CLASS XII SAMPLE PAPER -05

SECTIONA

1)The value of 'x' for which the product $\begin{bmatrix}2 & 0 & 7\\ 0 & 1 & 0\\ 1 & -2 & 1\end{bmatrix}\begin{bmatrix}-x & 14x & 7x\\ 0 & 1 & 0\\ x & -4x & -2x\end{bmatrix}$ equals an identity matrix .

2) If A is an invertible matrix of order 3and |A|=4 find |A.AdjA|

3) Write the intervals for which $f(x) = x - \frac{1}{x}$ is strictly increasing / decreasing.

4) A and B are such that P(A)=1/2 , P(B)=3/12, P(not A or not B)=1/4 state whether A and B are independent

SECTIONB

5) Write the differential equation of the family of all parabolas with vertex at the origin and axis is X axis.

6) Let * be the binary operation on Q_0 defined by a * b = ab/4, find the identity element.

7) Evaluate: $\sec^2(\tan^{-1} 3)$

8) If the distance between the point (-6,0,0) and the plane 2x-3y+z-k=0 is $\sqrt{14}$ units find the values of k

9) Evaluate $\int_0^{2\pi} \frac{e^{\sin x}\,dx}{e^{\sin x} + e^{-\sin x}}$

10) A coin is thrown again and again until three heads are obtained. Find the probability of getting the third head in the fourth throw of the coin.

11)If are two vectors such that $|\vec{a} + \vec{b}| = |\vec{a}|$ then prove that $2\vec{a} + b$ is perpendicular to b

12)Write the differential equation of all the family of curves which passes through the origin

Section C

13) If any three vectors $\vec{a}, \vec{b}$ and c are coplanar , prove that the vectors $\vec{a} + b$, $\vec{b} + \vec{c}$ and $c + a$ are also coplanar .

14) Find a vector of magnitude 6 units and perpendicular to each of the vector $2\vec{a} + b$ and $\vec{a} + 2\vec{b}$

Where and $b = \hat{i} + 2\hat{j} - 2\vec{k}$

(OR)

Find the value of (such that is perpendicular to c and $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}, b = -\hat{i} + 2\hat{j} + \hat{k}, \vec{c} = 3\hat{i} + \hat{j}$

15)Using the properties of determinants, prove the following:

$$\begin{vmatrix} -bc & b^2 + bc & c^2 + bc \\ a^2 + ac & -ac & c^2 + ac \\ a^2 + ab & b^2 + ab & -ab \end{vmatrix} = (ab+bc+ac)^3$$

16) Solve for x : $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\left(\frac{8}{31}\right)$ (OR)

If $\tan^{-1} 4x = \cot^{-1}\left[2\tan\left(\cos^{-1}\left(\frac{5}{13}\right)\right)\right] + \tan^{-1}\left(2\tan\left(\sin^{-1}\left(\frac{5}{13}\right)\right)\right)$ find the value of x

17)Find all the points of discontinuity of the function f(x)=[x^2]on [1,2) where [.]denotes the greatest integer

function .(OR) Find whether $f(x) = \begin{cases} \frac{\sin x + x\cos x}{2x\cos x - \sin x} & x > 0 \\ 2 & x = 0 \\ \frac{4\left(1-\sqrt{1-x}\right)}{x} & x < 0 \end{cases}$ is continuous at x=0

18) If $y = [\log (x + \sqrt{1+x^2}\,]^2$, show that $(1+x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - 2 = 0$

19) Using the properties of definite integrals : Evaluate $\int_0^{\pi} \frac{x\,dx}{4-\cos^2 x}$ (Or) $\int_0^2 x\sqrt{2-x}\,dx$

20)Solve the following differential equation: $(3xy+y^2)dx + (x^2+xy)dy=0$

21) Find the intervals in which the following function is strictly increasing or decreasing
f (x) = $20 - 9x + 6x^2 - x^3$.

(OR)

Two equal sides of an isosceles triangle with fixed base 'a' are decreasing at the rate of 9cm / second. How fast is the area of the triangle decreasing when the two sides are equal to 'a'.

22) Find the equation of the perpendicular drawn from the point (2, 4,-1) to the line $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$

(OR)

Find the vector and Cartesian equation of the plane passing through the intersection of the planes $\vec{r}.(\hat{i} + \hat{j} + \hat{k}) = 1$ and $\vec{r}.(2\hat{i} + 3\hat{j} - \hat{k}) + 4 = 0$ and parallel to x-axis. Find the inclination of this plane with the yz plane

23) A can hit a target 4 times in 5 shots, B 3 times in 4 shots and C 2 times in 3 shots. Find the probability that at least two of them may hit the target

(OR)

There are 40 hardworking scholars in a class. Out of which 10 are sports persons. Three scholars are selected at random out of them. Write the probability distribution for selected persons who are sports persons. Find the mean of the distribution. Explain the importance of sports in education.

SECTION-D

24).10 students were selected from a school on the basis of values for giving awards and were divided into three groups. The first group consists of hard workers, the second group consists of honest and law abiding students and the third group comprises obedient students. Double the number of the students of the first group added to the number in the second group gives 13, while the combined strength of the first and the second group is four times that of the third group. Using matrix method find the number of students in each group. Apart from the above values suggest one more value the school should consider for awards.

25)'Let f:[-1,(}([-1,() is given by $f(x)=(x+1)^2-1$,x(-1.Show that f is invertible . Also find the set
S= {x:f(x)=f^{-1}(x)}

26) Show that the right circular cone of least Curved Surface Area and given volume has an altitude equal to (2 times the radius of the base.

27)Evaluate : $\int \frac{\sin^{-1}\sqrt{x}-\cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x}+\cos^{-1}\sqrt{x}}dx$ (OR) $\int_{1}^{0} \sin^{-1}\left(x\sqrt{1-x}-\sqrt{x}\sqrt{1-x^2}\right)dx$

28) Find the area of the region bounded by the curve $y=x^2+2$ and the lines $y=x$ and $x=0$ and $x=3$.

(OR)

Using integration find the area of the region in the first quadrant enclosed by the X –axis, the line $y=\sqrt{3}x$ and the circle $x^2+y^2=8$

29) A manufacturer makes two products A and B .Product A sells at Rs 200 per unit and takes 30 minutes to make. Product B sells at Rs 300 per unit and takes 1 hour to make. There is a permanent order of 14 units of product A and 16 units of product B. A working week consists of 40 hours of production and the weekly turnover must not be less than Rs 10,000. If the profit in each of product is Rs 20 and on product B is Rs30, then how many of each should be produced so that the profit is maximum? Also, find the maximum profit. Solve the problem graphically.