DNN-003-020406 Seat No. _____

M. Sc. (Physics) (Sem. IV) (CBCS) Examination

May / June – 2015

Physics ET - 9 : Electronic Communication

Faculty Code : 003
Subject Code : 020406

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Number on right margin indicates marks.

1. **Attempt any Seven:** **(14)**

(a) What are different types of Digital Modulation ?

(b) Contrast the advantages and disadvantages of fiber-optic cables and metallic cables.

(c) What are the normal modes of radio wave propagation ?

(d) Define: Shannon's limit for information capacity

(e) What are the primary and secondary transmission line constants?

(f) Define look angels for satellite

(g) Determine the maximum usable frequency (MUF) for ionospheric radio wave communication if a critical frequency is 20 MHz and an angle of incidence 35^0

(h) Define reflection coefficient of transmission line.

(i) Draw the block diagram of fiber optic communication system

(j) What is the dominant mode in wave guide ? What is the cut off wave length in rectangular wave guide for the dominant mode ?

2. **Attempt any TWO:**

(a) What is ionosphere in earth upper atmosphere ? Discuss the role of ionosphere in HF radio wave communication hence explain the terms: Plasma and critical frequencies, virtual height and skip distance. What is secant law ? **(07)**

(b) Write a note on "duct" and "tropo-scatter" modes of propagation **(07)**

(c) Derive expression for "Transmission path loss" incurred by an electromagnetic wave as it propagates through free-space. For a carrier frequency of 6000 MHz and a distance of 50 km, calculate the transmission path loss in dB **(07)**

3. (a) What is frequency shift keying ? Discuss working of FSK-transmitter and receiver with neat diagrams. **(07)**

(b) Explain the working of binary phase shift keying (BPSK) - modulator and receiver with truth table, phasor and constellation diagrams. **(07)**

OR

3. (a) Derive expression for input impedances of open (Z_{oc}) and short-circuited (Z_{sc}) transmission lines. Show that $Z_0 = \sqrt{Z_{oc} Z_{sc}}$, where Z_0 is the characteristic impedance of any uniform and symmetrical transmission line. Explain the variation of Z_{oc} and Z_{sc} as a function of line length. **(07)**

(b) Draw the internal layout of a communication satellite and explain function of each section in detail including uplink & down link models and transponder. **(07)**

4. **Attempt any TWO:**

(a) Show that how a TE_{10} wave can be formed by superposition of two TEM waves. Prove the relation : $\frac{1}{\lambda_g^2} = \frac{1}{\lambda^2} - \frac{1}{(2a)^2}$ for a rectangular waveguide where 'a' is broader dimension of rectangular waveguide. **(07)**

(b) What are the primary and secondary transmission line constants ? Derive general equation for input impedance (Z_{in}) of a transmission line of length ℓ and termination load Z_R **(07)**

(c) Describe different types of modes based on field configuration for a rectangular wave guide **(07)**

5. **Attempt any TWO:** **(14)**

(a) Write short note on 8-QAM

(b) What is a Geostationary satellite ? Write a brief note.

(c) Discus: Ground wave propagation mode for radio wave communication

(d) Write short note on Propagation of light through optical fiber

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