

M.Sc Sem-3 Examination

504

Physics

Time : 2-30 Hours]

November-2024

[Max. Marks : 70

Q.1 (A) Draw the equivalent circuit for a short section of transmission line, and explain the physical meaning of each circuit element. [07]

A loss less coaxial cable has a capacitance of 100 pF/m and a characteristic impedance of 50Ω . Find the inductance of a 1 m long cable.

(B) Explain the terms: (i) Characteristic impedance [07]
(ii) VSWR

OR

Q.1 (A) What is Smith chart? What are the main features of a Smith chart. [07]

(B) Explain with necessary equations how a section of a short circuited and open circuited transmission line can be used as inductive circuit element in high frequency (R.F.) circuits. [07]

Q.2 (A) Explain the principle, structure and important properties of Yagi – Uda antenna. [07]

(B) Discuss the similarities and dissimilarities between the end fire and the broad side array antennas. [07]

OR

Q.2 (A) Derive radiation field equations for Hertzian dipole oriented in z - direction. [07]

(B) Write a detailed note on: Effect of ground on antennas. [07]

Q.3 (A) Define amplitude modulation. Derive the expression for instantaneous voltage of amplitude modulated wave and draw its frequency spectrum. [07]

(B) Describe Armstrong method of FM generation. [07]

OR

Q.3 (A) Draw circuit of Foster Seeley detector and explain the demodulation process of FM wave. List the advantage of this detector. [07]

(B) Explain working of envelope diode detector for demodulation of AM wave. [07]

Q.4 (A) List the various types of Pulse Modulations. What is Pulse amplitude modulation (PAM)? Draw its frequency spectrum and explain the aliasing effect in it? [07]

(B) What are the main requirements of Matched filter? Draw and discuss the circuit of Integrate and Dump type matched filter for rectangular pulses. [07]

OR

Q.4 (A) Describe Binary Phase Shift Keying (BPSK). How can it be generated and detected? Draw its frequency spectrum. [07]

(B) What is the importance of carrier recovery circuit? Draw and discuss Squaring Loop method for carrier recovery. [07]

- Q.5** Answer in brief **Any Seven** questions from the following: (Each question is of **two** mark). [14]
- (i) Define reflection coefficient? What will be the reflection coefficient in case of matched termination?
 - (ii) A 50Ω microwave transmission line is terminated in load $75 + 100j \Omega$. Find the normalized load impedance.
 - (iii) What is a quarter wave transformer? What is its use?
 - (iv) What are called parasitic elements in an antenna array?
 - (v) What is Log periodic antenna?
 - (vi) Draw radiation pattern of a parabolic reflector antenna.
 - (vii) State advantages of SSBSC type of modulation.
 - (viii) Calculate the bandwidth of Frequency modulated wave with modulating signal frequency, $f_m = 8 \text{ kHz}$ and maximum frequency deviation, $\Delta f = 75 \text{ kHz}$.
 - (ix) What is Minimum Shift Keying (MSK)?
 - (x) State Nyquist theorem.
 - (xi) In a PCM system the signal with a cut off frequency of 6 kHz is digitized into 6 bit samples. Find the Signal to Noise $[(S/N)_q]$ ratio.
 - (xii) What is meant by probability of bit error in baseband transmission system? Is Probability of Bit error (P_{be}) lower in Polar waveform than unipolar waveform?

*** PAPER ENDS ***