CLASS XII
SAMPLE PAPER
MATHEMATICS(041)

Time: 3 Hours **Maximum Marks 80**

INTRODUCTION:- All questions are compulsory.
There are three sections A, B, C.D. This question paper consists of 36 questions.
Questions from 1 to 20 are of 01 mark each, questions from 21 to 26 are of 02 marks each, questions from 27 to 32 are of 04 marks each and questions form 33 to 36 is of 06 marks each.

SECTION –A

Questins 1 to 10 are multiple choice type. Select the correct option.

1. If A is a square matrix such that $A^2 = I$, then A^{-1} is equal to

a) I b) 0 c) A d) I + A

2.The matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ is a

a) Unit matrix b) Null matrix c) symmetric matrix d) skew symmetric matrix

3. The domain of the function $f(x) = \text{Sin}^{-1}\sqrt{x-1}$ is

a) [1, 2] b)[-1,1] c)[o,1] d) none of these

4. $\int_0^2 [x]dx \; is \; equal \; to$

a) 2 b)1 c)1/2 d) 0

5.If $\hat{a}$ and $\hat{b}$ are unit vectors and θ is the angle between them, then $|\hat{a} - \hat{b}|$ is equal to

a) $\sin \theta/2$ b) $\sqrt{2}\sin\frac{\theta}{2}$ c) $\cos\frac{\theta}{2}$ d) $\sqrt{2}\cos\frac{\theta}{2}$

6. The distance between the planes 2x + 2y – z + 2 = 0 and 4x +4y- 2z + 5 = 0 is equal to

a) ½ b) ¼ c) 1/6 d) none of these

7.Angle between the lines whose direction ratios are proportional to a,b,c and b-c, c-a, a-b is

a) 0 b) π c) $\frac{\pi}{2}$ d) none of these

8. The point at which the maximum value of x+y subject to the constraints x +2y ≤ 70, 2x +y ≤ 95, x,y ≥ 0 is obtained , is

a) (30,25) b) (20,35) c) (35,20) d) (40,15)

9.If 2P(A) =P(B) = 5/13 and P(A/B) = 2/5 , so the value of P(AUB) is equal to

a) 11/22 b) 15/26 c) 9/26 d) 11/13

10. A bag contains 3 white, 4 red and 5 black balls. Two balls are drawn one by one with out replacement. The probability that at least one ball is black is

a) 7/22 b) 15/22 c) 17/22 d) 5/22

Questions 11 to 15 are fill up the blanks so that the statements are true.

11. If $y = log\sqrt{tanx}$, then the value of $\frac{dy}{dx}$ at $x = \frac{\pi}{2}$ is --------

12. At ------point the tangent to the curve $y = e^{1-x^2}$ on [-1,1] is parallel to x –axis.

13.If $f(x) = sin^2x$ and $g(f(x)) = IsinxI$ then g(x)=---------

OR

If the A contains 5 element and the set B contains 6 element then the number of bijective function from A to B is ---------.

14. The projection of a line segment on X,Y and Z axes are 12,4,and 3 respectively then the length of line segment is----------.

OR

The line segment joining (-a,-b,-c) and (a,b,c) divides by xy-plane in the ratio --------- ----------.

15. If A =$\begin{bmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{bmatrix}$ and A(adjA)=$\begin{bmatrix} K & 0 \\ 0 & K \end{bmatrix}$ then K= ---------

Question no-16 to 20, Answer the following questions

16. If $\int \frac{2^{\frac{1}{x}}}{x^2}dx = k2^{\frac{1}{x}} + c$ then find k.

17. What is the perpendicular distance of the point (1,1,1)from the plane 2x+y-z=3

OR

Find the distance of the planes x + y - 2z = 6 and 2x + 2y - 4z =8

18. Find the integrating factor of the differential equation $\frac{dy}{dx} + ycotx = 4xcosecx$.

19. Find the equation of the plane containing the points (1,0,0),(0,1,0),(0,0,1)

20. From a packs of 52 cards are drawn one by one without replacement. find the probability that both of them are queens.

SECTION-B

21.Find $a_{12}c_{12}$ of $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ -1 & 0 & 1 \end{bmatrix}$

22. Differentiate $tan^{-1}x = \sqrt{\frac{1+sinx}{1-sinx}}$ w.r.t. x

23. Find the maximum value of the function $f(x) = sinx + cosx$ where 0<x<$\frac{\pi}{2}$

24. Find $\int x sin^{-1}x\, dx$.

25. find $\int \frac{dx}{(2sinx+3cosx)^2}$ or $\int e^x \frac{(1-x)^2}{(1+x^2)^2}$dx

26.Let R={ (x, x^3): x is a prime number <5} be a relation. find the range of R.

OR

Prove that: $tan^{-1}\frac{1-x}{1+x}$ - $tan^{-1}\frac{1-y}{1+y}$ =$sin^{-1}[\frac{y-z}{\sqrt{(1+x^2)(1+y^2)}}]$

SECTION-C

27. Solve $(x+1)\frac{dy}{dx}$ =$2e^{-y} - 1, y(0) = 0$

OR

Solve $x^2ydx - (x^3 + y^3)dy = 0$

28.If a young man drives his vehicle 25km/hr, he has to spend Rs2 per km on petrol. If he drives it at a faster spend of 40km/hr, the petrol cost increases to Rs5/per km .He has Rs100 to spend on petrol and travel with in one hour. Express this as an LPP and solve.

29. If $f(x) = \{\frac{1-cos10x}{x^2}, \quad x < 0$

k, x = 0

$\sqrt{x}/(\sqrt{625} + \sqrt{x} - 25)$, x>0

then find the value of k so that f(x) is continuous at x=0

30.find $\int_0^{\frac{\pi}{2}} \frac{xsinx.cosx}{sin^4x+cos^4x} dx$

OR

Evaluate $\int_1^3 (x^2 + 3)dx$ as limit of sums.

31. Two coins are drawn from a bag contains 4 coins and found to be gold. What is the probability that other coins are gold.

32. Let f:N→ R be a function defined as f(x)=$4x^3 + 12x + 15$ show f is invertible and find f^{-1}

SECTION-D

33. If A=$\begin{bmatrix} 1 & -2 & 0 \\ 2 & -1 & -1 \\ 0 & -2 & 1 \end{bmatrix}$ find A^{-1} . Using A^{-1} solve x-2y=10, 2x-y-z=8, -2y+z=7

OR

Using properties of determinant prove that $\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix}$=$4a^2b^2c^2$

34.A point on the hypotenuse of a right triangle is a distances a and b from the sides of the triangle. Show that minimum length of the hypotenuse is $(a^{\frac{2}{3}} + b^{\frac{2}{3}})^{\frac{3}{2}}$

OR

An open box with squere base is to be made out of a given quantity of card board of area c^2 square unit . Show that maximum volume of box is $\frac{c^3}{6\sqrt{3}}$ cubic units.

35. Find the image of the point (1,6,3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$

36. Find the area of the region {(x,y): $x^2+y^2 \leq 1 \leq x + y$}

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