



PX-003-1204007

Seat No. _____

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

August - 2020

ET - 11 : Electronic Communication

Faculty Code : 003

Subject Code : 1204007

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) For a carrier frequency of 6 GHz and a distance of 50 km, determine the free space path loss.
- (b) What will be the angle of elevation of an antenna when the virtual height and actual height of the ionosphere are equal ?
- (c) What are the normal modes of radio wave propagation ? Give range of frequencies used for each mode.
- (d) What are the various links of connections in satellite communication ?
- (e) What will be the distance to the radio horizon for an antenna height 4040 feet above ground level ?
- (f) What are the different techniques for digital modulation ?
- (g) Define : Shannon's limit for information capacity.
- (h) Enlist different types of losses in optical fiber system.
- (i) "Transmission line is called wireless link": explain in brief.
- (j) What do you mean by dominant mode in rectangular wave guide?

- 2 Attempt Any Two :**
- (A) What is ionosphere in earth's upper atmosphere ? **7**
 What are its different layers ? Which layer is used for radio wave communication ? Explain ionospheric HF radio wave propagation hence explain the terms: Plasma and critical frequencies.
- (B) How the virtual height of the ionosphere is measured ? **7**
 What is secant law ? Explain skip distance and service range.
 Determine maximum usable frequency for a critical frequency of 20 MHz and an angle of elevation 45° .
- (C) What is atmospheric duct radio wave communication? **7**
 Discuss duct propagation and tropospheric scatter propagation in detail.
- 3 (A) Determine elevation angle and azimuth angle for a **7****
 geo-stationary satellite at the given earth station :
 Earth station latitude : 22°
 Earth station longitude : 71°
 Satellite latitude : 0°
 Satellite longitude : 74°
 Distance from earth centre to satellite : 42164 km and radius of earth is 6378.14 km
- (B) Write a note on satellite orbital patterns and **7**
 geo-stationary satellite.
- OR**
- 3 (A) Write a detailed note on Quadrature Amplitude **7****
 Modulation.
- (B) Draw the internal layout of a communication satellite **7**
 and explain function of each section in detail including uplink & down link models and transponder.

- 4 Attempt Any **Two** : 7
- (A) Show that how a TE₁₀ wave can be formed by 7
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.
- (B) Write a brief note on infinite transmission line with 7
necessary expressions. Also, define secondary constants
of transmission line.
- (C) Explain Physics of propagation of light through 7
optical fiber.
- 5 Attempt Any **Two** : 14
- (A) Write a note on Ground wave propagation
- (B) Write a note on BPSK technique of digital modulation
- (C) Write a note on transmission line with any termination.
- (D) Differentiate transmission line and wave guide. Write
a note on rectangular waveguide.
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