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SARDAR PATEL UNIVERSITY

M. Sc. Integrated Biotechnology Examination, First Semester

Thursday, 29-11-2012

10:30 A.M. to 01:30 P.M.

PS01CIGB01: PHYSICS-I

Total Marks: 70

Q-1 Fill in the blanks by choosing appropriate option.

[08]

- (1) The wavelength range of UV-rays is _____ nm.
(a) 10 - 400 (b) 0.01 - 10 (c) 400 - 700 (d) less than 0.01
- (2) The _____ is an example of biaxial doubly refracting crystal.
(a) calcite (b) topaz (c) tourmaline (d) quartz
- (3) The _____ lens is also called convergent lens.
(a) plano-convex (b) concave (c) convex (d) plano-concave
- (4) The distance between field lens and eye lens in Huygen's eyepiece is _____.
(a) $2f$ (b) $2f/3$ (c) $3f$ (d) $3f/2$
- (5) The wavelength of He-Ne laser is _____ Å.
(a) 6943 (b) 6328 (c) 5790 (d) 5896
- (6) The inner most part of an optical fibre is called _____.
(a) jacket (b) cladding (c) core (d) aperture
- (7) The de-Broglie wavelength for matter waves can be given by _____.
(a) h/mc^2 (b) $h/2mE$ (c) hf (d) h/p
- (8) The photoelectric current is directly proportional to _____ of incident radiation.
(a) frequency (b) wavelength (c) potential (d) intensity

Q-2 Answer the following questions. (Any Seven)

[14]

- (1) What are X-rays? Write its properties and applications.
- (2) State and explain Rayleigh's limit of resolution.
- (3) Explain the form of fringes obtain using Michelson's interferometer.
- (4) Write a note on power of lens.
- (5) What do you mean by 'Achromatism of lenses'?
- (6) Write full form of LASER and explain how it differs from an ordinary light.
- (7) Discuss the step index and graded index optical fibre.
- (8) Explain the particle- wave duality nature of light.
- (9) Enlist the various types of spectra and give its details.

Q-3 (A) Describe the construction and working of Fresnel's biprism experiment for the study of interference. [06]

(B) (1) Explain the formation of Newton's rings in reflected light. [03]

(2) Calculate the smallest wavelength difference that can be resolved using a grating having 15000 lines per inch in 5000 Å light. [03]

OR

(B) Explain the polarization of light waves. State and derive Brewster's law. [06]

Q-4 (A) What are aberrations? Explain chromatic aberration and its types in detail. [06]

(B) (1) Explain the deviation produced by an optical system. Derive necessary equation. [03]

(2) Find out the power of an optical system consisting two convex lenses with focal length 25 cm each. [03]

OR

(B) What do you mean by 'Thin lens'? Explain the refraction of light through thin lens. Derive necessary formula. [06]

Q-5 (A) Describe the laser action of He-Ne laser with energy level diagram. [06]

(B) (1) What is an optical fibre? Describe its structure with necessary diagram. [03]

(2) Calculate the numerical aperture and the acceptance angle of an optical fibre having $\mu_{\text{core}} = 1.65$ and $\mu_{\text{cladding}} = 1.55$. [03]

OR

(B) Describe the formation of hologram and reconstruction of image from it. [06]

Q-6 (A) What is the photoelectric effect? Discuss the effect of intensity and frequency of incident radiation on it. [06]

(B) (1) State and explain Bragg's law. [03]

(2) Calculate the longest wavelength that can be analyzed by a rock salt crystal of spacing $d = 2.82 \text{ \AA}$ in the first order. [03]

OR

(B) Explain about the Bohr's atomic model. Discuss its limitations. [06]