CBSE Sample Paper

CLASS- XII   MATHEMATICS   (Code No. 041)   M.M. 100

TIME : 3 HOURS

General Instructions:

1. *All questions are compulsory.*

2. *The question paper consists of 26 questions divided into three section A, B and C.*
   section A comprises of 06 questions of one mark each, section B comprises of 13 questions of four marks each and section C comprises of 07 questions of six marks each.

3. *All questions in section A are to be answered in one word, one sentence or as per the exact requirement of the question.*

4.There is no overall choice. However, internal choices has been provided in four questions of 4 marks each and two questions of 6 marks each. you have to attempt only one of the alternative in all such questions.

5. *Use of calculator is not permitted. However, you may ask for logarithmic and Statistical Tables, if required.*

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Section – A

Q.01 Show that the function $f: R \rightarrow R$ given by $f(x) = x^3 + x$ is a bijective.

Q.02 Solve for x : $\tan^{-1} \frac{1-x}{1+x} = \frac{1}{2}\tan^{-1}(x), x > 0,$

Q.03 If $\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = A + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$, then find the matrix A.

Q.04 for what value of a, $\begin{bmatrix} 2a & -1 \\ -8 & 3 \end{bmatrix}$ is a singular matrix ?

Q.05 A square matrix A, of order 3, has $|A| = 5, find\ |A.adjA|$.

Q.06 Evaluate $\int e^x \left[\frac{1}{x} - \frac{1}{x^2}\right] dx.$

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Section – B

Q.07 Let A = $N \times N$ and $*$ be the binary operation on A defined by
$(a, b) * (c, d) = (a + c, \ b + d)$, show that $*$ is commutative and associative,
Find the identity elements for $*$ on A, if any

Q.08 Solve the equation $\sin[2 \cos^{-1}\{\cot(2 \tan^{-1} x)\}] = 0$.

P. T. O.

OR

Solve for **x:** $sin^{-1}(1 - x) - 2 \, sin^{-1}x = \dfrac{\pi}{2}$.

Q.09 Using properties of determinants, prove that:

$$\begin{vmatrix} a^2 + 1 & ab & ac \\ ab & b^2 + 1 & bc \\ ca & cb & c^2 + 1 \end{vmatrix} = (1 + a^2 + b^2 + c^2)$$

Q.10 For what values of a and b, the function f defined as :

$$f(\text{x}) = \begin{cases} 3ax + b, & if < 1 \\ 11, & if \ x = 1 \\ 5ax - 2b, & if \ x > 1 \end{cases} is \ continuous \ at \ x = 1.$$

Q.11 If $x^y + y^x = a^b$, $find \ \dfrac{dy}{dx}$.

Q.12 Find the intervals in which the function given by

$$f(x) = \ \sin x + \cos x, \ \ 0 \le x \le 2\pi \text{ is}$$

(a) Increasing , *(b)* decreasing

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Q.13 Evaluate: $\int_0^{2\pi} \dfrac{dx}{1 + e^{\sin x}}$.

Q.14 Form the differential equation of the family of circles in the second quadrant and Touching the coordinate axes.

Q.15 Solve the differential equation :

$$\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right)\frac{dx}{dy} = 1, x \neq 0; \text{ when x = 0, y = 1,}$$

Q.16 Let $\vec{a} = \hat{\imath} - \hat{\jmath}, \ \vec{b} = 3\hat{\jmath} - \hat{k}$ and $\vec{c} = 7\hat{\imath} - \hat{k}$. Find the vector $\vec{d}$ which is perpendicular

To both $\vec{a}$ and $\vec{b}$ and $\vec{c}.\vec{d} = 1$.

Q.17 Find the distance from the point (3, 4, 5) to the point, where the line

$\dfrac{x-3}{1} = \dfrac{y-4}{2} = \dfrac{z-5}{2}$ meets the plane x + y + z = 2.

P. T. O.

Q.18 A and B throw a die alternately till one of them gets a '6' and wins the games. Find

Their respective probabilities of winning if A starts the game.

Q.19 Evaluate the integral $\int_0^{\pi/2} \dfrac{x \sin x \cos x}{\sin^4 x + \cos^4 x} \, dx$.

Section – C

Q.20 Using elementary transformation, find the inverse of the matrix, if exits
$$\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$$

Q.21 Show that the semi- vertical angle of right circular cone of given surface area and

Maximum volume is $\sin^{-1}\frac{1}{3}$.

Q.22 Evaluate $\int_1^3 (x^2 - x + 1)dx$ using integral as the limit of sums.

Q.23 Find the area lying above x- axis and included between the circles $x^2 + y^2 = 8x$ and the Parabola $y^2 = 4x$.

Q.24 Find the distance of the point (-2, 3, -4) from the line $\frac{x+2}{3} = \frac{2y+3}{4} = \frac{3z+4}{5}$ measured

Parallel to the plane 4x + 12y - 3z + 1 = 0.

Q.25 A letter is known to have come either from LONDON or CLIFTON. On the envelop just two consecutive letter ON are visible. What is the probability that letter has come from

    (1) LONDON ?   (ii) CLIFTON ?

Q.26 A small firm manufactures gold rings and chains. The total number of rings and chains Manufactured per day is atmost 24. It takes 1 hour to make a ring and 30 minutes to make a chain. The maximum numbers of hours available per day is 16. If a profit on a ring is Rs. 300 and that on a chain is Rs. 190, find the number of rings and chains that should be Manufactured per day, so as to earn the maximum profit. Make it as an L.P.P. and solve it Graphically.

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