

GEO INFORMATICS ENGINEERING BRANCH
SECOND SEMESTER

PH9162 - PHYSICS FOR GEO INFORMATICS ENGINEERING

(REGULATIONS 2008)

Time: 3 hr

(Max. Mark: 100)

Answer ALL Questions

Part - A (10 × 2 = 20 Mark)

1. What is Kirchhoff's law of thermal radiation?
2. Estimate the surface temperature of earth assuming it to be in radiative equilibrium with the sun, the radius of the sun is 7×10^8 m and its surface temperature is 6000 K. The distance of the earth from the sun is 1.5×10^{11} m.
3. What is Mie scattering? Give example.
4. What do you mean diffused reflection ?
5. What are defects of a image formed by a single lens ?
6. How resolution of a photographic film is affecting the " speed " of a film ?
7. State Kepler's law of planetary motion.
8. What is RADAR ?
9. How is Schottky barrier formed?
10. What is photoresister ?

Part - B (5 × 16 = 80 Mark)

11. (a) i. Outline the basics of photographic process in the film with neat diagram and explain the performance of photographic film in terms of : speed, contrast and spectral resolution. (10)
ii. How are colour and false-colour infra - red film constructed? (6)
12. (a) Calculate the gravitational potential and the intensity of the gravitational field due to a spherical shell of uniform density (ρ) at points: (8+4+4)
 - i. inside
 - ii. outside and
 - iii. on the surface of a hollow spherical shell.

(OR)

- (b) i. State and prove Kepler's law of planetary motion. (6)
ii. Write short notes on : Geo stationary satellite, weather satellite, military satellite. (6+2+2)
13. (a) i. Describe the construction and working of photomultiplier tube with neat diagram. (10)
(P T O)

- ii. Explain the various parameters used to assess the performance of a detector. (6)

(OR)

- (b) Write short notes on:

(6+4+4)

- i. Photo-voltaic diodes
- ii. CCD Camera and
- iii. Avalanche photo diode.

14. (a) From the theory of origin of refractive index, derive the Rayleigh scattering.

(OR)

- (b) i. Explain the various types of polarization processes. (12)
ii. Find out the fundamental resonance frequency for O₂ molecule. (4)

15. (a) i. Derive the expression for Planck's black body radiation. (8)
ii. From this expression deduce Rayleigh -Jean's law and Wien's law. (3+3)
iii. What will be temperature of a star whose energy distribution shows a maximum at 450 nm? (2)

(OR)

- (b) i. What is electromagnetic radiation? Explain the sources of electromagnetic waves with neat diagram. (2+8)

- ii. The electric field of an electromagnetic wave in free space is given by (6)

$$E_x = 0$$

$$E_y = E \cos(\omega t - kx)$$

$$E_z = 2E \cos(\omega t - kx)$$

where $E = 1$ kV/m. Find the corresponding magnetic field and the flux density of the radiation.