

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B Tech. Summer 2021 - 22 Examination**

**Semester: 8****Subject Code: 203101483****Subject Name: Introduction to Space Technology****Date: 30-03-2022****Time: 10:30am to 1:00pm****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1 Objective Type Questions – (All are compulsory) (Each of one mark) (15)**

1. A star of .....colour can be said to be the coolest.
2. .... telescope is being manufactured in collaboration between NASA, ESA and CSA, as a successor of Hubble Telescope.
3. In a recent news with reference to space, ‘Lyrid’ is a .....
4. The orbital velocity of Satellite is .....
5. The escape velocity from the Earth is .....
6. Name two failed missions of NASA?
7. Mention any two Accidents and Disasters in Spaceflight?
8. Storms of gases are visible in the chromospheres of the Sun during?
9. The asteroid belt is located between which two planets in the solar system?
10. How much time does light require to travel distance of 150,000,000 kilometers from the Sun to the earth?
11. Which planet has the solar system's highest mountain Olympus Moons?  
a) Jupiter  
b) Venus  
c) Uranus  
d) Mars
12. New Horizons’ spacecraft was launched by NASA to study which of the following planet?  
a) Mars  
b) Jupiter  
c) Pluto  
d) Saturn
13. How old is the solar system (approximately)?  
a) 5 billion years  
b) 500 billion years  
c) 50 billion years  
d) 5000 billion years
14. Which planet has the fastest revolution time?  
a) Mercury  
b) Neptune  
c) Uranus  
d) Jupiter
15. Which female astronaut spent the maximum time in space?  
a) Lisa Norwak  
b) Kalpana Chawla  
c) Sunita Williams  
d) Mary Rose

**Q.2 Answer the following questions. (Attempt any three) (15)**

- A) What are 4 types of space exploration? Name them with suitable example.
- B) Define the Following

a) Thrust	b) Total impulse	c) Specific impulse	d) Satellite	e) Payload
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- C) Derive Thrust equation from a Stationary Rocket Engine / Motor with neat sketch?
- D) Derive Equation of motion or Rocket equation?

**Q.3** A) Explain single stage and multistage rocket with suitable example? (07)

B) What are the losses in ascent phase of a launch vehicle? Explain them in detail. (08)

**OR**

B) What are the different types of propellant used in Rocket propulsion. Briefly explain any two of them? (08)

**Q.4** A) Consider a two-stage rocket with two boosters. The total weight of two serial stages is 15,000 kg and that of each booster is 5000 kg (4000 kg propellant + 1000 kg structure). The exhaust velocity of all the stages including the booster is 3000 m/s and the mass flow rate of propellant from each booster and each stage is 70 kg/s. Calculate  $\Delta V$  achieved by the vehicle? (07)

**OR**

A) Describe the Earth space missions and their orbits with neat sketch in detail? (07)

B) What is meant by Re-entry in spacecraft or rocket? Explain in detail about different types of Re-entries? (08)