KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD – 32
SAMPLE PAPER – 07 (2019-20)

SUBJECT: MATHEMATICS(041)

<u>BLUE PRINT : CLASS XII</u>

Chapter	MCQ (1 mark)	FIB (1 mark)	VSA (1 mark)	SA (2 marks)	LA - I (4 marks)	LA- II (6 marks)	Total
Relations and Functions	--	1(1)	--	**2(1)***	4(1)	--	**5(2)**
Inverse Trigonometric Functions	1(1)	--	--		--	--	**3(2)**
Matrices	2(2)	1(1)	--	--	--	--	**3(3)**
Determinants	--	--	1(1)	--	--	**6(1)***	**7(2)**
Continuity & Differentiability	--	1(1)	--	--	**4(1)***	--	**5(2)**
Applications of Derivatives	--	**1(1)***	--	2(1)	--	**6(1)***	**9(3)**
Integrals	1(1)	--	2(2) **1(1)***	--	4(1)	--	**8(5)**
Applications of the Integrals	--	--	--	--	--	6(1)	**6(1)**
Differential Equations	--	--	1(1)	2(1)	4(1)	--	**7(3)**
Vector Algebra	1(1)	**1(1)***	--	**2(1)***	--	--	**4(3)**
Three-Dimensional Geometry	3(3)	--	--	2(1)	--	6(1)	**11(5)**
Linear Programming	--	--	--	--	4(1)	--	**4(1)**
Probability	2(2)	--	--	2(1)	**4(1)***	--	**8(4)**
Total	**10(10)**	**5(5)**	**5(5)**	**12(6)**	**24(6)**	**24(4)**	**80(36)**

Note: * - Internal Choice Questions

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SUBJECT: MATHEMATICS — **MAX. MARKS : 80**

CLASS : XII — **DURATION : 3 HRS**

General Instruction:

(i) All the questions are compulsory.

(ii) The question paper consists of **36** questions divided into 4 sections A, B, C, and D.

(iii) **Section A** comprises of **20 questions** of **1 mark** each. **Section B** comprises of **6 questions** of **2 marks** each. **Section C** comprises of **6 questions** of **4 marks** each. **Section D** comprises of **4 questions** of **6 marks** each.

(iv) There is no overall choice. However, an internal choice has been provided in three questions of 1 mark each, two questions of 2 marks each, two questions of 4 marks each, and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of calculators is not permitted.

SECTION – A

Questions 1 to 20 carry 1 mark each.

1. The value of $\sin(2\sin^{-1}(0.6))$ is

(a) 0.48 (b) 0.96 (c) 1.2 (d) sin 1.2

2. The matrix $\begin{bmatrix} 0 & -5 & 8 \\ 5 & 0 & 12 \\ -8 & -12 & 0 \end{bmatrix}$ is a

(a) diagonal matrix (b) symmetric matrix (c) skew symmetric matrix (d) scalar matrix

3. If A is a square matrix such that $A^2 = I$, then $(A - I)^3 + (A + I)^3 - 7A$ is equal to

(a) A (b) I – A (c) I + A (d) 3A

4. $\int \frac{dx}{x \log x \log(\log x)}$ is equal to

(a) $\log|\log(\log x)| + C$ (b) $|\log x| + C$

(c) $\log\left|\log\left(\frac{1}{x}\right)\right| + C$ (d) $\log|\log x| + C$

5. The value of λ for which the two vectors $3\hat{i} - 6\hat{j} + \hat{k}$ and $2\hat{i} - 4\hat{j} + \lambda\hat{k}$ are parallel is

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

6. If a line makes and angle $\frac{\pi}{3}$ and $\frac{\pi}{4}$ with x-axis and z-axis respectively, then the angle made by the line with y-axis is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{5\pi}{12}$

7. The lines $\frac{x-2}{1}=\frac{y+4}{2}=\frac{z-3}{3}$ and $\frac{x}{2}=\frac{y-1}{4}=\frac{z+3}{6}$ are

(a) skew (b) Parallel (c) intersecting (d) coincident

8. The straight line $\frac{x-3}{3}=\frac{y-2}{1}=\frac{z-1}{0}$ is

(a) parallel to x-axis (b) parallel to y-axis
(c) parallel to z-axis (c) perpendicular to z-axis

9. Two cards are drawn from a well shuffled deck of 52 playing cards with replacement. The probability, that both cards are queens, is

(a) $\frac{1}{13}\times\frac{1}{13}$ (b) $\frac{1}{13}+\frac{1}{13}$ (c) $\frac{1}{13}\times\frac{1}{17}$ (d) $\frac{1}{13}\times\frac{4}{51}$

10. The probability of guessing correctly at least 8 out of 10 answers on a true-false type examination is

(a) $\frac{7}{64}$ (b) $\frac{7}{128}$ (c) $\frac{45}{1024}$ (d) $\frac{7}{41}$

11. If $\vec{x}$ is a unit vector such that $\vec{x}\times\hat{i}=\hat{k}$, then $\vec{x}.\hat{j}=$________

OR

The unit vector in the direction of vector $\vec{a}=2\hat{i}+3\hat{j}+\hat{k}$ is ________

12. The relation R = {(a, b): |a – b| is a multiple of 3} in set A = {1, 2, 3, ..., 10} is an equivalence relation. The equivalence class related to 2 is ________

13. If $\begin{bmatrix} y+2x & 5 \\ -x & 3 \end{bmatrix}=\begin{bmatrix} 7 & 5 \\ -2 & 3 \end{bmatrix}$ then the value of y is _______.

14. The function f (x) = $\begin{cases} \frac{\sin x}{x}+\cos x, & if \quad x\neq 0 \\ k \quad , & if \quad x=0 \end{cases}$ is continuous at x = 0, then the value of k is ____

15. A balloon which always remains spherical has a variable diameter $\frac{3}{2}$(2x + 1) then the rate of change of its volume with respect to x is ______

OR

If the radius of a sphere is measured as 9 cm with an error of 0.03 cm, then the approximate error in calculating its surface area is _____

16. Find: $\int xe^{x}dx$

17. Find: $\int \frac{dx}{\sqrt{2x-x^2}}$

18. Evaluate: $\int \frac{1}{x(x^4+1)}dx$

OR

Find an anti derivative of sin 2x – 4e^{3x}.

19. Find the Integrating Factor of the differential equation $(1-y^2)\frac{dx}{dy}+yx=ay(-1<y<1)$.

20. If $\begin{vmatrix}\sin\alpha & -\cos\alpha \\ \sin\beta & \cos\beta\end{vmatrix}=\frac{\sqrt{3}}{2}$, where α and β then write the value of $\alpha + \beta$.

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. A and B are two events such that P(A) = a, P(B) = b and P(A ⋂ B) = c, find $P(\overline{A}\cap\overline{B})$.

22. Let f and g be two real functions defined as f(x) = 2x – 3; g(x) = $\frac{3+x}{2}$. Find fog and gof. Can you say one is inverse of the other?

OR

Prove that: $\tan^{-1}1+\tan^{-1}2+\tan^{-1}3=\pi$

23. If the plane 2x – 3y + 6z – 11 = 0 makes an angle $\sin^{-1}\alpha$ with x-axis, then find the value of α.

24. Find the point(s) on the curve 2y = 3 – x, at which the tangent is parallel to the line x + y = 0.

25. Find the differential equation of the family of lines passing through origin.

26. If $\vec{a}=2\hat{i}+2\hat{j}+3\hat{k}, \vec{b}=-\hat{i}+2\hat{j}+\hat{k}$ and $\vec{c}=3\hat{i}+\hat{j}$ are such that $\vec{a}+\lambda\vec{b}$ is perpendicular to $\vec{c}$, find the value of λ.

OR

Find the position vector of the mid point of the vector joining the points P(2, 3, 4) & Q(4, 1, –2).

SECTION – C

Questions 27 to 32 carry 4 marks each.

27. Let S be the set of all points in a plane and R be a relation in S defined as R = { (a, b): distance between points a and b is less than 2 units}. Is R an equivalence relation?

28. If x = a (cos t + t sin t) and y = a (sin t – t cos t), find $\frac{d^2y}{dx^2}$

OR

Find $\frac{dy}{dx}$,if $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$.

29. A manufacturing company makes two types of teaching aids A and B of Mathematics for class XII. Each type of A requires 9 labour hours of fabricating and 1 labour hour for finishing. Each type of B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing, the maximum labour hours available per week are 180 and 30 respectively. The company makes a profit of Rs. 80 on each piece of type A and Rs. 120 on each piece of type B. How many pieces of type A and type B should be manufactured per week to get a maximum profit? Make it as an LPP and solve graphically.

30. Evaluate: $\int \frac{1}{\sin\theta + \sin 2\theta} d\theta$

31. Solve the differential equation $x\frac{dy}{dx} - y = (x-1)e^x$

32. In a group of 900 students, 200 attend extra classes, 300 attend school regularly and 400 students study themselves with the help of peers. The probability that the student will succeed in competition who attends extra classes, attend school regularly and study themselves with the help of peers is 0.3, 0.4 and 0.2 respectively. One student is selected who succeeded in the competition. What is the probability that he attends school regularly?

OR

Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that (i) both balls are red. (ii) first ball is black and second is red.

SECTION – D

Questions 33 to 36 carry 6 marks each.

33. Show that height of the cylinder of greatest volume which can be inscribed in a right circular cone of height h and semi vertical angle α is one-third that of the cone and the greatest volume of cylinder is $\frac{4}{27}\pi h^3 \tan^2\alpha$

OR

The sum of the perimeter of a circle and square is k, where k is some constant. Prove that the sum of their areas is least when the side of square is double the radius of the circle.

34. Find the area bounded by the curve | x | + | y | = 1.

35. Solve the following system of equations by matrix method.

3x – 2y + 3z = 8

2x + y – z = 1

4x – 3y + 2z = 4

OR

If α, β, γ are the roots of the equation $x^2(px + q) = r(x + 1)$. Prove that $\begin{vmatrix} 1+\alpha & 1 & 1 \\ 1 & 1+\beta & 1 \\ 1 & 1 & 1+\gamma \end{vmatrix} = 0$.

36. Find the direction cosines of two lines connected by the relations $l - 5m + 3n = 0$, $7l^2 + 5m^2 - 3n^2 = 0$.