CBSE Class 12 Maths Question Paper 2020
Set 1

MATHS SET 1

General Instructions:

Read the following instructions very carefully and strictly follow them:

(i) This question paper comprises **four** Sections A, B, C and D. This question paper carries **36** questions. **All** questions are compulsory.

(ii) **Section A –** Questions no. **1 to 20** comprises of **20** questions of **1** mark each.

(iii) **Section B –** Questions no. **21 to 26** comprises of **6** questions of **2** mark each.

(iv) **Section C –** Questions no. **27 to 32** comprises of **6** questions of **4** mark each.

(v) **Section D –** Questions no. **33 to 36** comprises of **4** questions of **6** mark each.

(vi) There is no overall choice in the question paper. However, an internal choice has been provided in 3 questions of one mark, 2 questions of two marks, 2 questions of four marks and 2 questions of six marks. Only one of the choices in such questions have to be attempted.

(vii) In addition to this, separate instructions are given with each section and question, wherever necessary.

(viii) Use of calculators is **not** permitted.

SECTION – A

Question numbers 1 to 10 are multiple choice type questions. Select the correct option.

1. If A is a square matrix of order 3, such that $A(adj\ A) = 10I$ then $|adj\ A|$ is equal to

(a) 1 (b) 10 (c) 100 (d) 101

2. If A is a 3 × 3 matrix such that $|A| = 8$ then $|3A|$ equals

(a) 8 (b) 24 (c) 72 (d) 216

3. If $y = Ae^{5x} + Be^{-5x}$ then $\frac{d^2y}{dx^2}$ is equal to

(a) 25y (b) 5y (c) 0-25y (d) 15y

4. $\int x^2.e^{x^3}.dx$ euqals

(a) $\frac{1}{3}e^{x^3} + c$ (b) $\frac{1}{3}e^{x^4} + c$ (c) $\frac{1}{2}e^{x^3} + c$ (d) $\frac{1}{2}e^{x^2} + c$

5. If $\hat{i}, \hat{j}, \hat{k}$ are unit vectors along three mutually perpendicular directions, then

(a) $\hat{i}.\hat{j} = 1$ (b) $\hat{i} \times \hat{j} = 1$ (c) $\hat{i}.\hat{k} = 0$ (d) $\hat{i} \times \hat{k} = 0$

6. ABCD is a Rhombus whose diagonals intersect at E. Then $\overrightarrow{EA} + \overrightarrow{EB} + \overrightarrow{EC} + \overrightarrow{ED}$ equals

(a) 0 (b) $\overrightarrow{AD}$ (c) $2\overrightarrow{BC}$ (d) $2\overrightarrow{AD}$

7. The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{4-z}{K}$ and $\frac{x-1}{K}=\frac{y-4}{2}=\frac{z-5}{-2}$ are mutually perpendicular if the value of K is

(a) $\frac{-2}{3}$ (b) $\frac{2}{3}$ (c) -2 (d) 2

8. The graph of the inequality $2x+3y>6$ is

(a) half plane that contains the origin

(b) half plane that neither contains the origin nor the points of the line $2x+3y=6$

(c) whole $xoy-$ plane excluding the points on the line $2x+3y=6$

(d) entire xoy plane

9. A card is picked at random from a pack of 52 playing cards. Given that the picked card is queen. The probability of this card to be a card of spade is

(a) $\frac{1}{3}$ (b) $\frac{4}{13}$ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

10. A die is thrown once. Let A be the event that the number obtained is greater than 3. Let B be the event that the number obtained is less than 5. Then $P(A\cup B)$ is

(a) $\frac{2}{5}$ (b) $\frac{3}{5}$ (c) 0 (d) 1

Fill in the blanks in question numbers 11 to 15.

11. A relation in a set A is called identity relation, if each element of A is related to itself.

12. If $A+B=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}$ and $A-2B=\begin{bmatrix}-1 & 1\\ 0 & -1\end{bmatrix}$ then $A=$ _____

13. The least value of the function $f(x)=ax+\frac{b}{x},(a>0,b>0,x>0)$ is _____

14. The integrating factor of the differential equation $x.\frac{dy}{dx}+2y=x^2$ is _____

(OR)

The degree of the differential equation $1+\left(\frac{dy}{dx}\right)^2=x$ is _____

15. The vector equation of a line which passes through the points (3, 4, -7) and (1, -1, 6) is _____

(OR)

The line of shortest distance between two skew lines is _____ to both the lines.

Question numbers 16 to 20 are of very short answer type questions.

16. Find the value of $\sin^{-1}\left[\sin\left(\frac{-17\pi}{8}\right)\right]$

17. For $A=\begin{bmatrix}3 & -4\\ 1 & -1\end{bmatrix}$ write A^{-1}

18. If the function f defined as $f(x)=\begin{cases}\frac{x^2-9}{x-3}, & x\neq 3\\ K, & x=3\end{cases}$ is continuous at $x=3$. Find the value of K.

19. If $f(x)=x^4-10$ then find approximate value of $f(2.1)$

(OR)

Find the slope of the Tangent to the curve $y=2.\sin^2(3x)$ at $x=\pi/6$

20. Find the value of $\int_1^4 |x-5|.dx$

SECTION - B

Question numbers 21 to 26 carry 2 marks each.

21. If $f(x)=\frac{4x+3}{6x-4}, x\neq\frac{2}{3}$ then show that $fdf(x)=x$ for all $x\neq\frac{2}{3}$, also write inverse of f.

(OR)

Check if the relation R in the set R of real numbers defined as $R=\{(a,b):a<b\}$ is

(i) Symmetric (ii) Transitive

22. Find $\int\frac{x}{x^2+3x+2}.dx$

23. If $x=a\cos\theta, y=b\sin\theta$ then find $\frac{d^2y}{dx^2}$

(OR)

Find the differential of $\sin^2 x$ *w.r.t.* $e^{\cos x}$

24. Evaluate $\int_1^2\left[\frac{1}{x}-\frac{1}{2x^2}\right]e^{2x}.dx$

25. Find the value of $\int_0^1 x(1-x)^n.dx$

26. Given two independent events A and B such that $P(A)=0.3$ and $P(B)=0.6$. Find $P(A' \cap B')$

SECTION - C

Question numbers 27 to 32 carry 4 marks each.

27. Solve for $x: \sin^{-1}(1-x)-2\sin^{-1}x=\frac{\pi}{2}$

28. If $y=(\log x)^x+x^{\log x}$ then find $\frac{dy}{dx}$

29. Solve the differential equation

$$x.\sin\left(\frac{y}{x}\right).\frac{dy}{dx}+x-y.\sin\left(\frac{y}{x}\right)=0$$

Given that $x=1$ when $y=\frac{\pi}{2}$

30. If $\vec{a}=i+2j+3k$ and $b=2i+4j-5k$ represent two adjacent sides of a parallelogram, find unit vectors parallel to the diagonals of the parallelogram.

(OR)

Using vectors, find area of the triangle ABC with vertices

$A(1,2,3), B(2,-1,4)$ and $C(4,5,-1)$

31. A company manufactures two types of novelty souvenirs made of plywood. Souvenirs of type A require 5 minutes each for cutting and 10 minutes each for assembling. Souvenirs of type B require 8 minutes each for cutting and 8 minutes each for assembling. There are 3 hours 20 minutes available for cutting and 4 hours for assembling. The profit is Rs.100 each for type A and Rs.120 each for type B souvenirs. How many souvenirs of each type should the company manufacture in order to maximize the profit. Formulate the problem as an LPP and solve it graphically.