Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. (Full Time) - END SEMESTER EXAMINATIONS, June 2024

GEO-INFORMATICS
II Semester
PH3201 & Physics for Geoinformatics Engineering
(Regulation 2023)

Time: 3hrs Max. Marks: 100

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|---|---|
| CO1 | Acquire knowledge in specialty physics by further exploring space weather and the effect of those environments on satellites |
| CO2 | Implement the heat transfer principles in remote sensing |
| CO3 | Understand the basic optical principles |
| CO4 | Understand the fundamentals of gravitation |
| CO5 | Gain knowledge about different types of electro-optic sensors and its detection mechanism |

**BL – Bloom's Taxonomy Levels**
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

## PART- A(10x2 = 20Marks)
(Answer all Questions)

| Q.No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 1 | What is solar cycle? | 2 | CO1 | L1 |
| 2 | What are coronal mass ejections? | 2 | CO1 | L1 |
| 3 | State and explain the specific heat capacity. | 2 | CO2 | L2 |
| 4 | State any two differences between black and grey bodies. | 2 | CO2 | L1 |
| 5 | What is main difference between lens and plane mirror? | 2 | CO3 | L1 |
| 6 | Explain a method used to reduce the spherical aberration produced by lenses? | 2 | CO3 | L4 |
| 7 | Define gravitational potential. | 2 | CO4 | L1 |
| 8 | State Netwon's law of gravitation. | 2 | CO4 | L1 |
| 9 | Explain photoelectric effect. | 2 | CO5 | L2 |
| 10 | What are the after-image and Purkinje effects? | 2 | CO5 | L1 |

## PART- B(5x 13 = 65 Marks)
(Restrict to a maximum of 2 subdivisions)

| Q.No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 11 (a) | Write an essay about sun's internal structure with neat diagram. | 13 | CO1 | L2 |
| OR | | | | |
| 11 (b) | Radiation impacts on satellites and navigation. | 13 | CO1 | L2 |
| 12 (a) | Discuss in detail about various modes of heat transfer along with mathematical representation. | 13 | CO2 | L3 |
| OR | | | | |
| 12 (b) | Draw and describe the theories of evolution of black body radiation. | 13 | CO2 | L3 |
| 13 (a) | What is chromatic aberration? Explain longitudinal aberration. Write about achromatism of two thin lenses separated by a distance and explain how it can reduce chromatic aberration. | 13 | CO3 | L4 |
| OR | | | | |

| | | | | |
|---|---|---|---|---|
| 13 (b) | Derive achromatism of two thin lenses separated by a distance and explain how it can reduce chromatic aberration. Analyze how spherical aberration can be minimized. Any two approaches | 13 | CO3 | L4 |
| 14 (a)(i) (ii) | Derive earth 'g' variation as a function of height. Let's consider an International Space Station is designed to operate at an altitude of 1000 km. When completed, it will have a weight (measured at the Earth's surface) of 4.22 $x10^6$ N. What is 'g' at this height? Also find its weight when in orbit? | 7+6 | CO4 | L3,L5 |
| OR | | | | |
| 14 (b) (i) (ii) | State and derive Kepler's third law. Calculate the period of Mercury's orbit around the Sun. Its radius is 2.43 $x10^6$ m, respectively. Its distance from sun is 5.79 $x10^{10}$ m. The mass of sun is $1.99x10^{30}$ kg | 7+6 | CO4 | L3,L5 |
| 15 (a) | Discuss the processing steps of photofilm. | 13 | CO5 | L4 |
| OR | | | | |
| 15 (b) | Draw and explain the mechanism of photomultipliers and photoconductors. | 13 | CO5 | L4 |

## PART- C(1x 15 = 15 Marks)

(Q.No.16 is compulsory)

| Q.No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 16. (i) | Explain forced convective heat transfer? | 3 | CO2 | L4 |
| (ii) | Consider a hollow sphere satellite with the outer diameter is 4 m, and the shell thickness of 10 mm is reentering the atmosphere. The shell satellite is made of stainless steel with properties of ρ = 8238 kg/m3, Cp= 5 468 J/kg·K, and k = 13.4 W/m·K. During the reentry, the effective atmosphere temperature surrounding the satellite is 1250°C with convection heat transfer coefficient of 130 $W/m^2 \cdot K$. If the initial temperature of the shell is 10°C, determine the shell temperature after 5 minutes of reentry. Assume heat transfer occurs only on the satellite shell. | 12 | CO2 | L5 |