MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 43

Total Marks : 32

Max. Time : 36 min.

Topics : Solution of Triangle, Application of Derivatives, Straight Line

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q. 1,2	**(3 marks, 3 min.)**	**[6, 6]**
Subjective Questions (no negative marking) Q.3,4,5,6,7,8	**(4 marks, 5 min.)**	**[26, 30]**

1. For a regular polygon, let r and R be the radii of the inscribed and the circumscribed circles. A **false** statement among the following is

(A) There is a regular polygon with $\frac{r}{R} = \frac{1}{\sqrt{2}}$.
(B) There is a regular polygon with $\frac{r}{R} = \frac{2}{3}$.
(C) There is a regular polygon with $\frac{r}{R} = \frac{\sqrt{3}}{2}$.
(D) There is a regular polygon with $\frac{r}{R} = \frac{1}{2}$.

2. If in triangle ABC, $r_1 = 2r_2 = 3r_3$, D is the middle point of BC. Then cos $\angle$ ADC is equal to

(A) $\frac{7}{25}$ (B) $-\frac{7}{25}$ (C) $\frac{24}{25}$ (D) $-\frac{24}{25}$

3. Two men P and Q start with velocities v at the same time from the junction of two roads inclined at 45º to each other. If they travel by different roads, find the rate at which they are being separated.

4. ABC is a triangle and D is the middle point of BC. If AD is perpendicular to AC, prove that

$$\cos A \cdot \cos C = \frac{2(c^2 - a^2)}{3ac}$$

5. With usual notation In a ΔABC, a, c, A are given and $b_2 = 2b_1$, where b_1, b_2 are two values of the thrid side, then prove that $3a = c\sqrt{(1+8\sin^2 A)}$

6. If $2f(x) = f(xy) + f\left(\frac{x}{y}\right)$ for all x, y, $\in R^+$, f(1) = 0 and f ' (1) = 1, then find f(e) and f '(2).

7. Through the origin O, a straight line is drawn to cut the lines $y = m_1x + c_1$ and $y = m_2x + c_2$ at Q and R respectively. Find the locus of the point P on this variable line, such that OP is the geometric mean between OQ and OR.

8. The circle $x^2 + y^2 = 1$ cuts the x-axis at P & Q. Another circle with centre at Q and variable radius intersects the first circle at R above x-axis and the line segment PQ at S. Find the maximum area of the ΔQSR.

Answers Key

1. (B) **2.** (B) **3.** $v\sqrt{(2-\sqrt{2})}$

6. $f(e) = 1$, $f'(2) = \frac{1}{2}$ **7.** $(y - m_1x)(y - m_2x) = c_1c_2$

8. $\frac{4\sqrt{3}}{9}$