THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U PHY3 C03 - MECHANICS, RLATIVITY, WAVES AND OSCILLATIONS

(Physics - Complementary Course)

(2019 Admission onwards)

Time : 2.00 Hours   Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. Explain the invariance of an equation under Galilean transformation.

2. State work-energy theorem.

3. What are the conditions required to attain high velocity for rocket propulsion?

4. State the postulates of special theory of relativity.

5. What is meant by time dilation?

6. Write down the mass-energy relation and explain the symbols

7. Obtain a mathematical expression for the period of oscillation of a loaded spring

8. What is meant by damped oscillations? Obtain an expression for its motion.

9. Sound wave is a mechanical wave. Explain.

10. Explain energy density of a plane progressive wave.

11. What is group velocity?

12. What is meant by eigen value equation? Explain with an example.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. A lift is moving upwards with an acceleration $2m/sec^2$. Compute the effective weight of a man standing in it, when his actual mass is 70kg.

14. What is the effect of coriolis force due to rotation of earth?

15. What is a conservative force? State atleast three characteristics.

16. A shell at rest explodes into three pieces of mass in the ratio 1:1:2. If the two pieces of equal mass flyoff with a speed each of 10m/s perpendicular to each other, what is the speed of the third heavier piece?

17. Show that $x^2+y^2+z^2-c^2t^2$ is Lorentz invariant.

18. Draw the graph between maximum KE and the frequency of incident photon for a metal surface. Determine the work function from this graph.

19. Obtain time dependent and time independent Schrodinger equation.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

20. Define central force.
    (a) Show that angular momentum of a particle in central force field is conserved.
    (b) Show that the motion under central force occurs in a plane.

21. Derive the expression for relativistic variation of mass with velocity.

(1 × 10 = 10 Marks)

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