

### Satellite questions

1. Which shape will provide maximum surface area for solar radiation, for the same volume. Is it feasible?
  - i) cube
  - ii) sphere
  - iii) Cuboid (golden ratio)
  - iv) None of the above
2. Maximum heat is produced by which part of satellite? Which is the process creating heat?
3. A modern method of producing current onboard satellites is by joining 2 satellites by a thin metal tether (about 2km length). The difference between orbital radius of the two satellites is equal to the length of the tether (this gives an idea of the position of the satellite with respect to each other). How is the power produced and from which of the following power sources is it absorbed by the satellite.
  - i) Solar radiation
  - ii) Earth's gravitational potential energy
  - iii) Earth-moon gravitational potential energy
  - iv) Earth's magnetic field
4. On board Computers have very less RAM and Memory specifications. Which of these processes is most likely to suffer maximum because of this handicap? Why?
  - i) Beacon (transmitters broadcast a continuous "beeping" signal)
  - ii) Attitude Control (by gravity gradient booms)
  - iii) Astro-photography (long duration imaging)
  - iv) Communication with earth
5. What are the type of antennas used in micro satellites (student satellites) as transmitters and receivers? On earth we use dish antennas, for communicating with the satellite. What is the major factor which decides the type of antenna used?
6. Which of these are easier to operate on a satellite: Beacon or Camera? Why?
7. Which phase of the satellites life does it undergo maximum stress and vibrations, for which the satellite is designed? Give the range of the maximum stress (in term of g).
  - i) launch
  - ii) in orbit
  - iii) re-entry
  - iv) none of the above
8. Most of the sensors on the satellite need very high voltage potential (about 1000V). Which of these are the major troubles and how are they taken care of?
  - i) battery voltage is in the order of 10-30V
  - ii) high voltages in vacuum leads to breakdown of the air
  - iii) large currents hence large magnetic fields
  - iv) over-heating of the sensors
9. What is the range of efficiency of the solar cells put on satellites?

- i) 0.99997 – 0.998
- ii) 0.004 – 0.01
- iii) 0.3 – 0.5
- iv) 0.95 – 0.98

10. Small perturbations in the satellite orbit are sensed on student satellites using which device? How?

- i) gyroscope
- ii) magnetometer
- iii) sun sensor
- iv) laser

11. List at least 5 causes of perturbation of satellite orbit and compare their effects, i.e. state which of them can cause more trouble than the others.

12. What is the average time period of most micro satellites (student satellites)? What is the orbital radius (height above earth) for this satellite?

- i) less than 1 minute
- ii) 70 – 120 minutes
- iii) 1 day
- iv) 1 year

13. India is planning the Chandrayaan mission to go to moon. Which of these launch vehicles will be used to carry the payload?

- i) ASLV
- ii) GSLV
- iii) PSLV
- iii) SLV

14. If you want to make a spy satellite, which kind of orbit will you choose? Why?

- i) geo-stationary
- ii) polar
- iii) molniya
- iv) sun-synchronous