

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - MAY/JUNE 2024**

Semester : Semester VIII - 2020

Course Code : ECE3055

Course Name : Satellite Communication

Program : B.Tech

Date : May 29, 2024

Time : 01:00 PM - 4:00 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ANY FIVE QUESTIONS

(5 Q X 2 M = 10 M)

1. Orbital shape in which the satellite is orbiting is decided by the Eccentricity of the satellite. If the eccentricity e of the orbit is zero then the shape of the satellite orbit is -----
(CO1) [Knowledge]
2. The commercial and domestic satellites were launched for different applications of satellite communication. Name the first commercial satellite launched.
(CO1) [Knowledge]
3. The solar energy is not uniformly available throughout the year. The battery panels are used as a back up for power supply in satellites. These battery panels are made up of -----
(CO2) [Knowledge]
4. The three axes namely RPY which define a satellite's attitude are its roll, pitch, and yaw (RPY) axes. The axis which is associated with the centre of the earth is named as -----
(CO3) [Knowledge]
5. TDMA, FDMA, CDMA are the multiple access methods used for efficient transmission and reception of signals. We have many limitations which make them unsuitable for transmission. The limitations of FDMA-satellite access are stated as.....
(CO3) [Knowledge]
6. The parameters of Space link decide the efficiency of a satellite. The quality of a space-link is measured in terms of the Ratio
(CO4) [Knowledge]
7. Among TDMA, FDMA, CDMA, TDMA is one of the data access methods used in satellite communication. In TDMA ----- identifies the transmitting station
(CO4) [Knowledge]

PART B

ANSWER ANY FIVE QUESTIONS

(5 Q X 10 M = 50 M)

8. Launch vehicles are used to inject the satellite with the required thrust into the transfer orbit. Write a short note on Launch Vehicles and Propulsion .
(CO1) [Comprehension]
9. The LNA having a gain of G_1 and equivalent noise temperature as T_{e1} is connected to a receiver having noise factor of F through a cable having loss of $L:1$. The receiver noise figure is 12 dB, the cable loss is 5 dB, the LNA gain is 50 dB, and its noise temperature 150 K. The antenna noise temperature is 35 K. Calculate the noise temperature referred to input as T_{ant} .
(CO2) [Comprehension]
10. Scientist Kepler was able to summarize the carefully collected data of Orbital Parameters. State the three laws of the Kepler with accurate descriptions.
(CO3) [Comprehension]
11. The three axes named RPY which define a satellite's attitude are its *roll*, *pitch*, and *yaw* (RPY) axes. Define and explain RPY axes with respect to satellite communication.
(CO3) [Comprehension]
12. The Global Navigation system is GNSS .GNSS are widely used for far distance applications. Write a short note on GNSS systems .
(CO4) [Comprehension]
13. The GSM is termed as Global System for Mobile Communications. Explain in detail several subsystems involved in the GSM architecture .
(CO4) [Comprehension]
14. The Multiple access methods are mainly meant to provide access for duplex channels. Differentiate between preassigned and demand assigned access methods.
(CO5,CO4) [Comprehension]

PART C

ANSWER ANY TWO QUESTIONS

(2Q X 20 M = 40 M)

15. a) While discussing with manu about the techniques in multiple access used in satellite communication ,The Technique in which the signal information is transmitted in Bursts which is suitable for transmission of digital signals is TDMA .The carrier recovery circuits are used in the frequency conversion of signals .With Basic equipment Blocks bring out the detailed note on the TDMA system and its bursts formats along with its carrier recovery circuit.

b) Noise temperatures gets amplified in Amplifiers in cascade determine the overall noise temperature . A 12 GHz receiver consists of an RF stage with gain $G_1 = 30$ dB and noise temperature $T_1 = 20$ K, a down converter with gain $G_2 = 10$ dB and noise temperature $T_2 = 360$ K and an IF amplifier stage with gain $G_3 = 15$ dB and noise temperature $T_3 = 1000$ K. Calculate the effective noise temperature and noise figure of the system. Take the reference temperature to be 290 K.

(CO1) [Application]

16. a) EIRP is a very criteria in analysis of uplink and downlink links. Link budget is actually the sum of all the losses between: Transmitter - Satellite & back down to a Receiver. With the required diagram and necessary equation explain the Basic link analysis to derive Friis transmission equation.

b) All the transmission losses are related to all the 4 layers of earth's atmosphere. Transmission losses of the satellite play a very important role in deciding the factors of efficiency in the link of transmission and reception of the signals. Name and Explain in details all the types of transmission losses of the satellite.

(CO4,CO2) [Application]

17. a) For the Satellites to be in orbits, Station keeping is a method followed to keep the satellites in its orbit. Explain in detail the types of Station Keeping and its manovers and the steps followed to overcome the manovers.

b) Loss of satellites result in loss of data. Tracking telemetry and command system (TT&C) system plays a very important role in satellite communication systems. With a neat block diagram Explain in detail the working of TT&C system.

(CO4,CO3) [Application]