2/26

2803N1146

Candidate's Seat No :_____

M.Sc. Sem.-3 Examination

504

Physics

March-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Q.1 (A) Draw the circuit approximation of a section of a transmission line. Derive an expression for input impedance of a transmission line as a function of length. [07]

(B) Explain the terms: (i) Characteristic impedance, and (ii) Reflection coefficient. A lossless T-line has characteristic impedance of 50 ohm and $Z_L = 120$ ohm. Find the reflection coefficient and VSWR. [07]

OR

Q.1 (A) What is Smith chart? Derive the equations of constant resistance and reactance circles of Smith chart. [07]

(B) Explain with necessary equations how a section of a short circuited and open circuited transmission line can be used as capacitive 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) Write a detailed note on types of antennas [07]

OR

Q.2 (A) Write a detailed note on: Parabolic reflector antenna [07]

(B) Discuss the effect of ground on antennas. [07]

Q.3 (A) Define amplitude modulation. Derive the expression for instantaneous voltage of amplitude modulated wave. Define amplitude modulation index (m_a). [07]

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

OR

Q.3 (A) Draw and discuss the circuit of a Balanced Modulator using JFET to generate Double sideband suppressed carrier (DSBSC) signal. [07]

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

Q.4 (A) Discuss Amplitude Shift Keying (ASK). Draw its frequency spectrum and find out its bandwidth requirement? [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) Name two types of carrier recovery circuits. Draw and discuss Costa Loop method for carrier recovery. [07]

(P.T.O)

Q.5 Answer in brief **Any Seven** questions from the following: (Each question is of **two** mark). [14]

(i) Define reflection VSWR? What will be the VSWR in case of matched termination?

(ii) What do you understand by matched load?

(iii) What is a quarter wave transformer? What is it's use?

(iv) What are called parasitic elements in an antenna array?

(v) Draw radiation pattern of a Log periodic antenna?

(vi) What is the difference between Fraunhofer and Fresnel region?

(vii) Give three reasons that explain the need of modulation.

(viii) Explain how phase modulation index (m_p) is different from frequency modulation index (m_f).

(ix) What is Minimum Shift Keying (MSK)?

(x) State Nyquist theorem.

(xi) (a) Ratio detector offers Amplitude limiting . **(TRUE or FALSE).**

(b) Frequency modulation is a constant bandwidth system. **(TRUE or FALSE).**

(xii) Define Pulse Position Modulation (PPM).

***** PAPER ENDS *****