

Principles of Electronic Communication (313326)

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

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 analog signal and digital signal with neat sketch.
- b) Differentiate between simplex and half duplex mode of communication (any two points).
- c) Define sensitivity and selectivity of a radio receiver.
- d) State the value of intermediate frequency (IF) used in: (i) AM (MW band) receiver (ii) FM broadcast receiver.
- e) State any four characteristics of ground (surface) wave propagation.
- f) Name the layers of ionosphere present during (i) day time (ii) night time.
- g) Draw a neat sketch of Yagi-Uda antenna along with its radiation pattern.

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

- a) Define noise in electronic communication. Classify noise and explain any two types of external noise.
- b) A 10 kW carrier is amplitude modulated simultaneously by two sine waves to modulation depths of 0.4 and 0.5. Calculate the total modulation index, total transmitted power and the antenna current if the unmodulated antenna current is 8 A.
- c) Compare narrow band FM and wide band FM w.r.t. (i) Range of modulating frequency (ii) Bandwidth (iii) Need of pre-emphasis (iv) Application.
- d) Find the type of propagation used for: (i) FM radio broadcasting (ii) Ship-to-shore communication (iii) Microwave links (iv) Mobile (cellular) communication

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

- a) Draw and explain the block diagram of low level AM transmitter.

- b) An FM signal has a maximum frequency deviation of 9 kHz and modulation index 3. Using the Bessel function table, find the number of significant sidebands and the bandwidth. Also find the bandwidth by Carson's rule.
- c) Define the following terms w.r.t. sky wave propagation: (i) Maximum usable frequency (ii) Virtual height (iii) Actual height (iv) Critical frequency
- d) Draw the radiation pattern of resonant dipole antennas for: (i) $L = \lambda/2$ (ii) $L = \lambda$ (iii) $L = 3\lambda/2$ (iv) $L = 3\lambda$

Q.4 Attempt any THREE of the following:

12

- a) Describe the varactor diode modulator used for FM generation with neat circuit diagram.
- b) Compare sky wave and space wave propagation w.r.t. (i) Principle (ii) Frequency range (iii) Service range (iv) Effect of fading
- c) Compare AM and FM on the basis of: (i) Definition (ii) Modulation index (iii) Bandwidth (iv) Noise immunity
- d) Compare resonant and non-resonant antenna on the basis of: (i) Definition (ii) Reflection (iii) Bandwidth (iv) Example
- e) Choose a proper antenna for the following applications: (i) Portable MW radio receiver (ii) TV reception at VHF (iii) DTH satellite TV reception (iv) GPS receiver in a mobile phone

Q.5 Attempt any TWO of the following:

12

- a) A modulating signal $6 \sin (2\pi \times 2 \times 10^3 t)$ amplitude modulates a carrier $10 \sin (2\pi \times 2 \times 10^5 t)$. Find the modulation index, percentage modulation, frequencies and amplitudes of the sidebands and bandwidth. Draw the frequency spectrum and sketch the AM wave.
- b) Compare DSB-FC (AM), DSB-SC and SSB w.r.t. (i) Carrier suppression (ii) Sideband suppression (iii) Bandwidth (iv) Transmission efficiency (v) Power requirement (vi) Application
- c) Describe microstrip patch antenna with neat sketch. Draw its radiation pattern and list its advantages and applications.

Q.6 Attempt any TWO of the following:

12

- a) Redraw the block diagram shown in Fig. 1 by identifying the blank blocks A, B and C. Describe the function of each block of the receiver.

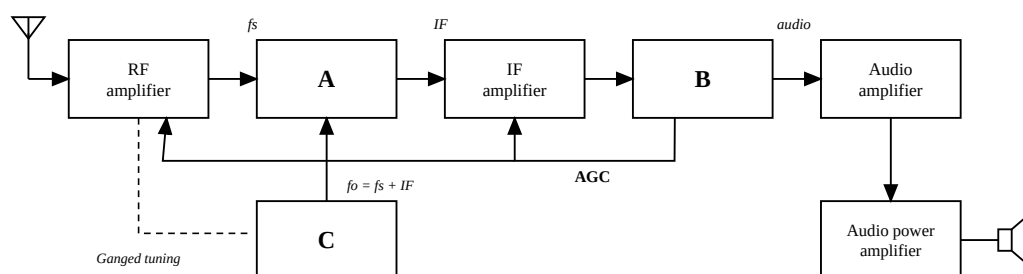


Fig. 1

- b) List different methods of FM detection. With the help of neat block diagram explain PLL as FM demodulator.
- c) Write the correct frequency range for the following applications: (i) Voice communication (ii) Short wave (international) broadcasting (iii) FM radio broadcasting (iv) RADAR (v) Power transmission (vi) Cellular phones

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