Sample Paper(Mathematics)

Year 2020   **Class 12th**

(Topic-wise Break Up)

Topic	No.Of 1 Mark Questions	No.Of 2 Marks Questions	No.Of 4 Marks Questions	No of 6 Marks Questions	Total Marks
Relations and functions	02	---	02	---	10
Matrices and Determinants	01	01	01	01	13
Calculas	---	03	05	03	44
Vectors and Three Dimentional Geometry	01	01	02	01	17
Linear Programming	--	01	01	---	06
Probability	---	02	---	01	10
Total Questions	04	08	11	06	100Marks 29 Questions

* ❖ Note for Paper Setters:
* ❖ The sample question papers comprises of 29 Questions, divided into (04) four sections A, B,C,D.
* ❖ Section A comprises of Multiple Choice Questions from (Q.1 to Q.4) each of 1 Marks
* ❖ Section B comprises of 8 questions (Q 5 to Q. 12) each of 2 marks.
* ❖ Section C comprises of 11 Questions (Q 13 to Q23) each of 4 marks.
* ❖ Section D comprises of 6 Questions (Q24 to Q 29) each of 6 marks.

Subject: Mathematics. Class 12th. Max.Marks=100, Time: 3 hours.

Section A (Multiple Choice Questions) 4Qx1M= 4 marks

Q.No.1) In the set A ={1,2,3,4,5} a relation R defined by R={(x,y): x,y $\in$ A,x<y} then R is:

(a) Reflexive   (b) Symmetric   (c) Transitive   (d) Anti symmetric.

Q.2) If f(x) =$(a - x^n)^{1/n}$ then f(f(x)) =

(a) x   (b) a-x   (c) x^n (d) $x^{1/n}$

Q.3) A and B are two square matrices such that AB=A and BA=B then $A^2 =$

(a) B   (b) A   (c) I   (d) 0

Q.4) If $\vec{a}$ is a vector perpendicular to $\vec{b}$ and $\vec{c}$ then

(a) $\vec{a}.(\vec{b}x\vec{c})$=0   (b) $\vec{a}x(\vec{b}x\vec{c}) = 0$

(c) $\vec{a}x(\vec{b} + \vec{c}) = 0$ (d) $\vec{a} + (\vec{b} + \vec{c}) = 0$

Section B (very short answer type Question) 8Qx2M=16 marks

Q.5) Define Symmetric and skew symmetric Matrices.

Q.6) Evaluate $\int \frac{Cos\sqrt{x}}{\sqrt{x}} dx$

Q.7) Evaluate $\int_2^3 \frac{1}{x^2-1} dx$.

Q.8) Define Order and Degree of a differential Equation.

Q.9) Find the projection of $\vec{a}$ on $\vec{b}$ where $\vec{a} = 2\hat{\imath} - 2\hat{\jmath} + \hat{k}$, $\vec{b} = \hat{\imath} + 2\hat{\jmath} - 2\hat{k}$.

Q.10) Define the term Optimization.

Q.11) p(A) = $\frac{6}{11}$ p(B) = $\frac{5}{11}$ p(A$\cup$ B) = $\frac{7}{11}$, find p(B\A)

Q.12) A die is rolled, if the outcome is an even number, what is the probability that it is a prime number.

Sec C (Short Answer Type Questions) 11Qx4M=44 marks

Q.13) Let f:$X \to Y$ be invertible function,show that f has unique inverse.

Q.14) Write in the simplest form $\tan^{-1}(\frac{\cos x-\sin x}{\cos x+\sin x})$

Q.15) Find the inverse of a matrix A if

$$A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$$

Q.16) At what point of the curve $y = x^2$ does the tangent make an angle 45^0 with the x-axis.

Q.17) Using differentials find the approximate value up to 3 decimal places of $26^{1/3}$.

Q.18) Prove that $\int \sqrt{x^2 + a^2}\, dx = x\frac{\sqrt{x^2+a^2}}{2} + \frac{a^2}{2} log|x + \sqrt{x^2 + a^2}| + c$

Q.19) Prove that $\int_a^b f(x) dx = \int_a^b f(a + b - x) dx$

Q.20) If $y = cos^{-1} x$, Find $\frac{d^2 y}{dx^2}$ in terms of y alone.

Q.21) If $\vec{a} = 2\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$, $\vec{b} = -\hat{\imath} + 2\hat{\jmath} + \hat{k}$ and $\vec{c} = 3\hat{\imath} + \hat{\jmath}$ are such that $\vec{a} + \lambda\vec{b}$ is perpendicular to $\vec{c}$, then find the value of λ.

Q.22) Find the coordinates of the foot of the perpendicular drawn from the origin to the plane $2x+3y+4z-1=0$

Q.23) Solve graphically ,

Minimize or Maximize Z= 5x+10y

Subject to :   x+2y≤120,   x+y≥ 60,   x-2y≥ 0,   x,y ≥ 0

Section D (Long Answer Type Questions) 6Qx6M=36marks

Q.24) Using the properties of determinants, prove that

$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ca & cb & -c^2 \end{vmatrix} = 4a^2 b^2 c^2$$

(OR)

Solve the system of equations;

2x+3y+3z=5,   x-2y+z=-4,   3x-y-2z=3

Q.25) If $y=(xCosx)^x + (xSinx)^{1/x}$, Find $\frac{dy}{dx}$

(OR)

Find the values of 'a' and 'b' such that the function defined by:

$f(x)=\begin{cases} 5 & ,x \leq 2 \\ ax + b, & 2 < x < 10 \\ 21, & x \geq 10 \end{cases}$ is a continues function.

Q.26) Evaluate $\int \frac{Sin^8x-Cos^8x}{1-Sin^2xCos^2x} dx$

(OR)

Find the area of the region enclosed by the curve $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$

Q.27) Solve the Linear differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$

(OR)

Find the equation of the curve passing through the point (0,0) and whose differential Equation is $\frac{dy}{dx} = e^x Sinx.$

Q.28) Find the vector equation of the line passing through (1,2,3) and parallel to the planes $\vec{r}.(\hat{\imath} - \hat{\jmath} + 2\hat{k}) = 5$ and

$\vec{r}.(3\hat{\imath} + \hat{\jmath} + \hat{k}) = 6$

(OR)

Find the shortest distance between the lines l_1 and l_2 whose vector equations are:

$\vec{r} = \hat{\imath} + \hat{\jmath} + \lambda(2\hat{\imath} - \hat{\jmath} + \hat{k})$ and $\vec{r} = 2\hat{\imath} + \hat{\jmath} - \hat{k} + \mu(3\hat{\imath} - 5\hat{\jmath} + 2\hat{k})$

Q.29) From a lot of 16 bulbs, which include 4 defective bulbs, a sample of 3 bulbs is drawn at random without replacement. Find the probability distribution of no. of defective bulbs drawn.

(OR)

A die is thrown 6 times. If "getting an odd number" is a success, what is the probability of

(i) 5 successes   (ii) at least 5 successes   (iii) at most 5 successes