

Sample Paper – 2015
Class – XII
Subject – MATHEMATICS

M.M.:50

time:1.5hr

Chapter – 2,3,4,5,6,11

SECTION-A

Q.1.For what value of x, the matrix A is singular? If $A = \begin{bmatrix} 1+x & 1-x \\ 2 & 1 \end{bmatrix}$

Q.2.Find the value of $\sin\left[\frac{\pi}{6} - \sin^{-1}\left(\frac{-1}{\sqrt{2}}\right)\right]$

Q.3.Differentiate $\log(1+x)$ w.r.t. $\sin^{-1} x$

Q.4.Find the slope of the tangent to the curve $y = 3x^4 - 4x$ at $x = 1$.

SECTION-B

Q.5.For what value of K, is the following function continuous at $x = 0$

$$F(x) = \begin{cases} \frac{\sqrt{1+kx} - \sqrt{1-kx}}{x} & \text{if } -1 \leq x < 0 \\ \frac{2x+1}{x-1} & \text{if } 0 \leq x < 1 \end{cases}$$

Q.6.Find the intervals in which function $f(x) = 2x^3 - 3x^2 - 36x + 7$

(i) strictly increasing (ii) strictly decreasing

Q.7. Prove that $\cot^{-1}\left[\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right] = \frac{x}{2}$

Q.8. Using properties of determinants prove that
$$\begin{vmatrix} 3a & -a+b & -a+c \\ -b+a & 3b & -b+c \\ -c+a & -c+b & 3c \end{vmatrix} = 3(a+b+c)(ab+bc+ca).$$

Q.9. Differentiate $x^{\sin x} + (\sin x)^{\cos x}$ w.r.t. x .

Q.10. Find the equation of the tangent to the curve $x^2 + 3y = 3$, which is parallel to the line $y - 4x + 5 = 0$.

Q.11. If $x = (\theta - \sin \theta)$ and $y = a(1 - \cos \theta)$. find $\frac{d^2 y}{dx^2}$ at $\theta = \frac{\pi}{2}$

SECTION- C

Q.12. A company manufactures two types of sweaters type A and type B. It costs Rs360 to make one unit of type A and Rs120 to make a unit of type B. The company can make atmost 300 sweaters and can spend atmost Rs72000 a day. The number of sweaters of type A cannot exceed the number of type B by more than 100. The company makes a profit of Rs 200 on each unit of type A but considering the difficulties of a common man, the company charges a nominal profit of Rs20 on a unit of type B. Using LPP, Solve the problem for maximum profit.

Q.13. Two schools A and B want to award their selected teachers on the values of honesty, hard work and regularity. The school A wants to award Rs x each, Rs y each and Rs z each for the three respective values to 3, 2, and 1 teachers with a total award money of Rs 1,28 lakhs, School B wants to spend Rs1.54 lakhs to award its 4,1,3 teachers on the respective values. If the total amount of award for one prize on each value is Rs 57000, then using matrices, find the award money for each value.

Q.14. A given rectangular area is to be fenced off in a field whose length lies along a straight river. If no fencing is needed along the river, show that the least length of fencing will be required when length of the field is twice its breadth.

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