Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY
Winter Examination-2020

Subject Name : Physics−I
Subject Code : 4SC01PHY1 **Branch: B.Sc. (All)**
Semester: 1 **Date: 12/03/2021** **Time: 11:00 To 02:00** **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 Multiple Choice Questions:** **(14)**

a) The unit(s) of Elasticity is/are **01**
(A) N/m^2 **(B)** Pascal **(C)** $dyne/cm^2$ **(D)** All Correct

b) Young's modulus … **01**
(A) $Y = \frac{MgL}{2\pi r\Delta\ell}$ **(B)** $Y = \frac{MgL}{\pi r\Delta\ell}$ **(C)** $Y = \frac{MgL}{\pi r^2\Delta\ell}$ **(D)** $Y = \frac{\pi r^2\Delta\ell}{MgL}$

c) For unit vectors, $\hat{\imath}.\hat{\imath} = \hat{\jmath}.\hat{\jmath} = \hat{k}.\hat{k}$=____ &$\hat{\imath} \times \hat{\imath} = \hat{\jmath} \times \hat{\jmath} = \hat{k} \times \hat{k}$=____ **01**
(A) −1, 0 **(B)** 1, 0 **(C)** 0, 1 **(D)** 0, −1

d) The unit of strain is **01**
(A) Unitless **(B)** N/m^2 **(C)** $Dyne/cm^2$ **(D)** Kg/m^2

e) What minimum velocity is required for an object of mass "m" to escape the gravitational pull of earth with "M" and radius "R" from its surface? **01**
(A) $\sqrt{2GM/R}$ **(B)** $(GM/R)^2$ **(C)** $\sqrt{GMm/R}$ **(D)** $\sqrt{GM/R}$

f) Which of the following is not one of the fundamental forces? **01**
(A) Gravitational **(B)** Frictional **(C)** Nuclear **(D)** None

g) What is the unit of gravitational potential energy? **01**
(A) N **(B)** N/Kg **(C)** Joule **(D)** Joule/K

h) Force according to Newton's law is **01**
(A) F = m.a. **(B)** F = dP/dt **(C)** F = mdv/dt **(D)** All Correct

i) What is the full form of GPS? **01**
(A) Graphical Positioning System **(B)** Geo Peripheral System **(C)** Global Positioning System **(D)** Ground Positioning System

j) The accepted value and unit of Acceleration due to Gravity (g) is **01**
(A) 10.81 m/s^2 **(B)** 9.81 m/s^2 **(C)** 981 m/s^2 **(D)** 9.81 cm/s^2

k) Kinetic energy =_____ & Potential energy = _____ **01**
(A) ½ mv^2, mgh **(B)** mv^2, mgh **(C)** Mgh, mv^2 **(D)** ½ mgh, mv^2

l) Which of the following is correct in case of Angular acceleration (α) **01**
(A) $d\omega\backslash dt$ **(B)** $d^2\theta/dt^2$ **(C)** rad/s^2 **(D)** All correct

m) $\hat{\imath} \times \hat{\jmath}$ =___;$\hat{\jmath} \times \hat{k}$=____;$\hat{k} \times \hat{\imath}$=____ &$\hat{\jmath} \times \hat{\imath}$ =___;$\hat{k} \times \hat{\jmath}$=___;$\hat{\imath} \times \hat{k}$=____ **01**
(A)$\hat{k},\hat{\imath},\hat{\jmath}$&$\widehat{-k},-\hat{\imath},-\hat{\jmath}$ **(B)**$\widehat{-k},-\hat{\imath},-\hat{\jmath}$&$\hat{k},\hat{\imath},\hat{\jmath}$ **(C)**$\hat{\imath},\hat{\jmath}\hat{k}$&$-\hat{\imath},\widehat{-\jmath}\widehat{-k}$

n) Newton's _____ law of motion states that action and reaction are equal in magnitude and opposite in direction. **01**

(A) 0^{th} **(B)** 3^{rd} **(C)** 2^{nd} **(D)** 3^{rd}

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

Q-2		**Attempt all questions**	**(14)**
	(A)	Distinguish giving examples: Scalar quantities V/s. Vector quantities.	**05**
	(B)	Write a short note on GPS.	**06**
	(C)	What is Homogeneous Differential Equation? Write formula for the first order Differential Equation.	**03**
Q-3		**Attempt all questions**	**(14)**
	(A)	Explain in detail: Gravitational potential and Gravitational potential energy.	**07**
	(B)	Derive the equation of simple harmonic motion $x = \text{a}\sin(\omega t + \phi)$	**07**
Q-4		**Attempt all questions**	**(14)**
	(A)	What is Hook's law? How moduli of elasticity are derived from this law?	**04**
	(B)	Name moduli of elasticity. Explain any one deriving necessary formula.	**07**
	(C)	10 kg load is suspended at open end of a 300 cm long metallic wire of 0.5 mm diameter, its length is increased by 1 mm. Find Young's modulus.	**03**
Q-5		**Attempt all questions**	**(14)**
	(A)	What is difference between conservative force and non-conservative force? Give examples of conservative forces. Prove that the work done by conservative force along a closed path is zero.	**07**
	(B)	Define center of mass. Obtain expression for the center of mass of (i) A system with large number of particles	**04**
	(C)	A ball of 100 gram at rest is thrown 100 meter up. Calculate its velocity. What is the kinetic energy and total energy when it just strikes the ground?	**03**
Q-6		**Attempt all questions**	**(14)**
	(A)	Distinguish : Linear motion versus Angular motion	**04**
	(B)	Discuss angular momentum of a rigid body and derive $\vec{L} = I\,\vec{\omega}$.	**07**
	(C)	Calculate Torque of a flywheel of moment of inertia 8kgm^2, rotating with angular velocity 5 revolution/second in 10 sec.	**03**
Q-7		**Attempt all questions**	**(14)**
	(A)	Explain mutual inductance giving figure and derive necessary formula.	**08**
	(B)	Narrate Faraday's law of electromagnetic induction.	**06**
Q-8		**Attempt all questions**	**(14)**
	(A)	Define network theorem. Explain Maximum Power Transfer theorem.	**07**
	(B)	State and prove: Thevenin's theorem	**07**