P. P. SAVANI UNIVERSITY

First Semester of B.Sc. Fire & Safety Examination
December-2022
SSFS1010–Applied Physics

12.12.2022, Monday   Time: 9:00 a.m. to 011:30 a.m.   Maximum Marks: 60

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1   Short Questions   [10]

1.1   Objectives   [05]

1.1a   In the given option, the second fundamental unit is:
    A   Length
    B   Luminous intensity
    C   Plane angle
    D   Time

1.1b   Joule/coulomb is the same as..........
    A   1 ampere
    B   1 kwh
    C   1kw
    D   1 volt

1.1c   Which of the following Physical concepts does Newton's Third Law of Motion explain?
    A   Angular momentum
    B   Displacement
    C   Momentum
    D   Acceleration

1.1d   Which of the following is not a unit of time?
    A   Second
    B   Minute
    C   Hour
    D   Light year

1.1e   Work has the dimensions as that of ....
    A   Power
    B   Torque
    C   Magnetic force
    D   None of these

1.1f   When there are no external forces, the shape of a liquid drop is determined by
      A   Surface Tension of the liquid
      B   The density of the liquid
      C   The viscosity of the liquid
      D   The temperature of air only

1.1g   The surface of the water in contact with the glass wall is ....
      A   Plane
      B   Concave
      C   Convex
      D   None of these

1.1h   If common salt is dissolved in water, then the surface tension of saltwater is:
      A   Increased
      B   Decreased
      C   Not changed
      D   First increases then decrease

1.1i   Cohesion is maximum in
      A   Solids
      B   Liquids
      C   Gases
      D   same in all

1.1j   Molecular forces are.................
      A   Always repulsive
      B   Always attractive
      C   Sometimes attractive and sometimes repulsive
      D   Attractive up to a certain distance

1.2   Answer the Following: (MCQ/Short Question/Fill in the Blanks)   [05]
1.2a   Define vector quantity.
1.2b   Wind velocity can be represented as a vector quantity. (True or False).
1.2c   Water has a high surface tension. (True or False).
1.2d   What is Viscosity?
1.2e   Evaporation is rapid on a wet day. (True or False).

Q.2   Short Notes (Attempt any two)   [06]
A   Describe Newton's law of viscosity.
B   Explain Streamline and Turbulent flow.
C   Explain angle of contact.

Q.3   Explain in detail (Attempt any two)   [14]
A   Determination of Co-efficient of viscosity 'η' by falling sphere method.
B   Calculate the radius of drop of water falling through air if the terminal velocity

of drop is 1.2 cm/sec, coefficient of viscosity of air 1.8 x 10⁻⁵ N-s/ m², density
of water is 1000 Kg/m³ and the density of the air is 1.21 Kg/m³.

C   Explain capillary rise method to determine surface tension.

<div align="center">Section-II (Total Marks - 30)</div>

Q.1   Short Questions   [10]

1.1   Objectives   [05]

1.1a   A system which can neither exchange matter nor energy with the surroundings
is called......

    A   Open system
    B   Isolated system
    C   Closed system
    D   Ideal system

1.1b   Thermodynamics is based on study of .... of the system

    A   microscopic properties
    B   macroscopic properties
    C   physical properties
    D   chemical properties

1.1c   The process in which size of system remains constant is known as................

    A   Isothermal
    B   Adiabatic
    C   Isochoric process
    D   Isobaric process

1.1d   Which of the following is not a state function?

    A   Internal energy
    B   Enthalpy
    C   Work
    D   Volume

1.1e   For an adiabatic expansion

    A $\Delta U = -ve$
    B $W = +ve$
    C $\Delta U = 0$
    D $\Delta T = 0$

1.1f   In X-ray emission tubes, X-ray is emitted by the acceleration of ....

    A   Atoms
    B   Protons
    C   Electrons
    D   Neutrons

1.1g   X-Rays are not used in.....

A   Photographic film
B   Photocells
C   Geiger tubes
D   Ionization Chamber

1.1h   An alpha particle is same as?
    A   a helium nucleus
    B   a hydrogen nucleus
    C   a proton
    D   a positron

1.1i   When two atomic nuclei combine it is called as
    A   Chain reaction
    B   Nuclear fusion
    C   Nuclear decay
    D   Nuclear fission

1.1j   A radioactive nucleus emits a beta particle. The parent and daughter nuclei
    are...........
    A   Isotopes
    B   Isotones
    C   Isomers
    D   Isobars

1.2   Answer the Following: (MCQ/Short Question/Fill in the Blanks)   [05]
1.2a   A system is called homogeneous if the physical state of all its constituents is the
    same. (True or False).
1.2b   Define Thermal Equilibrium.
1.2c   Isotones have the same number of _____.
1.2d   There are four types of radiation obtained from radioactive elements. (True or
    False).
1.2e   What is the source of stellar energy?

Q.2   Short Notes (Attempt any two)   [06]
A   Explain Macroscopic and Microscopic systems.
B   Describe important features of first law of thermodynamics.
C   Explain alpha-decay.

Q.3   Explain in detail (Attempt any two)   [14]
A   Explain isothermal expansion of ideal gas with calculation for work done.
B   What is a nuclear chain reaction? Explain the difficulties and their removal in
     its success.
C   Explain heat engine & its efficiency.