



ANDHRA UNIVERSITY TRANS-DISCIPLINARY RESEARCH HUB

SPACE SCIENCE

UNIT I

The Earth's Atmosphere Evolution of the planetary atmosphere variations of atmospheric densities and temperature. Formation and structure of Ionosphere. The radiation belts. Auroras. Lyman glow of the night sky. The geo-corona and airglow studies.

UNIT II

Sun and Interplanetary Medium

Structure of solar atmosphere. Solar granulation and super granulation. Sunspots. Solar flares. Solar radiation. Scattering, reflection and Absorption within the Atmosphere of the Earth. Heat budget.

Solar wind. Interaction with planetary atmosphere. Radiation belts and interplanetary magnetic field. Interplanetary dust.

UNIT III

Theory of Radiation

Review of electromagnetic theory. Maxwell's equations and electromagnetic waves. Polarization. Elementary theory of radiation. Bremsstrahlung, Gyromagnetic, Synchrotron and Cerenkov radiations. Propagation of radio waves in ionized medium.

UNIT IV

Radio Techniques for Ionosphere studies

Basic parameters of an antenna. Various types of antennas. Non-steerable, partially steerable and fully steerable radio telescopes. Receiver systems and their calibration. Studies of ionosphere by ground based and space techniques. MST Radar. MST Radar for Ionospheric studies. Two-element and multi-element Interferometers.

Books Recommended:

1. J.A. Ratcliffe: An Introduction to the Ionosphere and Magnetosphere.
2. Harold Zirin: Astrophysics of the Sun.
3. W.N.Hess and G.Mead(Ed): Introduction to Space Science.
4. Sagan C. Owen T.C. and Smith. H.J.: Planetary Atmospheres.
5. K.D. Abhayankar: Astrophysics of the solar system.
6. Jackson: Classical Theory of Radiation
7. Radio Astronomy: J.D.Kraus
8. Solar Radio Astronomy: M.R.K. Kundu
9. C.R.Kitchin: Astrophysical Techniques. University press).
10. Astrophysics-Stars and galaxies by K.D. Abhyankar.
11. C.R. Miczaika and W.M. Sinton: Tools of the Astronomers
12. W.A. Hiltner (Ed): Astronomical Techniques.



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MODEL QUESTION PAPER

SPACE SCIENCE

Answer 5 Questions. All Answers Carry Equal Marks

1. Describe in detail the formation and structure of the ionosphere of the Earth. [20]
- 2.a) Explain the Phenomenon of airglow of planetary atmosphere.
b) What is Aurora? What causes aurora show different colours?
Why does not moon have an aurora? [10+10]
- 3.a) Explain following phenomenon
i) Solar granulation
ii) Super granulation [10+10]
b) What is solar flare? Explain. [10+10]
- 4.a) Explain Electron-electron bremsstrahlung radiation. [10+10]
) Write in detail cerenkov radiation and
b) Gyromagnetic radiation.
- 5.a) Discuss in detail electromagnetic theory. [10+10]
) Write about propagation of radio waves in Ionized
b) medium.
- 6.a) What are the basic parameters of antenna? Explain. [10+10]
) Explain in detail the wire antennas and travelling
b) wave antennas.
- 7.a) How does a Radio telescope works? What are the advantages of Radio telescopes?
b) Write a note on non steerable radio telescope. [10+10]
8. Discuss in detail the effect of Earth's atmosphere on incoming solar radiation. [20]