Ref. No.: Ex/IEE/PE/B/T/421A/2022

B.E. INSTRUMENTATION AND ELECTRONICS ENGINEERING FOURTH YEAR SECOND SEMESTER EXAM– 2022

Jadavpur University Saltlake Campus

Paper : Instrumentation In Space Technology Hour : 3hr Full Marks :70

Q1 SHORT QUESTION (ANY FIVE) 10

I. In which year, the first radio telescope was built, enabling astronomers to detect otherwise invisible radiation from stars?
II. What is The metallicity of a star?
III. How does a main-sequence star consist of?
IV. What are two separate dynamos operating in the Sun?
V. *If the star is closer than ..... parsecs, then the star will appear deceptively bright; its ..... magnitude will be too brighi to tell us its true luminosity. (fill up the gaps)*
VI. What are two major factors of the 10.7 cm solar radio flux emission?

ANY FIVE FROM CO1,CO2,CO3 &CO4 (12X5=60)

CO1

2. What are the Solar Activity Indices? Describe Them.
Define Chandrasekhar Limit.
How the star's luminosity can be used to measure the interstellar distance? 6+2+ 4

CO2

3. Describe Reflecting telescope with diagram and mounting.
Draw a block diagram of Space Flight Particle Instruments. How do the energy and mass analyzer function?
What are the Sources of uncertainties of the measurements using such instruments? 4+6+2

CO3

4. How the Optical Telescope Assembly (OTA) was designed considering all payload bay constraints in Hubble Space Telescope? Explain the importance of Rate Gyro Assembly (RGA). How does it work? 4+4+4
5. Explain the construction, working principle and calibration of Faraday Cup? How much the energy loss of the particle in Matter is important to understand the response of the sensors to high energy particles? Explain Langmuir Probes technique used in rockets and satellites to measure ionosphere electron and ion densities, electron temperature, and spacecraft potential? 4+4+4
6. Describe construction and role of the Near Infra-Ray Camera and Multi-Object Spectrometer in Hubble Space Telescope with a schematic diagram. How does a Laser Ablation Mass Spectrometer detect the composition of a meteoritic sample? 8+4

CO4

7. Distinguish between Thermometric Type Solar Irradiance sensors and Radiometric type Solar Irradiance Sensor? What is DMBRLE Compression –decompression Technique? Explain Computation of Directional Response Error? How zenith component correction and azimuth component correction of the Sun can be done in Total Solar Irradiance Measuring System? 4+4+2+2
8. What is simple exponential smoothing? how the positional importance of the astronomical time series data is maintained with Simple Exponential Smoothing technique? How does Fractal Geometry say about the chaotic nature of any astronomical time series data? 5+3+4