CAREERS 360

JKBOSE Class 12 Mathematics

Model Test Paper

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 ∈ 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∪ 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* $\frac{d^2y}{dx^2}$ 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 : $x+2y\leq 120$, $x+y\geq 60$, $x-2y\geq 0$, $x,y\geq 0$

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

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

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

(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:

$$f(x)=\begin{cases} 5 \quad, x \leq 2 \\ ax + b, \quad 2 < x < 10 \\ 21\,, x \geq 10 \end{cases}$$ 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 $\vec{r}.(\hat{i} - \hat{j} + 2\hat{k}) = 5$ and

$\vec{r}.(3\hat{i} + \hat{j} + \hat{k}) = 6$

(OR)

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

$$\vec{r} = \hat{i} + \hat{j} + \lambda(2\hat{i} - \hat{j} + \hat{k}) \quad \text{and} \quad \vec{r} = \widehat{2i} + \hat{j} - \hat{k} + \mu(3\hat{i} - 5\hat{j} + 2\hat{k})$$

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