

**GUJARAT NATIONAL LAW UNIVERSITY  
GANDHINAGAR**

Course: Space Science and Communication Technology  
Semester- VI (Batch: 2018-23)

End Semester Online Examination: July-August 2021

Date: 08<sup>th</sup> August, 2021

Duration: 8 hours

Max. Marks: 40

**Instructions:**

- The respective marks for each question are indicated in-line.
- Indicate correct question numbers in front of the answer.
- No questions or clarification can be sought during the exam period, answer as it is, giving reason, if any.

	<b>Marks</b>
<p>Q.1 “M” is a Telecommunication Company which works on the transmission and reception quality of the audio signals in communication. Answer the following questions to help the company to take appropriate measures:</p> <p>a) Which type of signal is more immune to noises? (10-20 words)</p> <p>b) Explain the mechanism to generate the waves that are more immune to noises, with the help of neat circuit diagram ensuring that the voltage is maintained at a level 6 times the barrier voltage of the Silicon Diode. (250-300 words)</p>	<p>(1+3+4)</p>
<p>Q.2 India is planning to undertake a mission to one of the stars in near future. Respond to the following questions to help the new recruits of the organization to perform better in the future responsibilities that may be assigned:</p> <p>a) What is the name of the mission and it is destined to observe which star? (10-20 words)</p> <p>b) Which vehicle is being planned to be used to undertake the mission? (10-20 words)</p> <p>c) Explain the stages that occur in the life cycle of a star if the mass of the star is very much greater than the mass of the reference sun, with the help of a neat diagram. (400-450 words)</p>	<p>(1+1+4=6)</p>
<p>Q.3 The earth was to hit with a massive solar storm on 12 July 2021. Answer the following questions so that the Space Agencies and the Insurance Companies can plan appropriately for any such future solar storm and its probable impact on man-made satellites.</p> <p>a) Explain any six types of satellite communication systems prevalent currently in the man-made satellite sector. (250-300 words)</p> <p>b) The insurance can also be taken for satellites whenever they face failures. In view of the same explain any six causes of satellite failures including whether solar storm can act as one of the causes. (250-300 words)</p>	<p>(3+3=6)</p>
<p>Q.4 “X” is a Space Agency and plans to make its mark in the space sector by not only undertaking missions that deliver fully its objective but also are not harming the</p>	<p>(2+3+2+3=10)</p>

environment. In this regard, answer the following questions to acquaint the officials of the Agency with the required information:

- a) The Agency is into manufacturing satellites for navigation purposes and so explain the segments of such system. (150-200 words)
- b) The Agency will also be undertaking remote sensing missions. Hence explain any three types of resolution that helps in ensuring the quality of the remote sensing data. (250-300 words)
- c) In remote sensing, apart from the data obtained through the satellite, it is also important to obtain the data through other means. State the most pertinent point regarding the data obtained through other means. Also, explain two mechanisms other than remote sensing using which the oceanic wind speed can be measured highlighting one of the drawbacks of each mechanism.(150-200 words)
- d) The Agency is planning to develop a Space Debris Model to get an idea of the contribution its missions will make to the population of orbiting objects. Explain any three source mechanisms as well as sink mechanisms that shall be considered in the model. (250-300 words)

Q.5 Company "Y" is dealing with creation of infrastructure for different modes of communication. Recently the company has recruited new people and to train these new entrants, the company needs the answer to the following questions: (3+3+2=8)

- a) Name and explain the means of beyond-the-horizon propagation for Ultra High Frequency signals that use certain properties of the lowermost layer of the atmosphere, with the help of a neat diagram. (250-300 words)
- b) The company is into manufacturing of the optical fibre, explain any six standard tests that shall be performed while testing the fibre cables. (250-300 words)
- c) Explain any four reasons favouring the decision of the company to enter into manufacturing the optical fibre cable instead of the coaxial cable for communication purposes. (150-200 words)

Q.6 Read the case and answer the following question- (6)

Rishi was being arrested for malicious allegations against his ex-partner. A Readme mobile phone was recovered from him and investigated. It was found, approximately 40 text messages which were exchanged by ex-partner, were allegedly sent which included abusive and threatening content. We were also required to analyse the complainant's and defendant's call data records to map where calls had been made and received. Explain the role of mobile forensics in the investigation and also explain important tools for investigation. (Word limit 600- 750 words)

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