Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name :Physics–I

Subject Code :4SC01PHY1 Branch: B.Sc. (All)

Semester :1 Date :03/12/2018 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.

Q-1 **Attempt the following questions:** **(14)**

a) What is the difference between vectors and scalars? 01
b) Name different types of vectors. 01
c) Name two types of reference frames.Differentiate them with reference to Newton's 1st law. 01
d) Define constant current source in a network circuit. 01
e) Define constant Voltage source in a network circuit. 01
f) Write the accepted value and unit of Acceleration due to Gravity (g). 01
g) Define coefficient of restitution (e). Give its formula and unit. 01
h) Give the formula of Force according to Newton's law. Give its unit. 01
i) Give formula and units: Angular velocity(ω)andAngular acceleration(α). 01
j) Write Newton's law of gravitation. What is G? Write its value and unit. 01
k) Obtain acceleration due to gravity g of a place where a simple pendulum of length 100 cm performs 30 oscillations in a minute. 01
l) Define Amplitude in simple harmonic oscillations. 01
m) What is phase and phase constant (phase angle) in simple harmonic motion? 01
n) What are the functions/applications of a Multimeter? 01

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

Q-2 **Attempt all questions** **(14)**

(A) Describe scalar product of two vectors and their properties. **06**
(B) Derive the formula for the Vector Triple Product of three vectors. **06**
(C) If $\vec{A} = 2\,\hat{\imath} - \hat{\jmath} + \hat{k}$ and $\vec{B} = 3\,\hat{\imath} + 4\hat{\jmath} - \hat{k}$. Obtain Unit-vector parallel tothe resultant of these two vectors. **02**

Q-3 **Attempt all questions** **(14)**

(A) Define conservative force. Prove that the work done by the conservative **05**

force along a closed path is always zero.

(B)	Derive the work energy theorem.	**05**
(C)	Write the statements of Newton's three laws of motion.	**04**

Q-4 **Attempt all questions** **(14)**

(A)	Define Centre of Mass (CM). Obtain an expression for the centre of mass of Many-particle system.	**05**
(B)	Define: Elastic collision. Derive two-dimension elastic collision formula.	**05**
(C)	How much work is needed for a lift of mass 50 kg with one person of mass 50 kg inside it and moving from the ground floor to the total height of 50 meter at the 10^{th} floor in 1 minute?	**04**

Q-5 **Attempt all questions** **(14)**

(A)	Derive an expression for the angular momentum of a rigid body.	**05**
(B)	Discuss rotational kinetic energy of a rigid body with necessary equation.	**05**
(C)	A hollow cylinder of mass 3 kg and diameter 40 cm is rotating for 0.1 minute about its geometrical axis under the tangential force of 50 N by winding a thin string around it. Obtain the torque, moment of inertia, angular velocity, angular acceleration, angular momentum and rotational kinetic energy of the cylinder.	**04**

Q-6 **Attempt all questions** **(14)**

(A)	What is escape velocity? Derive necessary expression for the escape velocity. Prove that the escape velocity from the Earth's surface is 11.2 km/s.	**07**
(B)	State Kepler's laws of planetary motion.	**03**
(C)	Write a short note on G.P.S.	**04**

Q-7 **Attempt all questions** **(14)**

(A)	Describe Young's, Bulk and Rigidity modulus each by giving definition, figure, formula and unit only.	**06**
(B)	What is angular (simple) harmonic motion? Derive the equation for its total energy $E = \frac{1}{2} I\omega^2\theta_{max}^2$.	**05**
(C)	Obtain Young's modulus of a 100 cm long metal wire of diameter 1 mm experiencing elongation of 0.09 mm by 9 kg load. ($g = 3.12\ \pi\ ms^{-2}$)	**03**

Q-8 **Attempt all questions** **(14)**

(A)	Name any three network theorems for the circuit analysis. Discuss any one of them giving statement, circuit diagrams, formula and applications.	**07**
(B)	What is self-induction? Obtain self-inductance formula $L = -\varepsilon/(\partial \mathrm{I}/\partial \mathrm{t})$.Also, prove that energy stored in an inductor,when linked with magnetic field, is $W = (1/2)LI^2$.	**07**