

Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY
Summer Examination-2019

Subject Name : Physics I

Subject Code : 4SC01PHY1

Semester : 1 Date : 19/03/2019

Branch: B.Sc. (All)

Time : 02:30 To 05:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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Q-1 Attempt the following questions: (14)

- a) Define scalars.
- b) What is a frame of reference?
- c) Mention any two uses of a multimeter.
- d) Give the statement of Newton's third law of motion.
- e) Express the formula for moment of inertia.
- f) Define escape velocity.
- g) State Thevenin's theorem.
- h) What is elasticity?
- i) What is Newton's law of gravitation?
- j) Does energy remain conserved in an elastic collision?
- k) State Hooke's law.
- l) Give the full form of GPS.
- m) Mention the value of acceleration due to gravity (g) along with its unit.
- n) Define amplitude of a wave.

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions (14)

- a) Define conservative force. Prove that the work done by the conservative force along a closed path is always zero. (05)
- b) Find the angle between two vectors A and B; where $\vec{A} = 2\hat{i} - \hat{j} + \hat{k}$ and $\vec{B} = 3\hat{i} + 4\hat{j} - \hat{k}$. (03)
- c) Name and differentiate between the two types of vector products. (06)

Q-3 Attempt all questions (14)

- a) Define: Centre of mass. Derive an expression for the centre of mass of the system of large number of particles. (05)
- b) State and derive the work energy theorem. (05)
- c) Briefly explain the physics behind GPS. (04)

Q-4 Attempt all questions (14)

- a) Explain briefly the various modulus of rigidity. (07)
- b) Derive the relation between angular momentum (L) and moment of inertia (I). (05)



- c) Give example each of conservative and non-conservative forces. (02)
- Q-5 Attempt all questions (14)**
- a) Derive an expression for the gravitational potential energy for a point outside the sphere with proper diagram. (09)
- b) Derive an expression for rotational kinetic energy of a rigid body. (05)
- Q-6 Attempt all questions (14)**
- a) State and prove Norton's theorem. (09)
- b) State Kepler's laws of motion. How can one understand planetary motion based on Kepler's laws. (05)
- Q-7 Attempt all questions (14)**
- a) Explain the concept of time dilation using suitable example. (08)
- b) Differentiate between musical sound and noise. (04)
- c) State Newton's law of cooling. (02)
- Q-8 Attempt all questions (14)**
- a) Define self-induction. Derive the formula for self-inductance $L = -\varepsilon/(\partial I/\partial t)$. Also, prove that in the presence of magnetic field the energy stored in an inductor is $W = (1/2)LI^2$. (08)
- b) Derive the expression for total energy of a simple harmonic motion. (06)

