

Time: 3 Hours

DECEMBER 2014

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. Indicate the false statement. Modulation is used to
- (A) reduce the bandwidth used
 - (B) separate differing transmissions
 - (C) ensure that intelligence may be transmitted over long distance
 - (D) allow use of practical antenna
- b. Amplitude modulation is the process of
- (A) superimposing a low frequency on a high frequency
 - (B) superimposing a high frequency on a low frequency
 - (C) carrier interruption
 - (D) frequency shift and phase shift
- c. The value of a resistor creating thermal noise is doubled. The noise power generator is therefore
- (A) halved
 - (B) quadrupled
 - (C) doubled
 - (D) unchanged
- d. The modulation index of an AM wave is changed from 0 to 1. The transmitted power is
- (A) unchanged
 - (B) halved
 - (C) doubled
 - (D) increase by 50 percent
- e. FM signal with modulation index m is passed through a frequency tripler, the modulation index of the output is
- (A) m
 - (B) $9m$
 - (C) $3m$
 - (D) $m/3$

- f. Frequencies in UHF range generally propagates by means of
- (A) ground wave (B) sky wave
(C) space waves (D) surface waves
- g. The standard reference antenna for the directive gain is
- (A) dipole (B) isotropic
(C) half dipole (D) elementary doublet
- h. For low attenuation, best transmission media is
- (A) Flexible waveguide (B) Ridged waveguide
(C) Rectangular waveguide (D) Coaxial cable
- i. The most common modulation system used for telegraphy is
- (A) frequency shift key (B) pulse code modulation
(C) single tone modulation (D) two tone modulation
- j. Which of the following system is digital
- (A) pulse amplitude modulation (B) pulse position modulation
(C) pulse width modulation (D) pulse code modulation

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

- Q.2** a. Draw and Explain block diagram of analog communication system. (8)
- b. Define noise in communication system and explain shot noise in detail. (8)
- Q.3** a. Explain amplitude modulation (AM) in detail and derive the expression for total power in a single tone AM signal. (8)
- b. Draw and explain the block diagram of the filter method for single side band (SSB) modulator. (8)
- Q.4** a. What are the advantages and disadvantages of FM over AM? (8)
- b. A carrier is frequency modulated with a sinusoidal signal of 2 kHz resulting in a maximum frequency deviation of 5 kHz. Find the approximate band width of the modulated signal (4)
- c. Compare wideband and narrowband Frequency modulation (FM). (4)

- Q.5** a. Explain, with a neat block diagram, the working of a superheterodyne radio receiver. (10)
- b. Explain, with a neat block diagram, foster seeley discriminator for FM detector. (6)
- Q.6** a. Determine the length of the antenna operating at frequency of 500 kHz (consider velocity factor 0.95). (4)
- b. Explain the following terms with respect to antenna
(i) Directive gain
(ii) Radiation resistance
(iii) Beam width. (6)
- c. Explain the construction and working of Yagi Uda antenna. (6)
- Q.7** a. Explain the various types of propagation modes in rectangular waveguide. (8)
- b. Explain the following terms with reference to sky wave propagation: (8)
(i) Maximum Usable frequency
(ii) Critical frequency
(iii) Skip distance
(iv) Fading
- Q.8** a. Explain in detail with suitable waveform pulse amplitude modulation, pulse width modulation and pulse position modulation. (9)
- b. State Shannon-Hartley theorem. Calculate the capacity of the noisy channel having bandwidth of 3.1 kHz and signal to noise ratio of 32 dB. (7)
- Q.9** Write short note on the following: (2×8)
(i) Time division multiplexing (TDM)
(ii) Advantages of fibre optics links over coaxial cable