulating signal of frequency 2kHz, resulting in a frequency deviation of 5kHz. what is the bandwidth occupied by the modulated waveform ? The amplitude of the modulating sinusoid is increased by a factor 2 and its frequency lowered by 1kHz. what is the new bandwidth ? 5



10. a) Explain Delta modulation technique. What are advantages and disadvantages of DM ? 3 + 3

b) What do you mean by dynamic range of delta modulator ? 3

c) In PCM if modulating signal is sinusoidal then show that signal to Quantization noise ratio $((SNR)_{dB})$ is approximately $(1.8 + 6v)$. Where v is no. of bit per code.

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11. a) What do you mean by channel capacity ? How is it depending on SNR ? 2 + 2

b) An event has six possible outcomes with the probabilities $p_1 = \frac{1}{2}$, $p_2 = \frac{1}{4}$, $p_3 = \frac{1}{8}$, $p_4 = \frac{1}{16}$, $p_5 = \frac{1}{32}$, $p_6 = \frac{1}{32}$. Find the entropy of the system. Also find the rate of information if there are 16 outcomes per second. 2 + 2

c) Apply the Shanon-Fano coding procedure for the given message ensemble :

$$[X] = [x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7 \quad x_8]$$

$$[P] = [\frac{1}{4} \quad \frac{1}{8} \quad \frac{1}{16} \quad \frac{1}{16} \quad \frac{1}{4} \quad \frac{1}{16} \quad \frac{1}{8} \quad \frac{1}{8}]$$

Assume $M = 2$. Also find efficiency of coding. 7



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

- a) Significance of EYE pattern
 - b) Discrete memoryless source.
 - c) QAM system
 - d) Envelope Detector
 - e) Matched filter.
 - f) Hoffman coding.
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