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

April / May - 2017

ET - 9 : Electronics Communications

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)   Determine power density for a radiated power of 1000 W at distance of 20 km from an isotropic antenna.

   (b)   For a carrier frequency of 6000 MHz and a distance of 50 km, calculate the transmission path loss in dB.

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

   (d)   Define look angels for a satellite.

   (e)   Define : radio horizon. How it is related to optical horizon ?

   (f)   Define : Baud in digital modulation

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

   (h)   What is transmission line? Enlist different types of lines with it's uses.

   (i)   What do you mean by modes in context of wave guide ? Explain TEM mode.

   (j)   Draw the block diagram of fiber optic communication system.

2   Attempt any **two** :
    (a) Discuss ionospheric radio wave propagation hence   7
         define plasma frequency, and critical frequency.

    (b) Radio wave communication link is to be established   7
         through the ionosphere. The maximum virtual height
         of the layer 100 km at the mid point of the path and
         critical frequency is 2 MHz. The distance between
         stations is 600 km. Determine the maximum usable
         frequency and angle of elevation for the antenna main
         beam.

    (c) Write a note on ground wave propagation.   7

3   (a) What are the methods for digital modulation ?   7
         Discuss working of FSKtransmitter and receiver with
         neat diagrams.

    (b) Write a detailed note on Quadrature Amplitude   7
         Modulation.

                              OR

3   (a) Derive transmission line equation.   7

    (b) Draw the internal layout of a communication satellite   7
         and explain function of each section in detail including
         uplink and down link models and transponder.

4   Attempt any **two** :
    (a) Derive expression for input impedances of open (Z_{oc})   7
         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.

    (b) Explain Physics of propagation of light through   7
         optical fiber.

    (c) Enlist primary and secondary constants of transmission   7
         line. Explain Importance of it.

5 Attempt any **two** : **14**

    (a) Write a note on geo-stationary satellite.

    (b) BPSK technique of digital modulation.

    (c) Differentiate transmission line and wave guide.

        Write a note on rectangular waveguide.

    (d) Classification of optical fiber based on number of modes and refractive index.

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