B.Sc., Sem.-I

DSC-C-PHY-111 T : Physics

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) Symbols have their usual meaning.
(2) Figures on right side show marks.

1. (A) Obtain the expression of Triple Scalar Product. Give its physical interpretation and show that it follows cyclic property.

1. (B) If $\vec{a} = (2, -3, 1)$

$\vec{b} = (3, -2, 3)$

$\vec{c} = (4, -4, 3)$ then find $\vec{a} \cdot (\vec{b} \times \vec{c})$.

OR

1. (A) Write and prove Divergence Theorem.

1. (B) Derive gradient of Scalar field.

2. (A) Derive differential equation of longitudinal wave propagating through rod and obtain $V = \sqrt{\frac{E}{\rho}}$.

2. (B) Write merits and demerits of magnetostriction transducer.

OR

2. (A) With necessary diagram, explain Piezo-electric method to produce ultrasonic waves.

2. (B) State and describe method of detection of ultrasonic waves.

3. (A) Discuss the interference in the reflection region of a thin film and derive the expression for optical path difference. 5

3. (B) Derive the Snell's law of refraction by using Fermat principle. 5

OR

3. (A) Explain theory of Newton's rings and obtain the expression for path difference. 8

3. (B) Write Fermat's Principle of least time. 2

4. (A) Write note on spontaneous emission and stimulated emission. 6

4. (B) Write note on four level pumping. 4

OR

4. (A) Derive the relation between Einstein's co-efficient A and B. 6

4. (B) State and explain the main characteristics of LASER. 4

5. Answer in short : (Any **Ten**) 10

(1) What is Unit Vector ?

(2) State Gauss's theorem.

(3) State Stoke's theorem.

(4) Define : Transverse waves.

(5) What are ultrasonic waves ?

(6) Write one application of Newton's ring.

(7) Give full form of LASER.

(8) Which type of pumping is used in He-Ne LASER ?

(a) Three layer (b) One layer

(c) Four layer (d) Two layer

(9) Which are type of waves passing through rod ?

(10) In Newton ring, center is _______ (Light, Dark)

(11) Define : Active centers.

(12) Force is Scalar. (True or False)