

S.R. DAV Public School Puri  
Diwali Chhath vacation Assignment  
Sub: Mathematics. Class XI

- ① The value of  $K$  for which the function

$$f(x) = \begin{cases} \frac{1 - \cos 4x}{8x^2}, & \text{if } x \neq 0 \\ K & \text{if } x = 0 \end{cases}$$

is continuous at  $x=0$ .

② Evaluate:  $\int_2^3 \frac{x dx}{x^2 + 1}$

③ If  $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$  Find  $A^{-1}$ . Use  $A^{-1}$

to solve the following system of equations  
 $2x - 3y + 5z = 11$ ,  $3x + 2y - 4z = -5$   
 $x + y - 2z = -3$ .

- ④ Define the relation  $R$  in the set  $N \times N$  as follows:

For  $(a, b), (c, d) \in N \times N$ ,  $(a, b) R (c, d)$  iff  $ad = bc$ . Prove that  $R$  is an equivalence relation in  $N \times N$

- ⑤ Make a rough sketch of the region  $\{(x, y) : 0 \leq y \leq x^2, 0 \leq y \leq x, 0 \leq x \leq 2\}$  and find the area of the region using integration.

6) Find  $\int \frac{(x^3 + x + 1) dx}{x^2 - 1}$

7) Evaluate  $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt{\tan x}}$

8) Evaluate  $\int_0^4 |x-1| dx$

9) Find  $\int \frac{dx}{\sqrt{3-2x-x^2}}$

10) If  $y\sqrt{1-x^2} + x\sqrt{1-y^2} = 1$  then prove  $\frac{dy}{dx} = -\sqrt{\frac{1-y^2}{1-x^2}}$

11) Find the value of  $\sin^{-1}[\sin(\frac{13\pi}{7})]$

12) Prove that the function  $f$  is surjective where  $f: \mathbb{N} \rightarrow \mathbb{N}$  such that

$$f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases}$$

Is function injective? Justify your answer.

13) If  $y = \sin^2 x$ , then evaluate  $(1-x^2)y_2$

14) If  $A$  is a square matrix of order 3 and  $|A| = 5$  then find  $|\text{adj } A|$

15) If  $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$  then find possible values of  $x$ .

(16) If  $A, B$  are non-singular square matrices of the same order then  $(AB^{-1})^{-1} =$

- (a)  $A^{-1}B$  (b)  $A^{-1}B^{-1}$  (c)  $BA^{-1}$  (d)  $AB^{-1}$

(17) Evaluate:  $\int \cot^2 x \, dx$

(18) Evaluate:  $\int \frac{\sin(x-d)}{\sin(x+a)} \, dx$

(19) Find the area bounded by the curves  $y = \sqrt{x}$ ,  $2y+3 = x$  and the  $x$ -axis in the first quadrant.

(20) Find the area bounded by  $y = 2\cos x$ ,  $x=0$  to  $x = 2\pi$  and the axis of  $x$  in sq. unit.

(21) Evaluate:  $\int |x|^3 \, dx$

(22) The function  $f(x) = |x|$  has

- (a) only one maxima (b) only one minima  
(c) no maxima or minima (d) none of these.

(23) If  $A = [a_{ij}]$  is a square matrix of even order such that  $a_{ij} = i^2 - j^2$  then

- (a)  $A$  is symmetric matrix and  $|A|$  is a square  
(b) None of these (c)  $A$  is a skew-symmetric matrix and  $|A| = 0$   
(d)  $A$  is symmetric matrix and  $|A| = 0$

24) If  $A = \frac{1}{3} \begin{bmatrix} 1 & 1 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$  satisfies  $A^T A = I$

Then find  $xy =$

25) find  $\begin{vmatrix} a+ib & c+id \\ -c+id & a-ib \end{vmatrix}$

26) In the determinant  $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$  verify

that  $a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33} = 0$   
where  $A$  is cofactors.

27) Evaluate:  $\int (\sec^2 x)^3 dx$

28) Evaluate:  $\int \frac{dx}{\sec^2 x \sec x}$

29) Calculate the area under the curve  $y = 2\sqrt{x}$  included between the lines  $x=0$  and  $x=1$

30) prove that the relation  $R$  on the set  $N \times N$  defined by  $(a,b) R (c,d) \Leftrightarrow a+d = b+c$  for all  $(a,b), (c,d) \in N \times N$  is an equivalence relation. Also find the equivalence classes  $[(2,3)]$  and  $[(1,3)]$ .