

ELEMENTARY COMMUNICATION ENGINEERING*Time Allowed: 3 Hours**Full Marks: 70*

Answer to Question No.1 is compulsory and to be answered first.

This answer is to be made in separate loose script(s) provided for the purpose.

Maximum time allowed is 45 minutes, after which the loose answer scripts will be collected and fresh answer scripts for answering the remaining part of the question will be provided.

**On early submission of answer scripts of Question No.1,
a student will get the remaining script earlier.**

Answer any five questions from Group-A, B & C, taking at least one from each group.

1. A. Choose the correct answer from the given alternatives (any ten): 1x10
- i) If modulation is 100% then signal amplitude is _____ carrier amplitude – (a) equal to, (b) greater than, (c) less than, (d) none of these.
 - ii) Standard intermediate frequency used for AM receiver is – (a) 455 MHz, (b) 455 KHz, (c) 455 Hz, (d) none of these.
 - iii) Calculate the bandwidth occupied by a DSB signal when the modulating frequency lies in the range from 100 Hz to 10 KHz – (a) 28 KHz, (b) 24.5 KHz, (c) 38.6 KHz, (d) 19.8 KHz.
 - iv) A modulation index of 0.5 would be same as – (a) 0.5 of Modulation Depth, (b) ½% of Modulation Depth, (c) 5% of Modulation Depth, (d) 50% of Modulation Depth.
 - v) A 3 GHz carrier is DSB SC modulated by a signal with maximum frequency of 2 MHz. The minimum sampling frequency required for the signal so that the signal is ideally sampled is – (a) 4 MHz, (b) 6 MHz, (c) 6.004 GHz, (d) 6 GHz.
 - vi) In a super heterodyne receiver – (a) IF stage has better selectivity than RF stage, (b) the RF stage has better selectivity than IF stage, (c) the RF stage has same selectivity than IF stage, (d) none of the above.
 - vii) Three point tracking is achieved with which of the following? – (a) Double spotting, (b) Double conversion, (c) Variable selectivity, (d) The padding capacitor.
 - viii) A receiver having poor IF selectivity will also have poor – (a) sensitivity, (b) blocking, (c) diverse reception, (d) all of the above.
 - ix) In digital transmission, the modulation technique that requires minimum bandwidth is – (a) Delta modulation, (b) PCM, (c) DPCM, (d) PAM.
 - x) Granular noise occurs when – (a) Step size is too small, (b) Step size is too large, (c) there is interference from the adjacent channel, (d) bandwidth is too large.
 - xi) Central offices are connected by – (a) local loops, (b) trunk lines, (c) both a and b, (d) none of the above.

- xii) The typical voltage needed to "ring" a telephone is – (a) 48 volts DC, (b) 48 volts, 20 hertz AC, (c) 90 volts DC, (d) 90 volts, 20 hertz AC.

B. Answer the following questions (any five):

2x5

- i) What is Depth of Modulation?
- ii) Calculate the Power in one of the Sideband in SSBSC Modulation when the Carrier power is 124W and there is 80% Modulation Depth in the Amplitude Modulated Signal?
- iii) What are the advantages of using RF amplifier in super heterodyne receiver?
- iv) What is PLL?
- v) What is 'three point tracking'?
- vi) What is ISI?
- vii) What is meant by the term 'aliasing'?
- viii) What is the basic principle of time division switching?
- ix) Write two important applications of PWM technique.
- x) What is non-linear quantization?

Group-A

2. What is electromagnetic spectrum? Briefly discuss about different types of electronic communication. Define amplitude modulation with the help of a neat sketch. What is VCO? 2+3+(2+2)+1
3. With aid of necessary circuit diagram briefly discuss an AM generation method. Represent an AM signal in time and frequency domain. What is angle modulation? (3+3)-2+2
4. Briefly explain the principle of generation of PWM with the help of a neat block diagram. What is flat top sampling? Write down two important advantages of SSBSC over DSBSC. (2+4) 2+2

Group-B

5. Draw the block diagram of FM broadcast transmitter and discuss the functions of different stages of it. What is delayed AGC? What is pre-emphasis? (3-3)-2-2
6. Draw the neat block diagram of super heterodyne receiver and briefly explain the functions of IF stage. What are the factors that affect the choice of IF? Define one important characteristic of a radio receiver. <https://www.wbscteonline.com> (3+2)+3+2
7. Briefly explain the operation of limiter circuit with the help of circuit diagram. What is image frequency? What is 'lock range' in PLL? (3+3)+2+2

Group-C

8. Draw the block diagram of PCM transmitter and briefly explain the function of Quantizer. What is dynamic range? What is side tone? (3+3)+2+2
9. Briefly discuss the basic concept of CVSD with the help of necessary circuit diagram. Briefly explain the need of non-linear quantization in PCM technique? 7+3
10. Write short notes on the followings (any two): 5x2
(a) Line coding, (b) Companding, (c) Switching techniques in Electronic Exchange, (d) DTMF