

**International Islamic University Chittagong**  
**Department of Electronic and Telecommunications Engineering**  
**Final Examination**

Program: B.Sc. (Engg.)  
Course Code: ETE-4705  
Full Marks: 50

Semester: Autumn, 2018  
Course Title: Satellite Communications  
Time: 2 Hour 30 Minutes

**Group-A (20 Mark)**

Answer any **two** questions. The numbers in the right margin indicate full marks.

- Q.1 (a) Can you make the distinction between rain and cloud attenuation? 2  
(b) Outline SCPC and MSPC. 2  
(c) A satellite transponder has a bandwidth of 36 MHz and saturation EIRP of 27 dBW. The earth-station receiver has a  $[G/T]$  of 30dB/K, and the total link losses are 196 dB. The transponder is accessed by FDMA carriers each of 3-MHz bandwidth, and 6-dB output back off is employed. Calculate the downlink carrier-to-noise ratio for single-carrier operation and the number of carriers which can be accommodated in the FDMA system. Compare this with the number which could be accommodated if no back off were needed. The carrier-to noise ratio determined for single-carrier operation may be taken as the reference value, and it may be assumed that the uplink noise and inter modulation noise are negligible. 6
- Q.2 (a) Explain what is meant by rain rate and how it is related to specific attenuation. 4  
(b) What is depolarization? Explain how depolarization is caused by rain. 6
- Q.3 (a) Derive the free space transmission loss equation. 3  
(b) Draw and shortly explain the spectrum of AWGN. 4  
(c) Determine the probability of false detection for  $N = 40$ ,  $E = 5$  for unique word detection of satellite communication. 3

**Group-B (30 Mark)**

Answer any **three** questions. The numbers in the right margin indicate full marks.

- Q.4 (a) Describe the operation of a typical VSAT Communication System. State briefly where VSAT system find widest application. 6  
(b) Write some merits and demerits of using satellites in LEOs, MEOs, and GEOs for mobile satellite communications. 4

- Q.5 (a) Appraise the functions of back haul network manager of Satellite communication. 5
- (b) Distinguish between pre-assigned and demand-assigned traffic in relation to a satellite communications network. 5
- Q.6 (a) Compare between Web length Division Multiplexing and Dense Web length Division Multiplexing. 3
- (b) Draw the simplified block diagram of VSAT earth station transmitter and receiver and explain its operation. 2+5
- Q.7 (a) Do you know Uber or Pathao. Describe how they locate the passenger. 5
- (b) Propose a technique of encoding for GPS receiver 5