Sardar Patel University
No. of Printed Pages: 2
Vallabh Vidyanagar
MSc (Applied Science)-I semester Examination
Subject: Elements of Physical Sciences: PET01CAS01
Day & Date: Thursday 02 Jan 2014   Time: 10:30 am to 01:30 pm

Max marks 70

I   Select the most probable answer from the choices given below each question (8x1=8)

1. A force which is always directed towards a fixed point is generally called as

    A. Frictional force   B. Coriolis force
    C. Central force   D. Noninertial force

2. The reduced mass of a two body system constituting particles of masses m_1 and m_2 is given by

    A. $m_1 + m_2$ B. $m_1 m_2/(m_1 + m_2)$ C. $(m_1 + m_2)/ m_1 m_2$ D. $m_1 - m_2$

3. The eccentricity of a parabolic orbit is

    A. Equal to zero   B. greater than one   C. equal to one   D. less than one

4. The statistics of a system of distinguishable (classical) particles is described by

    A. Boltzmann Statistics   B. Fermi-Dirac Statistics
    C. Bose-Einstein statistics   D. Para statistics

5. The nonexistence of magnetic monopole is expressed by

    A. $\nabla . B = 0$ B. $\nabla X B = 0$ C. $B = 0$ D. $\nabla^2 B = 0$

6. Bragg's law is related to

    A. Laser action   B. Black body radiation
    C. X-ray diffraction   D. Auger Transition

7. The bio-molecular structure involved in replication and transcription is the

    A. RNA   B. DNA   C. mRNA   D. tRNA

8. The fourth state of matter is called
    A. Condensed phase   B. Gaseous state   C. Plasma state   D. Glassy phase

II.   Answer any seven questions very briefly   2X7= 14

        1. Define perigee and apogee of an elliptical orbit.
        2. Define Coriolis force and its effect
        3. Write down the Hamiltonian corresponds to a free particle.
        4. Write down the four Maxwell's equations
        5. Describe the properties of a plasma medium
        6. Explain briefly the concept of holography
        7. What is Diffraction and explain Bragg's law
        8. Explain the importance of DNA and RNA molecules in a biological cell
        9. Draw the I-V characteristics of a p-n junction diode

IIIA.   Derive Lagrange's equations through least action principle.   6
   B.   State and prove Kepler's laws of motion.   6
                                    OR
   B.   Obtain an expression for Fermi-Dirac distribution function   6

IVA.   Explain the production of X-rays and discuss their Characteristics.   6
   B.   Explain the working of LASER   6
                                    OR
   B.   Discuss the medical applications of Lasers   and X-rays   6

VA.   Describe the chemical structure of nucleic acid   6
   B.   Describe the working principle of a solar cell. Draw its I-V characteristics and
         define Fill factor.   6
                                    OR
   B.   Discuss the different functions of DNA and RNA and explain the double helical structure
        of DNA.   6

VIA.   Make a comparative study of Maxwell - Boltzmann, Bose-Einstein and Fermi-Dirac
        statistics.   6
   B.   Write a short note on biological nano structures.   6
                                    OR
   B.   Discuss the applications of plasma physics.   6

                                    —X—