



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech/(EE-NEW)/SEM-6/EE-605B/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 :

$10 \times 1 = 10$

- i) The PCM signal can be generated by amplitude modulating
 - a) PAM
 - b) PWM
 - c) PPM
 - d) PDM.
- ii) Adaptive delta modulation preferred over delta modulation as
 - a) it gives better noise performance
 - b) it uses lesser bits for encoding the signal
 - c) it does not suffer from slop over load and threshold effect
 - d) it has simpler circuitry.



- iii) Entropy is basically measure of
- a) Rate of Information
 - b) Average Information
 - c) Probability of Information
 - d) Channel capacity.
- iv) A source delivers symbols m_1, m_2, m_3 and m_4 with probability $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$ and $\frac{1}{8}$ respectively. The entropy of the system is
- a) 1.7 bits/sec
 - b) 1.75 bits/symbols
 - c) 1.75 symbols
 - d) 1.75 symbols/bit
- v) The main advantage of PCM system is
- a) Lower bandwidth
 - b) Lower Power
 - c) Lower Noise
 - d) None of these.
- vi) The highest modulating frequency used in AM broadcast system is
- a) 5 kHz
 - b) 10 kHz
 - c) 15 kHz
 - d) 2 MHz.



- xi) ISI is
- a) Inter Sample Interference
 - b) Intra sample Interference
 - c) Inter Symbol Interference
 - d) Intra Sample Interference.
- xii) The step size of Delta Modulation is
- a) Continuously changing
 - b) Discretely changing
 - c) Increased gradually
 - d) Fixed.

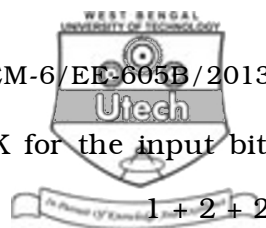
GROUP – B

(Short Answer Type Questions)

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

2. Given the data stream 1001101. Sketch the transmitted sequence of rectangular pulses for each of the following line codes : 5×1

- (i) Unipolar NRZ
- (ii) Unipolar RZ
- (iii) Polar RZ
- (iv) Polar NRZ
- (v) Bipolar NRZ.



3. Draw the waveform of ASK, PSK and FSK for the input bit sequence 00111011. 1 + 2 + 2

4. Show that in case of AM with modulation index equal to 1, only 33.33% of the transmitted power is used to carry information.

5. a) Considering a sinusoidal modulating signal $m(t)$ and carrier $c(t)$, draw the following waveforms :
 - (i) AM signal
 - (ii) FM signal.

- b) If the modulation index of AM signal is greater than unity, what problems will be encountered during demodulation ? 2 + 2 + 1

6. What is a PN sequence ? What are the properties of PN sequence ? 2 + 3

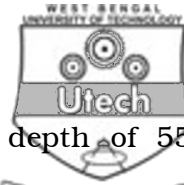
GROUP – C

(Long Answer Type Questions)

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

7. a) Derive the general expression for PM and FM wave. Hence comment on the relationship between them.

- b) What is Carson's Bandwidth ?



- c) A 300 W carrier is modulated on a depth of 55%. Calculate the total power in the modulated wave in the following forms of AM.

(i) DSB with carrier

(ii) DSB with suppressed carrier. $6 + 2 + 2 + 2 + 3$

8. a) State and explain Sampling theorem ?

b) Explain with a suitable block diagram how an analog signal is converted to digital signal using PCM ?

c) What are the desirable properties of line codes ?

d) What are the disadvantages of BPSK and how is it improved ? $4 + 5 + 2 + 4$

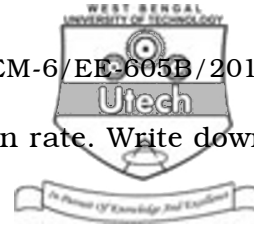
9. a) What is Inter Symbol Interference (ISI) ?

b) What is Nyquist criteria for zero ISI ?

c) Explain Matched Filter.

d) Compare Bit Rate with Baud Rate.

e) What is Shannon's limit ? $4 + 3 + 3 + 3 + 2$



10. a) Define source entropy and information rate. Write down the Shannon's theorem.
- b) Define Shannon-Fano algorithm for encoding.
- c) A discrete source emits one of five symbols once every millisecond with probabilities $1/2$, $1/4$, $1/8$, $1/16$, $1/16$. Obtain the source entropy and information rate using Shannon-Fano algorithm. $5 + 5 + 5$
11. Write short notes on any *three* of the following : 3×5
- a) VSB modulation
 - b) Envelop Detector
 - c) Delta modulation
 - d) Eye Pattern
 - e) Hartley-Shannon Law.
-