DELHI PUBLIC SCHOOL,JAMMU

ASSIGNMENT – PRE-BOARD –I

(2018-19)

CLASS- XII **SUBJECT-MATHEMATICS**

TOPICS :-

- RELATIONS AND FUNCTIONS
- INVERSE TRIGONOMETRIC FUNCTIONS
- DETERMINANTS AND MATRICES
- CONTINUITY AND DIFFERENTIABILITY
- APPLICATIONS OF DERIVATIVE
- INTEGRALS
- APPLICATION OF INTEGRALS
- DIFFERENTIAL EQUATION
- VECTOR ALGEBRA
- LINEAR PROGRAMMING

Q1. Determine whether the binary operation* on the set N of natural numbers defined by a*b =

2^{ab} is associative or not.

Q2. Find the projection vector of$2\hat{i} - \hat{j} + \hat{k} \quad on \quad \hat{\imath} - 2\hat{j} + \hat{k}$.

Q3.Find the approximate change in the value of $\frac{1}{x^2}$, when x change from x=2 to x=2.002

Q4.Verify that $ax^2 + by^2 = 1$ is a solution of the differential equation : $x(yy_2 + y_1^2) = yy_1$.

Q5.Find the inverse of the matrix$\begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix}$ .Hence ,find the matrix P satisfying the matrix equation $\begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$

Q6.Find $\int e^x \frac{\sqrt{1+sin\,2x}}{1+cos\,2x} dx$

Q7. Find a and b, if the function given by $f(x) = \begin{cases} ax^2 + b, & x < 1 \\ x2x + 1, & x \geq 1 \end{cases}$ is differentiable at x=1.

Q8. Find the equation of the tangent to the curve $y= (x^3 -1)(x-2)$ at the points ,where the curve intersects the x-axis.

Q9. Find the intervals in which the function f(x) = -3log(1+x) +4log(2+x)-4/2+x is strictly increasing or strictly decreasing.

Q10.A person wants to plant some trees in his community park.T**he local nursery** has to perform this task.It charges the cost of planting trees by the formula $C(x) = x^3-45x^2+600x$, where x is the number of trees and C(x) is the cost of planting x trees in rupees. The local authority has imposed a restriction that it can plant 10

to 20 trees in one community park.How many trees should the person place the order so that he has to spend least amount.use calculus and find the least amount.

Q11.Find the $\int \frac{secx}{1+cosecx}$dx

Q12. Find the particular solution of the differential equation ye^y dx = (y^3 +2xe^y) dy ; y(0) = 1.

Q13.Show that the (x-y)dy = (x+2y)dx is a homogenous differential equation. Also find the general solution of differential equation.

Q14.If$\vec{a}, \vec{b}, \vec{c}$ are three vectors such that $\vec{a} + \vec{b} + \vec{c}$ = 0, then prove that $\vec{a}X\vec{b} = \vec{b}X\vec{c} = \vec{c}X\vec{a}$ and hence show that $[\vec{a}\ \vec{b}\ \vec{c}]$ = 0.

Q15.If the function F:R to R be defined as f(x) =2x-3 and g:R to R by g(x) = x^3 +5,then find fog and show that fog is invertible.Also find $(fog)^{-1}$ and hence find $fog^{-1}(9)$.

Q16.A binary operation * on the set of real numbers by a*b = $\begin{cases} a, if\ b = 0 \\ |a| + b, if\ b \neq o \end{cases}$.If atleast one of a and b is 0,then prove that a*b=b*a. Check whether * is commutative .Find the identity element for * ,if exists.

Q17.If A=$\begin{bmatrix} 3 & 2 & 1 \\ 4 & -1 & 2 \\ 7 & 3 & -3 \end{bmatrix}$, then find A^{-1} and hence solve the following system of equations: 3x+y+7z=14,2x-y+3z=4,x+2y-3z=0.

Q18.If A = $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix}$, then find the inverse of A using elementary row transformations and hence solve the matrix equation XA = [1 0 1].

Q19.Using integration ,Find the area in the first quadrant bounded by the curve y = x|x| , and the circle x^2 +y^2 =2 and the y-axis.

Q20. Evaluate $\int_{\frac{-\pi}{4}}^{\frac{\pi}{4}} \frac{x+\frac{\pi}{4}}{2-cos2x}$dx.

Q21.Evaluate as a limit of a sum $\int_{-2}^{2}(3x^2 - 2x + 4)dx$

Q22.A company produces two different products. One of them needs ¼ of an hour of assembly work per unit,1/8 of an hour in quality control work and Rs.1.2 in raw materials. The other product requires 1/3 of an hour of assembly work pr unit,1/3 of an hour in quality control work and Rs. 0.9 in raw materials. Given the current availiability of staff in the company, each day there is atmost a total of 90 h available for assembly and 80h for quality control. The first product described has a market value of Rs.9 per unit and the second product has a market value of Rs.8 unit .In addition, the maximum amount of daily sales for the first product is estimated to be 200 units, without there being a maximum limit of daily sales for the second product. Formulate and solve graphically the LPP and find the maximum profit.