[47] SEAT No._____ No. of Printed Pages : 2

SARDAR PATEL UNIVERSITY

S.Y.B.Sc. Examination, THIRD Semester

Saturday, 24TH November 2018

Time : 2.00 pm To 5.00 pm

Applied Physics Course Code : US03CAPH01

Course Title : Optics and Remote Sensing

Total Marks : 70

Q-1 Write answers to the following multiple choice questions in your answer book by selecting the proper option. [10]

(1) Newton's formula for the lens system is given by
(a) $f = x_1.x_2$ (b) $f = \sqrt{x_1.x_2}$ (c) $f = \sqrt{x_1 - x_2}$ (d) $f = \sqrt{x_1 + x_2}$

(2) The spherical aberration produced by convex lens is_____.
(a)Negative (b) Positive (c) Zero (d) Neutral

(3) A lens is device which is used to form_____.
(a) Object (b)Interference (c) Image (d) Reflection

(4) Refractive Index of Canada Balsam is_____.
(a) 1.44 (b) 1.55 (c) 1.33 (d) 1.22

(5) The polarizing angle depends on the _____ of the medium.
(a) Velocity (b) Refractive Index (c) Width (d) Height

(6) In a ____ synchronous orbit all points at a given latitude have the same local mean solar time.
(a) sun (b) geo (c) moon (d) star

(7) The ability of the sensor to discriminate the smallest object on the ground of different sizes is called _____ resolution.
(a) spatial (b) spectral (c) radiometric (d) temporal

(8) Earth is considered to be a black body having temperature ___ K
(a) 200 (b) 300 (c) 400(d) 500

(9) If 's' is the arc length and 'r' is the radius then the planer angle θ is
(a) $s \cdot r$ (b) s/r (c) s+r (d) s-r

(10) The total solid angle subtended by the surface of sphere at the center is
(a) π (b) 2π (c) 4π (d) 8π

Q-2 Answer the following questions in brief. (Answer any Ten Questions) [20]

(1) Write a short note on curvature of field.
(2) What is aberration? Enlist the types of monochromatic aberrations.
(3) Write a short note on distortion.
(4) What are polarizer and analyser?
(5) Define polarized light and unpolarized light.
(6) Write a short note on polarization by scattering.
(7) Define spectral bands.
(8) Enlist the first four stages of remote sensing system.
(9) Discuss about the end utilization of remote sensing.

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(10) How is a radian related to a degree?
(11) Enlist the different radiometric quantities.
(12) Define solid angle and steredian.

Q-3 (a) What is lens aberration? Explain spherical aberration and discuss the methods of removal of spherical aberration. [5]

(b) Derive the expression for the longitudinal chromatic aberration in terms of dispersive power of lens for an object at infinity. [5]

OR

Q-3 (a) Describe the construction of image using cardinal points and hence derive the Newton's formula for the focal length of lens system. [5]

(b) What are cardinal points? Discuss about principal points and principal planes in detail. [5]

Q-4 (a) What is polarization by reflection? State Brewster's law and obtain the necessary formula. [5]

(b) Write a note on quarter wave plate. [5]

OR

Q-4 What is Polarimeter? With the help of necessary diagrams describe the construction and working of Laurent's half shade polarimeter in detail. [10]

Q-5 (a) Explain the multi-spectral concept of remote sensing. [5]

(b) Derive the equation for the velocity of electromagnetic radiation. [5]

OR

Q-5 (a) Discuss the different stages of remote sensing in detail. [5]

(b) With the help of necessary diagram give a detailed account of electromagnetic radiation. [5]

Q-6 (a) Explain the terms Radiant Energy and Radiant Flux in detail. [5]

(b) Discuss about Radiance and show its relationship with Irradiance. [5]

OR

Q-6 (a) State Kepler's laws of planetary motion and explain them with the help of schematic diagrams. [5]

(b) Discuss the different observation geometries used in remote sensing. [5]

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