MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 50

Total Marks : 33

Max. Time : 36 min.

Topics : Vector, Solution of Triangle, Function

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1	**(3 marks, 3 min.)**	**[3, 3]**
Multiple choice objective (no negative marking) Q.2, 3	**(5 marks, 4 min.)**	**[10, 8]**
Subjective Questions (no negative marking) Q. 4, 5, 6, 7, 8	**(4 marks, 5 min.)**	**[20, 25]**

1. P, Q have position vectors $\vec{a}$ & $\vec{b}$ relative to the origin 'O' & X, Y divide $\vec{PQ}$ internally and externally respectively in the ratio 2 : 1 . Vector $\vec{XY}$ =

(A) $\frac{3}{2}(\vec{b}-\vec{a})$ (B) $\frac{4}{3}(\vec{a}-\vec{b})$ (C) $\frac{5}{6}(\vec{b}-\vec{a})$ (D) $\frac{4}{3}(\vec{b}-\vec{a})$

2. If in a triangle ABC, $b\cos^2\frac{A}{2} + a\cos^2\frac{B}{2} = \frac{3c}{2}$, then

(A) $c^2 \geq ab$ (B) $\frac{a}{c}+\frac{c}{b}+\frac{b}{a} \geq 3$ (C) $\frac{a+c}{2c-a}+\frac{b+c}{2c-b} \geq 4$ (D) a, b, c are in A.P.

3. If 'O' is the circumcentre of the Δ ABC and R_1, R_2 and R_3 are the radii of the circumcircles of triangles OBC, OCA & OAB respectively, then $\frac{a}{R_1}+\frac{b}{R_2}+\frac{c}{R_3}$ has the value equal to

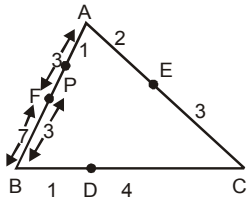
(A) $\frac{abc}{2R^3}$ (B) $\frac{R^3}{abc}$ (C) $\frac{4\Delta}{R^2}$ (D) $\frac{abc}{R^3}$

4. In a ΔABC, prove that $\frac{(a+b+c)^2}{a^2+b^2+c^2} = \frac{\cot\frac{A}{2}+\cot\frac{B}{2}+\cot\frac{C}{2}}{\cot A+\cot B+\cot C}$

5. If the solution of the equation $\sqrt{2+\sqrt{2+\sqrt{2+x}}} + \sqrt{3}\sqrt{2-\sqrt{2+\sqrt{2+x}}} = 2x$, where x > 0 is given by x = a cos(bπ/c) where argument of cosine function lies in [0, π/2), a, b, c $\in$ N and b, c are relatively prime, find the value of (a + b + c).

6. ABCD is a quadrilateral and E the point of intersection of the lines joining the middle points of opposite sides. Show that the resultant of $\vec{OA}$, $\vec{OB}$, $\vec{OC}$ and $\vec{OD}$ is equal to 4 $\vec{OE}$, where O is any point.

7. The point D, E, F divide the respective sides of ΔABC in the ratio as shown in figure. P is a point in AB which divides AB in the ratio 1 : 3 internally prove that $5(\vec{AD}+\vec{BE}+\vec{CF}) = 2\vec{CP}$



8. Find all the values of a for which the function $f(x) = (a^2 - 3a + 2)\cos\left(\frac{x}{2}\right) + (a-1)x$ possesses critical points.

Answers Key

1. (D) **2.** (A)(B)(C) **3.** (C)(D) **5.** 37

8. $(-\infty, 0] \cup [4, \infty) \cup \{1\}$