## SECTION 'B' (Short-Answer Questions) (25)

NOTE: Attempt any Five part questions from this section. All questions carry equal marks. The use of scientific calculator is allowed. All notations are used in their usual meanings. Draw diagram where necessary.

2. i) Derive an expression for the variation of 'g' with depth.

2. ii) How far apart are the diffracting planes in a NaCl crystal for which X-rays of wavelength 1.54 $\mathring{A}$ make a glancing angle of 15° – 54' in 1st order?

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2. iii) What is the difference between static and dynamic equilibrium? State the conditions of equilibrium.

2. iv) Determine the unit vector perpendicular in the plane of

$\vec{A} = 2\hat{i} - 6\hat{j} - 3\hat{k}$ and $\vec{B} = 4\hat{i} + 3\hat{j} - \hat{k}$

2. v) What is simple pendulum? Prove that the motion of simple


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2. iv) By drawing a figure establish work energy equation for a freely falling body.

## SECTION "C" (Detailed Answer Questions)(18)

NOTE: Attempt any One question from this section. Draw diagrams, where necessary.

3. a) Show that

i) $\vec{A}.\vec{B} = \vec{B}.\vec{A}$ (ii) $\vec{A}.(\vec{B}+\vec{C}) = \vec{A}.\vec{B} + \vec{A}.\vec{C}$

3. b) Explain Newton's formula for the speed of sound. What corrections did the Laplace made in Newton's formula? Also give the corrected formula.

3. c) With the help of ray diagram of compound microscope, derive the expression for its magnifying power.

4. a) What is diffraction grating? How it is used to determine wavelength of monochromatic light. Derive necessary formula.

4. b) Two bodies of masses M & m are connected with ends of a sting which passes over a frictionless pulley such that the two bodies move vertically. Derive the expressions for acceleration of bodies and tension in the sting.

4. c) A shell is fired at an angle 'θ' with the horizontal initial velocity 'vo'. Find the expressions for its;

i) Maximum height ii) Horizontal range

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