

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI**END-OF-SEMESTER EXAMINATIONS : NOVEMBER – 2023****B.Sc. – MATHEMATICS / CHEMISTRY****MAXIMUM MARKS: 50****SEMESTER: III****TIME : 3 HOURS****PART – III****PHYSICS FOR MATHEMATICS AND CHEMISTRY – I****SECTION – A****(10 X 1 = 10 MARKS)****ANSWER THE FOLLOWING QUESTIONS.****(Objective Questions with four Multiple Choices)****(K1)**

1. The ratio of lateral contraction to the longitudinal elongation is called

| | |
|--------------------|---------------------|
| a. Young's modulus | b. Rigidity modulus |
| c. Poisson's ratio | d. bulk modulus |
2. The space around a body within which its gravitational force of attraction perceptible is

| | |
|----------------------------|--------------------------------|
| a. gravitational potential | b. gravitational field |
| c. gravitational constant | d. acceleration due to gravity |
3. Persistence of sound in an enclosure is referred as

| | |
|------------------|-----------|
| a. reflection | b. beats |
| c. reverberation | d. rhythm |
4. In the He-Ne laser device, the neon –helium mixture ratio is

| | | | |
|--------|--------|--------|--------|
| a. 1:5 | b. 5:1 | c. 2:3 | d. 3:2 |
|--------|--------|--------|--------|
5. The refractive index of cladding of a optical fiber is

| | |
|---------------------------------------|---------------------------------------------------|
| a. equal to 1 | b. less than that of core material |
| c. greater than that of core material | d. equal to the refractive index of core material |

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.**(K2)**

6. What is known as geometrical moment of inertia?
7. Write the Kepler's law of planetary motion about period of revolution.
8. What are ultrasonic waves?
9. What is the output wavelength of Nd-YAG Laser device?
10. What is known as critical angle?

(CONTD 2)

SECTION – B**(5 X 3 = 15 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K3)**

11. a) Deduce the expression for the Poisson's ratio of a rubber.

(OR)

- b) Obtain the expression for the bending moment with diagrammatic explanation.

12. a) Deduce the Newton's law of Gravitation from Kepler's law.

(OR)

- b) Prove that the acceleration due to gravity decreases with increase of depth.

13. a) Methods of detection of ultrasonic waves and explain briefly.

(OR)

- b) List any five industrial applications of ultrasonic waves.

14. a) What is known as population inversion? Explain with optical pumping.

(OR)

- b) Describe the construction and working of a semiconductor laser

15. a) Explain the propagation of light in an optical fiber.

(OR)

- b) Give a note on construction of optical fiber.

SECTION – C**(5 X 5 = 25 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K4 (Or) K5)**

16. a) Define Youngs modulus (E), Rigidity modulus(G) and Bulk modulus(K) and establish the relation between them. Discuss the limits to the value of $\gamma = (3K-2G)/(6K+2G)$

(OR)

- b) Describe with necessary theory, how you would determine the rigidity modulus of a wire experimentally by using torsion oscillations.

17. a) Determine the gravitational potential and field due to a spherical shell.

(OR)

- b) Describe a method of determination of g with compound pendulum.

18. a) Derive the Sabine's formula for reverberation time and discuss its importance.

(OR)

- b) Describe the method of production of Ultrasonic waves through piezoelectric crystal method with diagram. Discuss the advantages and disadvantages.

19. a) Describe the construction and working details of a He-Ne laser device. Explain its pumping scheme with energy level diagram.

(OR)

- b) List any five major applications of Lasers in medical and industrial area with explanation.

20. a) What are the classifications of optical fiber? Explain in detail.

(OR)

- b) Write about method of propagation of light in fiber optic communication and its advantages in the real time world.