Anjuman Islam Janjira Degree College of Science Murud-Janjira, Raigad-402401 Affiliated to University of Mumbai	
Class: -F.Y.B.Sc.	**Subject: - Physics - I**
Semester:- II	**Course code: -USPH201**
Exam Event:- Summer 2024 (FH)	**Marks: -75**
Date:- 23/04/2024	**Duration:- 2.30 Hours**

Q1. Attempt any Four of the following. **(20)**

1) Derive the Newton's lens equation.
2) What is lens maker's equation? Calculate the focal length of Plano convex lens for which the radius of curve surface is 25 cm and refractive index of lens is 1.5?
3) Explain the concept of deviation of thin lens.
4) A thin Converging and diverging lens are placed coaxially at a distance of 6 cm a path. If the focal length of each lens is 10 cm. find equivalent focal length and position of first and second principle point.
5) Define spherical aberration. Write any two methods to reduce spherical aberration.
6) Explain chromatic aberration along with its two types.

Q 2. Attempt any Four of the following. **(20)**

1) What is simple microscope? Derive relation of magnifying power of simple microscope.
2) In compound microscope the object distance of objective is 10 cm and image distance is 5 cm. the image formed by eye lens is at distance of 20 cm having focal length 10 cm. then calculate i) magnifying power of compound microscope.
ii) maximum magnifying power of compound microscope.
iii) maximum magnifying power of compound microscope.
3) Write the difference between Ramsdens eyepiece and Huygens eyepiece.
4) Write a short note on interference of thin film.
5) A parallel beam of light of wavelength 5890 A^0 is incident on a thin film of refractive index 1.5 such as angle of refraction is 60^0. Calculate the smallest thickness of film which will make it appear dark by reflection.
6) In Newton's ring experiment the diameter of 10^{th} dark ring is 4 mm. the radius of curvature of Plano convex lens is 100 cm, calculate the wavelength of light.

Q 3. Attempt any Four of the following. **(20)**
1) Explain stimulated emission and write it's any two features.
2) Describe the characteristics of laser beam.
3) Define numerical aperture. Calculate Numerical aperture of a fiber with core refractive index $n_1 = 1.55$ and cladding $n_2=1.51$.
4) Write difference between spontaneous emission and stimulated emission.
5) What is optical fiber? Explain the optical fiber geometry.
6) Write difference between step index fiber and graded index fiber.

Q4. A) Select correct answer. **(Solve any 8 out of 12)** **(08)**
1) **Convex lens is also called as _____**
a) Converging lens b) Diverging lens c) biconvex d) Plano concave
2) SI unit of power of lens is _____
a) Diopter b) 1/m c) Both A and B d) None of these

3) The failure of lens to form a point image of a point object is called as_____

a) spherical aberration b) Chromatic aberration c) Coma d) Astigmatism

4) In general..... rays of light, after refraction through the lens do not meet at a single point

(a) paraxial (b) non-paraxial (c) paraxial and non-paraxial (d) paraxial and marginal

5) Ramsdens's eye-piece consists of two Plano-convex lenses of equal focal length f separated by a distance.....

(a) f (b) f/2 (c) -2/3 f (d) 1/3 f

6) Central spot in Newton's rings in transmitted system is .....

a) dark b) bright c) not definite d) sometimes bright and sometimes dark

7) What is the construction of a Ramsdens eyepiece?

a) It consists of a single lens. b) It consists of two Plano-convex lenses.

c) It consists of two Plano-concave lenses. d) It consists of a convex and a concave lens.

8) Which condition leads to the formation of dark fringes in Newton's rings?

a) Constructive interference b) Destructive interference

c) Phase reversal d) Polarization

9) LASER radiation is _____

a) Highly monochromatic b) Partially monochromatic c) White light d) None of these

10) Multi mode step index fiber has _____

a) Large core diameter & large numerical aperture

b) Large core diameter and small numerical aperture

c) Small core diameter and large numerical aperture

d) Small core diameter & small numerical aperture

11) What process occurs when an electron absorbs energy and moves to a higher energy level in an atom?

a) Absorption b) Emission c) Stimulated emission d) Spontaneous emission

12) What parameter determines the light-gathering ability of an optical fiber?

a) Core diameter b) Cladding diameter c) Numerical aperture d) Refractive index

Q4. B) Answer in one sentence (Solve any three out of five) (03)

1) Define power of lens.

2) What is lateral magnification.

3) Define magnifying power of simple microscope.

4) Write any one characteristics of laser.

5) What are the essential components of LASER?

Q4. C) Fill in the Blanks (Solve any four out of six) (04)

1) A lens with a _____ focal length converges light rays and forms real, inverted images.

2) Lateral magnification is the ratio of the _____ of the image to the height of the object.

3) A compound microscope uses multiple lenses to achieve _____ magnification.

4) Newton's rings are a series of concentric bright and dark fringes observed when a _____ lens is placed in contact with a flat glass surface.

5) Laser light is characterized by its high _____ and ability to be focused to a small spot.

6) Total internal reflection accurses only if angle of incident in core is _____critical angle.