CLASS XII
GUESS PAPER
MATHEMATICS

Time : 3 Hours **Max. Marks : 100**

SECTION – A **10x1=10**

1. Find the domain of the function $e^{3\log x}$.

2. Find a branch of the function $\cos^{-1}$ other than the principal value branch.

3. If A is a 3x3 matrix such that |A|=5 then what is |adjA| ?

4. What is the minimum value of | sin4x + 3| ?

5. Write square matrices A and B of order 2 such that AB=0, A≠0 and B≠0.

6. If $\vec{a}$ and $\vec{b}$ are any two vectors such that $|\vec{a}.\vec{b}| = |\vec{a} \times \vec{b}|$ then what is the angle between $\vec{a}$ and $\vec{b}$?

7. If the lines $\frac{x-1}{3} = \frac{y}{3k} = \frac{z+2}{1}$ and $\frac{x+1}{2k} = \frac{y+5}{1} = \frac{z-2}{-3}$ are perpendicular then find the value of k.

8. Write the value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^{25} x \, dx$

9. If $\vec{a}$ and $\vec{b}$ are unit vectors such that $|\vec{a}+\vec{b}| = 1$ then what is $|\vec{a}-\vec{b}|$?

10. If A is a square matrix of order 3 such that |A| = 4 then find A(adjA).

Section B **12x4=48**

11.Prove that the function f: R →R defined as f(x) = 2x-3 is invertible

12.Show that $\sin^{-1} 12/13 + \cos^{-1} 4/5 + \tan^{-1} 63/16 = \pi$

13. Using the properties of determinant show that

$$\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & z+x+2y \end{vmatrix} = 2(x+y+z)^3$$

Q.14.Differentiate $X^{\sin x} + \sin x^{\cos x}$

OR

If $x = \sqrt{a}^{\sin^{-1}t}$, $y = \sqrt{a}^{\cos^{-1}t}$ show that $dy/dx = -y/x$

15.Find the intervals in which the function f given by $f(x) = \sin x + \cos x$, $0 \le x \le 2\pi$

16.Show that the lines $x+3/-3 = y-1/1 = z-5/5$ and $x+1/-1 = y-2/2 = z-5/5$ are Coplanar

OR

Find the angle between the line $x+1/2 = y/3 = z-3/6$ and the plane $10x+2y-11z = 3$

17. Find the $\int x+2 / 2x^2+6x+5 \, dx$ OR

Find $\int (3\sin\phi - 2)\cos\phi / 5-\cos^2\phi - 4\sin\phi \, d\phi$

18. Evaluate $\int (x^2+1)e^x/(x+1)^2 \, dx$

Q.19.Two cards are drawn simultaneously with out replacement from well shuffed pack of 52 cards . Find the mean , variance , and standard deviation of the number of kings .

Q.20 .Obtain the invers of the following matrix using elementary operation

$$A = \begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{pmatrix}$$

21. Find the general solution of the differential equation $y\,dx - (x+2y^2)\,dy = 0$

22. Find the particular solution of the differential equation $dy/dx = -4xy^2$ Given that y=1 when x=0.

OR

Find the particular solution of the differential equation $x^2dy+(xy+y^2)dx = 0$ Given that y=1 when x=1

SECTION-C **7x6=42**

23. Find A^{-1} where $A = \begin{bmatrix} 2 & 3 & 10 \\ 4 & -6 & 5 \\ 6 & 9 & -20 \end{bmatrix}$

Using A^{-1}, solve the following system of equations

$$\frac{4}{x} - \frac{6}{y} + 5z = 1$$

$$\frac{2}{x} + \frac{3}{y} + 10z = 4$$

$$\frac{6}{x} + \frac{9}{y} - 20z = 2$$

24. Find the local maxima and local minima of $\sin^4 x + \cos^4 x$, $0<x<\pi/2$.

OR

Show that the semi vertical angle of right circular cone of given surface area and maximum volume is $\sin^{-1}\frac{1}{3}$.

25. Solve the initial value problem :

$(x + y)dy + (x - y)dx = 0$, $y = 1$ when $x = 1$.

26. Sketch the graph of the region

$\{(x,y) : 0 \le y \le x^2+3 ; 0 \le y \le 2x+3 ; 0 \le x \le 3\}$

Also find the area of the region using integration.

27. Let the number of times a candidate applies for a job be X and P(X=x)denotes the probability that he will be selected x times. Given that

$$P(X=x) = \begin{cases} (k+1)x, & \text{if } x = 0 \\ 2kx, & \text{if } x=1 \text{ or } 2 \\ k(6-x), & \text{if } x = 3 \text{ or } 4 \text{ or } 5 \end{cases}$$

where k is a +ve real number.

(a) Find the value of k.

(b) What is the probability that he will be selected exactly three times.

(c) What is the probability that he will be selected atleast once.

(d) Find the mean and variance of the probability distribution of X.

OR

In a hostel 60% of the students read Hindi newspaper, 10% read English newspaper and 20% read both. A student is selected at random..

(a) Find the probability that she reads neither Hindi nor English newspapers.

(b) If she reads Hindi newspaper, find the probability that she reads English newspaper.

(c) If she reads English newspaper, find the probability that she reads Hindi newspaper.

28. Find the vector equation of the line passing through the point (1,2,-4) and perpendicular to the two lines

$$\frac{x-8}{3} = \frac{y+19}{-16} = \frac{z-10}{7} \quad \text{and}$$

$$\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}.$$

29. A diet for a sick person must contain atleast 4000 units of vitamins, 50 units of minerals and 1400 units of calories. Two foods A and B are available at a cost of Rs4 and Rs3 per unit, respectively. If one unit of A contains 200 units of vitamin, 1 unit of mineral and 40 units of calories, one unit of B contains 100 units of vitamin, 2 units of minerals and 40 units of calories, find what combination of foods should be used to have the least cost?

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