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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2021-22 ONLY) **SUBJECT CODE 21UMS3A3/ 21UCY3A3**

REG.NO.

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : DECEMBER – 2022

B.Sc. – MATHEMATICS / CHEMISTRY **MAXIMUM MARKS: 70**

III SEMESTER **TIME : 3 HOURS**

PART – III
PHYSICS FOR MATHEMATICS AND CHEMISTRY – I

SECTION - A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS. (K1)

1. The dimensional formula for modulus of elasticity……..

   a) $M^{-1}LT^{-2}$ b) $ML^{-1}T^{-2}$ c) MLT^{-1} d) $ML^{1}T^{-2}$

2. Gravitational field is……

   a) vector field b) scalar field

   c) azimuthal field d) field produced by mass

3. Ultrasonic waves travel with the speed of ……

   a) more than velocity of sound b) 330 m/sec c) 20 kHz d) 20-20K Hz

4. Einstein's coefficient for stimulated emission while the transition is taking place between energy levels E1 and E2…….

   a) B_{12} b) A_{12} c) B_{21} d) A_{21}

5. The refractive index value of cladding material in an optical fiber should be……

   a) greater than core medium b) equal to air medium

   c) less than core medium d) equal to core medium

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

6. Define Bulk modulus.
7. What is known as equipotential surface?
8. What is known as reverberation?
9. Expand LASER
10. What are multimode fibers?

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SECTION – B (5 X 4 = 20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K3)

11. a) Establish the relation between the angle of shear and linear strain.

(OR)

b) What is the bending moment? Deduce an expression for it.

12. a) List Kepler's law of gravitational motion. Define gravitational field and potential.

(OR)

b) Write a note on a compound pendulum and its application.

13. a) What are Ultrasonic waves? How are they produced by the magnetostriction method?

(OR)

b) What is reverberation time? Deduce the formula of Sabine's for reverberation.

14. a) What is population inversion? How is it achieved? Discuss its importance while producing a laser beam.

(OR)

b) List the properties of a laser beam and explain them.

15. a) What is total internal reflection? Describe the structure of an optical fiber.

(OR)

b) Define the following with the expression
i) Numerical aperture ii) Acceptance angle

SECTION - C (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS

(K4 (Or) K5)

16. Define E, G, K, and ν. Obtain relation connecting them and show that i)E=9GK/3K+G ii) ν = 3K-2G/6K+2G

17. Derive the expression for the time period of torsional oscillations. Describe the experimental setup and procedure to determine the rigidity modulus of a steel wire.

18. Deduce the expression for gravitational potential and field due to a solid sphere

19. Mention any five industrial and medical applications of Ultrasonic waves and explain a method of determining the velocity of ultrasonic waves in liquids.

20. Describe the construction and working of the He-Ne laser with an energy level diagram.

21. Classify the types of optical fiber. Explain the mechanism of propagation of light energy in those fibers with the associated refractive index profile.

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