P. P. SAVANI UNIVERSITY

First Semester of B.Sc. Examination
February-2022
SSCH1040–Physics

09.02.2022, Wednesday **Time: 12:00 p.m. to 2:30 p.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 Which of the following is the unique property of LASER?

A Directional
B Wavelength
C Speed
D Frequency

1.1b When a bus starts suddenly, the passengers are pushed back. This is an example of which of the following?

A Newton's first law
B Newton's second law
C Newton's third law
D None

1.1c Due to an acceleration of $2m/s^2$, the velocity of body increases from 20m/s to 30m/s in a certain period. Find the displacement of the body in that period.

A 650
B 125
C 250
D 325

1.1d Stimulated emission occurs when

A $N_2 > N_1$
B $N_2 = N_1$
C $N_2 < N_1$
D None of the above

1.1e What is the need to achieve population inversion?

A To excite most of the atoms
B To bring most of the atoms to ground state
C To achieve stable condition
D To reduce the time of production of laser

1.1f A person holds a bucket by applying a 10N force. He then moves a horizontal distance of 5m and climbs up a vertical distance of 10m. Find out the total work done by him?

A 100J
B 150J
C 50J
D 200J

1.1g ..... is the force that resists motion when the surface of one objects comes in contact with the surface of the another.

A Kinetic energy
B Friction
C Work
D Collision

1.1h What is the principle of fibre optical communication?

A Diffraction
B Total internal reflection
C Interference
D Refraction

1.1i Which colour of light has the shortest wavelength?

A Red
B Blue
C Violet
D Yellow

1.1j The weakest force in the nature is

A Gravitational Force
B Nuclear force
C Weak force
D Electromagnetic force

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a State newton's second law of motion.
1.2b What is population inversion?
1.2c Define: Critical angle
1.2d What are the basic components of optical fibre?
1.2e What is pumping?

Q.2 Short Notes (Attempt any two) [06]

A Write down the advantages of optical fibre.
B State the differences between static friction and kinetic friction
C State the law of conservation of momentum.

Q.3 Explain in detail (Attempt any two) [14]

A Derive the expression for Einstein's coefficient. (LASER).
B Explain the construction and working of Nd: YAG LASER.
C Write a short note on: Friction is necessity and evil

Section-II (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a Which one of the following substance is not elastic?

A Iron
B Steel
C Copper
D Modelling clay

1.1b When a pure semiconductor is heated, its resistance

A goes down
B goes up
C remains the same
D can't say

1.1c Property of material due to which it attracts or repels other object is

A Charge
B Mass
C Friction
D Velocity

1.1d If the distance between the two points charges become half then force between them becomes

A double
B four times
C half times
D remains same

1.1e An electric field can deflect

A neutron
B X-rays
C alpha- rays
D none

1.1f With rise in temperature, the Young's modulus of elasticity of the material

A Increases
B decreases
C does not change
D may increase or decrease

1.1g Which one of the substance possess high elasticity?

A Rubber
B Steel
C Glass
D Aluminium

1.1h The dimensional formula for the stress is the same as that for

A Work

B Power
C Pressure
D Force

1.1i When a pentavalent impurity is added to the pure semiconductor, it becomes
A An insulator
B An intrinsic semiconductor
C P-type semiconductor
D n- type semiconductor

1.1j If by applying force, the shape of the body changed, then the corresponding stress is known as
A Tensile stress
B Bulk stress
C Shearing stress
D Compressive stress

1.2 **Answer the Following: (MCQ/Short Question/Fill in the Blanks)** [05]
1.2a State Gauss's law of Electrostatic.
1.2b State Hooke's law.
1.2c What is Transistor?
1.2d What is an intrinsic semiconductor?
1.2e Define resistivity.

Q.2 **Short Notes (Attempt any two)** [06]
A Write down the properties of elasticity.
B A wire of resistance 5Ω is drawn out so that its length is increased by twice its original length. Calculate its new resistance.
C Write a short note on p-type semiconductors.

Q.3 **Explain in detail (Attempt any two)** [14]
A Derive the expression for the electric field due to an infinitely long straight charged wire uniform charge density.
B What is transistor? Explain input and output characteristics of CE transistor?
C What is strain? Explain its classification in detail.