MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 42

Total Marks : 33

Max. Time : 37 min.

Topics : **Solution of Triangle, Application of Derivatives, Method of Differentiation**

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q. 1,2,3	**(3 marks, 3 min.)**	**[9, 9]**
Subjective Questions (no negative marking) Q.4,5,6,7	**(4 marks, 5 min.)**	**[16, 20]**
Match the Following (no negative marking) Q.8	**(8 marks, 8 min.)**	**[8, 8]**

1. In a ΔABC, if $\frac{s-a}{11} = \frac{s-b}{12} = \frac{s-c}{13}$, then $\tan^2\frac{A}{2}$ is equal to

(A) $\frac{143}{342}$ (B) $\frac{13}{33}$ (C) $\frac{11}{39}$ (D) $\frac{12}{37}$

2. The two adjacent sides of a cyclic quadrilateral are 2 and 5 and the angle between them is 60°. If the third side is 3, remaining fourth side is.

(A) 2 (B) 3 (C) 4 (D) 5

3. If $y = \cos^{-1}\sqrt{\frac{\sqrt{1+x^2}+1}{2\sqrt{1+x^2}}}$, then $\frac{dy}{dx}$ is equal to

(A) $\frac{1}{2(1+x^2)}, x \in R$ (B) $\frac{1}{2\,(1+x^2)}, x > 0$ (C) $\frac{-1}{2\,(1+x^2)}, x < 0$ (D) $\frac{1}{2(1+x^2)}, x < 0$

4. In a triangle ABC, if cos A + 2 cos B + cos C = 2. Prove that the sides of the triangle are in A.P.

5. If x and y are positive numbers and x + y = 1, then prove that $\left(1+\frac{1}{x}\right)\left(1+\frac{1}{y}\right) \geq 9$

6. Prove following inequalities :

(i) $\frac{x}{1+x} < \ell n\,(1+x) < x$ for $x > 0$

(ii) $2x > 3\sin x - x\cos x$ for $0 < x < \pi/2$

7. Find the greatest & least value of $f(x) = \sin^{-1}\frac{x}{\sqrt{x^2+1}} - \ell n\, x$ in $\left[\frac{1}{\sqrt{3}}, \sqrt{3}\right]$.

8. If $P(x) = x^3 + px^2 + qx + 6$, then match the entries in column - I with column - II

Column - I		**Column - II**	
(A)	If P(x) is divisible by $x^2 + ax + b$ and $x^2 + bx + a$, (a, b, $\in$ R), a $\neq$ b, then P(x)	(p)	have point of local maximum less than point of local minimum
(B)	If $3q > p^2$, then P(x)	(q)	is monotonic $\forall$ x $\in$ R
(C)	If p and q are two consecutive natural numbers such that p > q, then P(x)	(r)	has point of local maximum greater than point of local minimum
(D)	If $Q(x) = P(x) - 2x^3 - 2qx$ and $p^2 > 3q$, then Q(x)	(s)	possesses local maxima and local minima

Answers Key

1. (B) **2.** (A) **3.** (B)(C)

7. $(\pi/6) + (1/2)\ \ell n\ 3,\ (\pi/3) - (1/2)\ \ell n\ 3$

8. (A) $\rightarrow$ p, s ; (B) $\rightarrow$ q ; (C) $\rightarrow$ p, s ; (D) $\rightarrow$ r, s