V.P. & R.P.T.P. SCIENCE COLLEGE, VALLABH VIDYANAGAR
INTERNAL EXAMINATION
B.Sc. (Semester- 6)
Monday, 6th March 2017
11:00 a.m. to 12:30 p.m.
Subject: PHYSICS
Course: US06CPHY01
Title: Quantum Mechanics

Total Marks: 25

Q-1   Multiple Choice Questions (Attempt All)   **(03)**

(1)   The concept of matter wave was suggested by_____
(a)   de Broglie   (b)   Laplace
(c)   Heisenberg   (d)   Schrodinger

(2)   For bound state of a particle in a square well the energy is _____
(a) $E = 0$ (b) $E = \propto$
(c) $E < 0$ (d) $E > 0$

(3)   Potential for simple harmonic oscillator is $V = $ _____
(a) $\dfrac{p^2}{2m}$ (b) $\dfrac{1}{2}kx^2$
(c) mgh (d) kx

Q-2   Short Questions (Attempt any Two)   **(04)**

(1)   State the Heisenberg's uncertainty principle
(2)   Define odd and even parity of wave function
(3)   Write the Hamiltonian for anisotropic oscillator

Q-3   Discuss the motion of a wave packet and derive the expression of group   **(06)**
velocity of wave packet

OR

Q-3   Derive the one dimensional Schrodinger equation for a free particle   **(06)**

Q-4   Find the solution for a particle in a square well for E < 0   **(06)**

OR

Q-4   Using the admissible solutions derive the expression of energy eigen values **(06)**
for a particle in a square well

Q-5   Set up the Schrodinger equation for simple harmonic oscillator and obtain   **(06)**
its eigen value

OR

Q-5   Deduce the motion of a particle in central potential and derive the radial   **(06)**
equation