

Principles of Electronic Communication (313326)

MSBTE Diploma · K-Scheme · Model Question Paper — Set C

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Use of non-programmable electronic pocket calculator is permissible.
7. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) Define simplex and full duplex mode of communication with one example each.
- b) Justify: electromagnetic wave is said to be a transverse wave.
- c) Define phase modulation. Draw the PM waveform for a sinusoidal modulating signal.
- d) A 2 MHz carrier is amplitude modulated by a 3 kHz audio signal. Find the upper and lower sideband frequencies and the bandwidth.
- e) Define image frequency. Find the image frequency of an AM receiver tuned to 1000 kHz (IF = 455 kHz).
- f) Define the following terms: (i) Fading (ii) Polarization of EM wave
- g) Define the following terms w.r.t. antenna: (i) Radiation pattern (ii) Beam width

Q.2 Attempt any THREE of the following:**12**

- a) Compare synchronous and asynchronous transmission (any four points).
- b) Three AM transmitters have the following specifications: A — $P_c = 1500\text{ W}$, $m = 40\%$; B — $P_c = 1200\text{ W}$, $m = 70\%$; C — $P_c = 1000\text{ W}$, $m = 90\%$. Find (i) total transmitted power of A, B and C (ii) justify which transmitter is better as far as transmitted (sideband) power is concerned.
- c) Compare narrow band FM and wide band FM w.r.t. (i) Modulation index (ii) Maximum deviation (iii) Range of modulating frequency (iv) Noise immunity
- d) Describe ground wave propagation along with neat sketch.

Q.3 Attempt any THREE of the following:**12**

- a) Draw the practical AM diode detector circuit. Sketch its input and output waveforms.

- b) In commercial FM broadcasting the maximum frequency deviation is 75 kHz and the maximum modulating frequency is 15 kHz. Calculate the deviation ratio and bandwidth of FM.
- c) Name the layer of ionosphere which satisfies the following conditions:
 - (i) Exists only in day time and is the lowest layer.
 - (ii) Particularly absorbs HF waves yet allows them to reach the upper layer.
 - (iii) Efficiently reflects HF waves, especially at night.
 - (iv) Lies at about 100 km and reflects some HF waves in day time.
- d) Compare loop antenna and ferrite rod antenna on the basis of: (i) Working principle (ii) Construction (iii) Radiation pattern (iv) Application

Q.4 Attempt any THREE of the following:

12

- a) Draw the block diagram of low level AM transmitter. State two differences between low level and high level modulation.
- b) Draw the block diagram of PLL used as FM demodulator and describe the function of each block.
- c) Find out the type of propagation for: (i) FM radio broadcasting (ii) Ship-to-shore communication (iii) Satellite communication (iv) Amateur (HAM) radio over long distance
- d) Draw the radiation pattern of resonant dipole antennas of length: (i) $L = \lambda/2$ (ii) $L = \lambda$ (iii) $L = 2\lambda$ (iv) $L = 3\lambda$
- e) Compare resonant and non-resonant antenna on the basis of: (i) Definition (ii) Circuit (iii) Reflection coefficient (iv) Radiation pattern

Q.5 Attempt any TWO of the following:

12

- a) Define amplitude modulation and modulation index. Explain the effect of modulation index on AM wave for $m = 0$, $m < 1$, $m = 1$ and $m > 1$ with waveforms. An AM wave displayed on a CRO has $V_{\max} = 15 \text{ V}$ and $V_{\min} = 5 \text{ V}$; find the percentage modulation.
- b) Write down the frequency range and one application of each of the following: (i) Voice frequency (ii) Medium frequency (iii) Very high frequency (iv) Super high frequency (v) Infrared (vi) Visible light
- c) Describe microstrip patch antenna with neat diagram. Draw its radiation pattern. List its advantages and applications.

Q.6 Attempt any TWO of the following:

12

- a) (i) Define principle of superheterodyne receiver.
(ii) Explain the working of AM superheterodyne receiver with the help of neat block diagram and waveforms.
- b) (i) Compare sky wave and space wave propagation w.r.t. frequency range, polarization, service range and application.

- (ii) Define MUF. The critical frequency of a layer is 9 MHz; find the MUF for an angle of incidence of 60° .
- c) Write two applications of each of the following antennas: (i) Loop antenna (ii) Yagi-Uda antenna (iii) Telescopic antenna (iv) Dish antenna (v) Flexible antenna (vi) Smart antenna

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in

