Reg. No.



## FIFTH SEMESTER BTECH. (E & C) DEGREE END SEMESTER EXAMINATION JANUARY/FEBRAURY 2021 SUBJECT: INTRODUCTION TO COMMUNICATION SYSTEMS (ECE - 4304)

## **TIME: 3 HOURS**

## MAX. MARKS: 50

## Instructions to candidates

- Answer ALL questions.
- Missing data may be suitably assumed.
- 1A. Why synchronization is critical in a communication system. Design a Digital communication system with the help of a neat block diagram showing how synchronization leads to an acceptable bit error rate.
- 1B. With a proper tabular column, list down the frequency, wavelength and applications pertaining to the Electromagnetic spectrum from 30Hz to 300GHz.
- 1C. A system has power amplifier with a 60 dB gain, and has an output power of 10 W. What is the input power that is required to feed the antenna? If you want a further improvement in bit error rate for a system, what is the technique that you employ, Comment on the results obtained.

(4+3+3)

- 2A. Consider an Armored outdoor fibre optic cable, how exactly you can choose a loose tube structure in the cable which also avoids water blocking. Explain with a relevant diagram.
- 2B. Two silica fibres that are doped with 18 percent and 8 percent mole fractions of GeO<sub>2</sub> respectively. Compare the ultraviolet absorptions at wavelengths of 0.9 μm and 1.8 μm. Comment on the results.
- 2C. What is a micro bend in an OFC system? With the help of a neat diagram explain the losses which are induced due to bending.

(4+3+3)

- 3A. The transmit power of a certain system is 10 watts, and given that both transmit and receive parabolic antennas have a diameter of 3 m. The antenna efficiency is 55% for both. The satellite is in a GSO location, with a range of 35900 km. The frequency of operation is 12 GHz. Determine the received power. Assume that the gains of Tx and Rx antennas to be 49dBi.
- 3B. With the generic block diagram, explain a Telemetry Tracking and Commanding system.
- 3C. The downlink signal received at the earth station is 3 GHz, what local-oscillator frequencies f<sub>lo</sub> are needed to achieve IFs of 770 and 140 MHz?

(4+3+3)

4A. Consider a FSO system, define how Acquisition Tracking and Pointing happens in a FSO system. How to obtain the first link point from one satellite on LEO to another satellite on GEO.

- 4B. How handoff takes place in a mobile environment, define how channel allocation strategies help the network to have a proper handoff.
- 4C. Comment on the practical limitations of a Nano Cell Zone concept.

(4+3+3)

- 5A. With the help of a neat block diagram explain the concept of a MTI Doppler Radar. How a system identifies a moving target.
- 5B. Explain the concept of a bluetooth pico-net with scatter-net link.

(5+5)