C 5624

Name.................................

Reg. No.............................

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2016

(CUCBCSS—UG)

Complementary Course

PHY 2C 02—MECHANICS, RELATIVITY WAVES AND OSCILLATIONS

Time : Three Hours

Maximum : 64 Mark

Part A (One word)

Answer all questions.

Each question carries 1 mark.

1. The Michelson Morley experiment proved the non-existence of ————.

2. In the case of conservative forces, the work done is ———— independent.

3. Angular momentum conservation is subject to the condition of zero ————.

4. Velocity of all massive objects is limited to the velocity of————.

5. If the frequency of a SHM is f, the frequency of its kinetic energy is ————.

6. ———— is an example for a non-conservative force.

7. The unit of angular velocity is ————.

8. The variable in sound waves is ————.

9. In orbital motion, the gravitational pull is balanced by ———— force.

10. Operators associated with observable variables are ————.

(10 × 1 = 10 marks)

Part B (Short answers)

Answer all questions.

Each question carries 2 marks.

11. Distinguish between inertial and non-inertial frames of reference.

12. What are the *two* fictitious forces acting on rotating frames of reference ?

13. State the postulates of the special theory of relativity.

Turn over

14. Explain the concept of centre of mass of a system.

15. Define simple harmonic motion.

16. What is damping ?

17. Why does not a running bicycle fall ?

$(7 \times 2 = 14 \text{ mar...})$

Part C (Paragraph answers)

Answer **two** *questions.*
Each question carries 4 marks.

18. Derive the relationship between torque and angular momentum.

19. Explain the twin paradox.

20. Explain the concept of length contraction.

21. Discuss the basic postulates of quantum mechanics.

22. Prove the work energy theorem.

$(2 \times 4 = 8 \text{ mark...})$

Part D (Problems)

Answer **three** *questions.*
Each question carries 4 marks.

23. The kinetic energy of a body is increased by 300%. Give the percentage increase in momentum...

24. Two masses, 59 kg and 73kg are located at the ends of a rod 3.5m long. At what distance from ... first mass is the centre of mass of the system located ?

25. What is the mean life of a burst of Pi mesons travelling with a velocity of 0.73 times the velocity ... light if the proper mean life time is 2.5×10^{-8} s ? Find the distance travelled in this life time un... both relativistic and non-relativistic conditions.

26. An SHM is represented by the equation $y = 0.2 \sin (50\Pi t + 1.57)$, y and t are in meters ... seconds respectively. Determine the amplitude, frequency and time period of motion.

27. A particle executes SHM of amplitude a. At what distance from the mean position is the kine... energy and potential energy equal.

$(3 \times 4 = 12 \text{ mar...})$

Part E (Essays)

Answer **two** *questions.*
Each question carries 10 marks.

28. Arrive at the Lorentz transformation equations in accordance with the special theory of relativity.

29. Derive the time dependent Schrödinger equation.

30. Drive the expressions for kinetic, potential and total energies of an oscillator discussing their variations and hence prove the conservation of energy.

$(2 \times 10 = 20 \text{ marks})$