

INTRODUCTION TO THE COSMOS

Time : Three hours

Maximum : 100 marks

PART A — ($8 \times 5 = 40$ marks)

Answer any EIGHT questions.

1. Write any three trigonometric functions and draw their graphs.
2. If $\sin(A) = 4/5$ and $\sin(B) = 5/13$, Find $\sin(A - B)$.
3. State Newton's law of Gravitation. How the gravity in the Earth varies with respect to altitude?
4. Write notes on satellites and their type.
5. Give an account of the early models of the universe.
6. What are sidereal time and standard time?

7. Write notes on the following coordinate systems :

8. List the different units of distance in astronomy and explain.

9. State and explain the Kepler's laws of planetary motion.

10. Explain the Doppler effect.

PART B — ($4 \times 15 = 60$ marks)

Answer any FOUR questions.

11. State and prove the Pythagorean theorem.

12. Explain the lenses, orientation of images and telescopes in detail with suitable diagrams.

13. Explain the concepts and advantages of the following in detail : Radio Astronomy and X – ray astronomy.

14. Describe the

(a) terrestrial latitudes and longitudes and

(b) celestial coordinates with diagrams.

15. Write notes on the following coordinate systems : horizontal system, equatorial system, meridian system and ecliptic system.

16. Explain the atomic structure and spectra. Also write notes on Kirchoff's laws.

17. Describe the different types of Lunar and Solar eclipses with suitable diagrams.

SOLAR SYSTEM STUDIES

Time : Three hours

Maximum : 100 marks

PART A — ($8 \times 5 = 40$ marks)

Answer any EIGHT questions.

1. Distinguish between terrestrial planets and jovian planets.
2. What are solar neutrinos? Give its importance.
3. Explain the solar eruptions.
4. Draw different atmospheres of the Earth and explain.
5. Give an account of the first planet of our solar system.
6. What are Phobos and Deimos?
7. Explain why the planet Pluto is not considered as a planet?
8. List down some artificial and natural satellites and explain.
9. Write notes on Kuiper belt.
10. Give an account of Oort cloud.

PART B — ($4 \times 15 = 60$ marks)

Answer any FOUR questions.

11. Explain the production of energy inside the Sun and the transmission of it in detail.
12. Draw the structure of the Sun and different layers. Describe the properties of each layer.
13. Describe the origin of Moon. Also explain the surface of the Moon.
14. Compare the properties of the planets Mars and Venus in detail.
15. Write an essay on the planet Jupiter and its satellites.
16. Describe the properties of Saturn and its ring system with suitable diagram.
17. Explain the origin of comets, structure and physical properties of them.

STELLAR ASTRONOMY

Time : Three hours

Maximum : 100 marks

PART A — ($8 \times 5 = 40$ marks)

Answer any EIGHT questions.

1. How do you determine the distances to stars?
2. What are protostars and T – tauri stars?
3. Explain the electron degeneracy pressure and Chandrasekar's limit.
4. What are star clusters? Write briefly about them.
5. What are the different magnitudes of stars?
6. Write notes on high mass stars.
7. Define the binary stars. How do they exist?
8. Explain the Helium capture.
9. What are neutron stars? How do you detect them?
10. Why light can not escape from black holes?

PART B — ($4 \times 15 = 60$ marks)

Answer any FOUR questions.

11. Explain the Interstellar matter and formation of stars and nebulae.
 12. Draw the Hertzsprung – Russell diagram and explain it in detail.
 13. Write an essay on Stellar evolution by explaining the various stages of stars.
 14. Compare the structure and different properties of white dwarf, black dwarf and brown dwarf in detail.
 15. Describe the occurrence of stellar explosions, Nova and Super Nova.
 16. Discuss the formation of neutron stars and black holes. Mention some important properties of them.
 17. Explain the X – ray and Gamma ray bursters in detail.
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GALAXIES AND COSMOLOGY

Time : Three hours

Maximum : 100 marks

PART A — ($8 \times 5 = 40$ marks)

Answer any EIGHT questions.

1. What are galaxies? Explain the formation of a galaxy.
2. Write down the Tully-Fisher relationship and explain.
3. State and explain the Hubble's law.
4. What are Seyfert galaxies?
5. Write notes on active galaxies.
6. What are Quasars? Mention some important properties of them.
7. Define cosmology. Also explain the early models of the universe.
8. Give an account of Olber's paradox.
9. What is cosmic microwave background? Write notes on it.
10. Draw the Planck's radiation curve and explain.

PART B — ($4 \times 15 = 60$ marks)

Answer any FOUR questions.

11. With proper diagrams, describe the structure and dynamics of our own galaxy.
12. Explain the Hubble's classification of galaxies. Also draw the Hubble's tuning-fork diagram.
13. Write an essay on the Radio galaxies.
14. Explain the Quasar evolution and central engine of active galaxies and quasars.
15. Discuss in detail the following: cosmological constant, mass-energy relation, radiation era.
16. Explain
 - (a) Grand Unified Theory and
 - (b) matter era.
17. Describe the various possible geometries and evolution of the universe with suitable diagram.