REV-01
BSP/02/05

2024/06

SET A

B.Sc. PHYSICS
FOURTH SEMESTER
APPLIED OPTICS
BSP – 406 OLD COURSE [REPEAT]
[USE OMR FOR OBJECTIVE PART]

Duration : 1 hr 30 min. **Full Marks : 35**

(Objective)

Time : 15 min. **Marks : 10**

Choose the correct answer from the following: ***1×10=10***

1. When light travels through a denser to rarer medium, its direction
   a. Shifts towards the normal
   b. Shifts away from the normal
   c. Get reflected at the interface
   d. Doesn't change throughout the propagation

2. The linear magnification produced by a spherical mirror is +1/3, what type of mirror is this?
   a. concave
   b. convex
   c. plain
   d. plano-convex

3. Which of the following is not a characteristic of LASERS?
   a. monochromaticity
   b. coherence
   c. divergence
   d. intensity

4. Which of the following was the first laser to develop?
   a. Ruby laser
   b. CO_2 laser
   c. He-Ne laser
   d. Nd-YAG laser

5. The ratio of He and Ne gases in He-Ne laser is maintained at
   a. 1:5
   b. 5:1
   c. 1:10
   d. 10:1

6. In holographic technique, an image is recorded in terms of
   a. Amplitude only
   b. Phase and brightness
   c. Phase and amplitude
   d. Phase only

7. The magnifying power of a microscope is _____ proportional to the focal length of the objective and eyepiece.
   a. directly
   b. inversely
   c. Both (a) and (b)
   d. None of the above

8. The bandwidth for visible part of electromagnetic radiation is
   a. 300 to 400 nm
   b. 400 to 765 nm
   c. 765 to 3200 nm
   d. 3.2 μm to 10.5 μm

9. In step indexed fibers the light rays propagate in _____ manner inside the core.
   a. zig-zag
   b. helical
   c. straight
   d. All the above

10. For a step indexed fiber to support single mode propagation, the necessary criterion are:
   a. V=2.405 and $a > 5\mu m$
   b. $V < 2.405$ and $a < 5\mu m$
   c. $V > 2.405$ and $a < 5\mu m$
   d. $V > 2.405$ and $a = 5\mu m$

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Descriptive

Time : 1 hr. 15 min. Marks : 25

[Answer question no.1 & any two (2) from the rest]

1. What do you mean by refractive index of a medium? 1+4=5
   State the sign conventions related to spherical surfaces.

2. Discuss the principle, construction and working of a Ruby laser. 10

3. Draw the ray diagram of a simple microscope made of a single lens. 4+6=10
   A simple microscope is made of a combination of two lenses in contact of powers +15D and +5D. Calculate the magnifying power of the microscope, if the image is formed at 0.25m, the least distance of distinct vision.

4. Describe briefly the origin of infra-red spectroscopy. What are the stretching and bending vibrations? Discuss the functional group region and finger print region of the mid-infrared part. 2+4+4 =10

5. Discuss the construction and wave propagation principle of optical fibers. 5+5=10

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