Reg.No.:……………….…….….…… Name :……………….……..…….… **15U136**

BSc DEGREE END SEMESTER EXAMINATION - OCTOBER 2015

SEMESTER - 1: PHYSICS (COMPLEMENTARY) FOR BSC MATHEMATICS

COURSE - 15U1CPPHY1: PROPERTIES OF MATTER, MECHANICS AND FOURIER ANALYSIS

Time: Three Hours Max. Marks: 60

Part A

Answer **all** questions, 1 mark each (Total 8 marks)

1. State the basic law of elasticity.
2. Reason out why a negative Poisson value is practically impossible?
3. What do you understand by the term plane of bending?
4. Define moment of inertia.
5. What is meant by 'Phase' of a simple pendulum?
6. Define Fourier's Theorem.
7. The length of a simple pendulum is increased by 44%. What is the percentage increase in period?
8. What is meant by even and odd functions? (1 x 8 = 8)

Part B

Answer any **six** questions, 2 marks each (Total 12 marks)

9. What happens to the neutral surface of a bar when it is subjected to uniform bending?
10. Explain how torsional couple arises in a wire.
11. "The Dirichlet's condition is not satisfied at all times", Explain.
12. "A long rod helps to keep a rope walker's balance". Explain.
13. Define torque. How is it related to angular momentum?
14. What do you understand by free or natural vibrations?
15. By keeping moment of inertia of a body constant, if we double the time period, then what will happen to the angular momentum of body? Explain.
16. How can a pendulum be used to trace out a sinusoidal curve? (2 x 6 = 12)

Part C

Answer any **four** questions, 5 marks each

17. A wire has a tensile strength of 70MPa, and breaks under 100N of force. What is the cross-sectional area of the wire just before breaking?
18. Suppose your leg bones of cross-sectional area 9.50 cm^2 experience a force of approximately 855 N while walking. Find out the fractional amount your leg bones get compressed by walking, if $Y = 10^{10}$ N/m^2.
19. What are the characteristics of a simple harmonic motion?
20. A pendulum oscillates with a frequency of 0.5 Hz. What is the length of the pendulum?

21. Calculate the Fourier Series for the function f(x), defined on [-2,2], where

$$f(x)=\begin{cases}-1, & -2\le x\le 0,\\ \end{cases}$$

22. A pendulum can behave as a simple harmonic oscillator only if the angle of oscillation is small. Why? (5 x 4 = 20)

Part D

Answer any **two,** 10 marks each.

23. Derive the expression for bending moment. Use it to arrive at the equation for the depression at the end of a cantilever.
24. Explain with necessary theory how to determine the moment of inertia of a flywheel about its axis of rotation.
25. Discuss the effect of damping on the motion of particles making SHM. Illustrate with an example. Discuss also about its kinetic energy.
26. Deduce the expressions for the Fourier coefficients.

(10 x 2 = 20)

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