N-56080   Seat No._____

M. Sc. (Part - II) Examination

April / May – 2003

Physics : Paper - III

(Electronics - II)

Time :   Hours]   [Total Marks :

Instructions : (1) Attempt **all** questions.

(2) All questions carry **equal** marks.

(3) Symbols and terminology used have their usual meaning.

1 (a) Discuss general theory of transmission line and derive general expression for voltage on a line as a function of distance. Represent variation of voltage on a lossy line using phasor diagram.

(b) Define VSWR. Express VSWR in terms of reflection coefficient. What do VSWR = 1 and VSWR = ∞ signify with respect the matching of the transmission line with load.

(c) What are quarter wave lines ? How it acts as impedance transformer ? What are its limitations ?

OR

1 (a) Derive expression for propagation constant for DETE waves in a rectangular wave guide and explain that waveguide behaves as high pass filter.

(b) For a rectangular waveguide show that :

$$\vartheta_p \times \vartheta_g = c^2.$$

(c) A rectangular waveguide is characterized by a=6 cm and b = 3 cm. If the operating wavelength is 4 cm, compute the guide wave-length and phase velocity.

2 (a) Sketch current and voltage distribution on a centre fed half wave dipole. Derive expression for electric field radiated by this antenna, hence sketch its radiation pattern.

(b) What do you mean by frequency independent antenna ? Draw diagram of a log periodic dipole array and explain its operation.

OR

2 (a) Derive an expression for field strength as a function of distance on an ideal earth in space wave propagation. Sketch its variation.

(b) Discuss the major factors that determine the effective mode of wave propagation in a communication system.

3 (a) Discuss construction and operation of devices used for measurement of relative and absolute power at microwave frequencies.

(b) What is an isolator ? Describe construction and working of a Faraday rotation isolator. What are the applications of this device ?

OR

3 (a) Draw block diagram of a pulsed radar system and explain in brief function of each block. Describe modulators used in pulsed radar system.

(b) A car is moving towards a stationary CW Doppler radar transmitting at 10 G Hz along the axis of radar with a speed of 108 km/hr. Determine the Doppler shift and frequency of received signal. What would be the frequency of received signal if the car was moving away from the radar along the same axis ?

4 (a) Describe phasing method of single side band suppressed carrier signal generation.

(b) Draw the circuit diagram of Foster – Seely discriminator and explain how does it demodulate frequency modulated signals.

(c) Write a note on differential pulse code modulation. (DPCM)

OR

4 (a) Draw the block diagram of high frequency AM communication receiver. Discuss each block briefly. What is the importance of double conversion and delayed AGC ?

(b) A radio receiver is tuned to 555 kHz with its local oscillator frequency being 1010 kHz, determine :

(i) Image frequency

(ii) Image frequency rejection ratio if the loaded 'Q' of the RF section is 40.

5 (a) Describe the construction and working of vidicon camera tube with the help of neat and labelled diagram. What are the disadvantages of this camera tube ?

(b) Describe composite video signal. What are Black and White reference level ?

OR

5 (a) Show that transmission loss in satellite communication is related to frequency and angle of elevation of antenna. Calculate transmission loss for a geostationary satellite operating in C–band for both up link and down link. Assume angle of elevation of earth station antenna is 10^0.

(b) With the help of a diagram, discuss various types of noises introduced on ideal ground based antenna looking to the satellite. Based on noise considerations suggest most suitable wavelength range for satellite communication.

(c) Discuss merits and demerits of satellite communication over fiber optics communication.

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