SHIKSHA CLASSES

| Subject : Maths- I | BOARD QUESTION PAPER | Total Marks : 20 |
| Class : XII | Topic: 5. Vectors | Time : 1 Hr. |

Section A

Q.1 : Choose the correct option :   4

i) If the vectors $2\hat{i} - 3\hat{j}$, $\hat{i} + \hat{j} - \hat{k}$ and $3\hat{i} - \hat{k}$ form the three concurrent edges of a parallelopiped then the volume of the parallelopiped is

    a) 8   b) 10

    c) 4   d) 14

ii) The coordinates of the points which divides the line joining the point P $(2, -1, -4)$ and Q $(3, -2, 5)$ externally in the ratio $2 : 3$ is

    a) $(5, -4, 23)$ b) $(5, 4, 23)$

    c) $(-5, 4, 23)$ d) $(0, 1, -22)$

Q.2 : Solve the following questions: 2

i) In the triangle PQR, $\overline{PQ} = 2\bar{a}$ and $\overline{QR} = 2\bar{b}$ The mid-point of PR is M. Find following vectors in terms of $\bar{a}$ and $\bar{b}$ (i) $\overline{PR}$ (ii) $\overline{QM}$
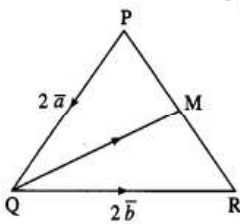
ii) A(2,3),B(-1,5),C(-1,1) and D(-7,5) are four points in the cartesian plane find $\overline{AB}$ and $\overline{CD}$

Section B

: **Solve the following : (ANY2)** 4

Q.3 : Show that the points A(2,1,1), B(0,–1, 4), C(4,3,–2) are collinear.

Q.4 : If two vertices of the triangle are A(3, 1, 4) and B (– 4, 5, – 3), and the centroid of the triangle is at G(–1,2, 1) then find the coordinates of the third vertex C of the triangle.

Q.5 : If A, B, C, D are four non-collinear points in the plane such that $\overline{AD} + \overline{BD} + \overline{CD} = 0$, then prove that the point D is the centroid of the triangle ABC.

Section C

: **Answer the following : (ANY 2)** 6

Q.6 : If $\overline{a} = \hat{i} - \hat{j} + 4\hat{k}$, $\overline{b} = \hat{i} + \hat{j} - 4\hat{k}$, $\overline{c} = \hat{i} + \hat{j} + \hat{k}$ find $\overline{a}.\left(\overline{b} \times \overline{c}\right)$

Q.7 : If G_1 and G_2 are the centroids of $\triangle ABC$ and $\triangle PQR$ respectively then show that $\overline{AP} + \overline{BQ} + \overline{CR} = 3\overline{G_1 G_2}$

Q.8 : Find the volume of tetrahedron whose vertices are A(3,7,4),B(5,–2,3),C(– 4,5,6) and D(1,2, 3).

Section D

: **Answer the following : (ANY 1)** 4

Q.9 : If $\overline{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$, $\overline{b} = b_1\hat{i} + b_2\hat{j} + b_3\hat{k}$, $\overline{c} = c_1\hat{i} + c_2\hat{j} + c_3\hat{k}$ then prove that

$$\left[\overline{a}\ \overline{b}\ \overline{c}\right] = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

Q.10: If P and Q are any two points having position vectors $\overline{p}$ and $\overline{q}$ with respect to O and R divides seg PQ externally in the ratio m : n then prove that $\overline{r} = \dfrac{m\overline{q} - n\overline{p}}{m - n}$, where $\overline{r}$ is the position vector of R.

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