

B. Tech. I  
ODD SEMESTER  
MAJOR EXAMINATION-2017-2018  
Space Science

Time: 03Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any four parts of the following:

(4×2.5)

- (a) Draw neat and clean sketches of reflecting type of telescopes. Discuss its advantages over refracting ones.
- (b) Describe the construction and function of Charge Coupled Device (CCD). Highlight its importance in imaging of distant celestial objects.
- (c) Write nuclear reactions inside Sun. How were the solar neutrinos detected?
- (d) Explain the construction and function of X-rays telescopes. Why are the X-rays collected at small glancing angles?
- (e) If the kinetic energy of an asteroid falling towards Earth exceeds its gravitational energy, show that its orbit will be necessarily unbounded.

(f) The force acting on a planet is given by the following equation-

$$f = -\frac{l^2 u^2}{m} \left( \frac{d^2 u}{d\theta^2} + u \right)$$

Here, the terms have their usual meanings. If  $r = \frac{p}{(1+\epsilon \cos\theta)}$ ; then show that the force obeys the inverse square law. ( $\epsilon$  and  $p$  are constants)

Q.2 Attempt any two parts of the following:

(2×5)

- (a) Draw neat and clean sketch of our galaxy Milkyway and explain its morphology. Show the position of our solar system in it.
- (b) Draw Hubble's tuning fork diagram and explain morphological evolution of galaxies.

(c) Why do "Pulsars" emit radiation? Explain with the help of neat and clean diagram.

**Q.3 Attempt any two parts of the following:**

(2×5)

- (a) Classify dwarf stars on the basis of Chandrasekhar limit and explain their equilibrium.
- (b) Draw neat and clean Hertzsprung-Russel (HR) diagram and explain the life cycle of star with mass  $1.8 M_{\odot}$  in it.
- (c) Account reasons for the existence of black hole.

**Q.4 Attempt any two parts of the following:**

(2×5)

- (a) Write notes on dark matter and dark energy? Give evidence in favor of their existence.
- (b) Define the terms "Big-Bang" and "Big-Crunch" and describe the related evolution of the Universe.
- (c) Starting from the Friedmann's equation, obtain the condition for flat model of the Universe and explain it.

**Q.5 Attempt any two parts of the following:**

(2×5)

- (a) Describe Hubble's law of expanding Universe. How does it indicate for Big-Bang in remote past of the Universe?
- (b) Explain different stages of evolution of the Universe with the help of neat and clean diagram.
- (c) Comment on term "Cosmic Shower".