

M.SC.(Phy.) Semester - 4 (CBCS) Examination
April/May-2022 (NEW COURSE)
Electronic Communication (Elective)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

- Q.1. Answers the following any **SEVEN** [14]
- (i). Write a mathematical expression of snell's law with statement.
 - (ii). Draw block diagram of optical fiber communication link.
 - (iii). Explain why is single-mode propagation impossible with graded index fiber.
 - (iv). What do you mean by modes in context of wave guide? Explain TEM mode
 - (v). List the four primary constants of transmission line
 - (vi). Determine power density for a radiated power of 1000 W at distance of 20 km from an isotropic antenna.
 - (vii). What are the normal modes of radio wave propagation ? Give range of frequencies used for each mode.
 - (viii). Define look angles for a satellite.
 - (ix). What will be the radio horizon of a transmitting antenna of height 100 meters?
 - (x). Write a types of digital modulations.
- Q.2. Answer any **TWO** [14]
- (1). Write a brief note on Classification of optical fiber based on number of modes and refractive index.
 - (2). 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.
 - (3). Show that how a TE_{10} wave can be formed by superposition of two TEM waves. Prove the relation: $1/\lambda_g^2 = 1/\lambda^2 = 1/2a^2$ for a rectangular wave guide, where 'a' is broader dimension of rectangular waveguide.
- Q.3. Answer the following [14]
- (1). Write a note on Ground wave propagation of radiowaves.
 - (2). Draw the internal layout of a communication satellite and explain function of each section in detail including uplink & down link models and transponder
- OR**
- Q.3. Answer the following [14]
- (1). Derive Transmission line equation using circuit theory.
 - (2). Write a brief note on rectangular waveguide.
- Q.4. Answer any **TWO** [14]
- (1). Discuss radio wave communication through earth ionosphere hence define plasma frequency and critical frequency. What is virtual height ? How it is measured
 - (2). Radio wave communication link is to be established through the ionosphere. The maximum virtual height of the layer 100 km at the mid point of the path and critical frequency is 4 MHz. The distance between stations is 800 km. Determine the maximum usable frequency and angle of elevation for the antenna main beam.
 - (3). Write a note on tropospheric scatter propagation.
- Q.5. Answer any **TWO** [14]
- (1). Describe geo-stationary satellite
 - (2). Write a note on BPSK technique of digital modulation
 - (3). Explain Physics of propagation of light through optical fiber.
 - (4). Discuss primary and secondary constants of transmission line. Also, Differentiate transmission line and waveguides.
