

Mathematics Sample Question Paper

Time: 3 hours 15 minutes

marks-100

Instructions- The first 15 minutes are scheduled for the examinees to read the question paper.

1. There are a total of nine questions in this question paper.

2. All questions are compulsory.

3. At the beginning of every question, it is clearly mentioned how many clauses it has.

4. You have to do it.

5. The marks of each question are marked in front of him.

1. Choose the correct answer from the following:

(a) Suppose the function defined by $f(x) = 3x$ is $f: \mathbb{R} \rightarrow \mathbb{R}$. Select the answer.

01

(i) F is a single cover.

(ii) F is a multiple envelope.

(iii) f is singular but

(iv) f is neither singular nor monotonous

(b) If R is the relation given by $R = \{(a, b) : a = b - 2, b > 6\}$ in the set \mathbb{N} .

01

(i) $(2, 4) \in R$

(ii) $(3, 8) \in R$

(iii) $(6, 8) \in R$

(iv) $(8, 7) \in R$

(c) Integration [Find the value of $\int x e^x dx$.]

01

(i) e^x

(ii) $(x+1)e^x$

(iii) $(x-1)e^x$

(iv) $x^2/2 * e^x$

(d) Differential equation is $2x^2 \frac{d^2y}{dx^2} - 3 \frac{dy}{dx} + y = 0$ highest power
01

(i) 2

(ii) 1

(iii) 0

(iv) Not defined.

(e) If the vectors $2i + j + k$ and $i - 4j + \lambda k$ are perpendicular to each other, then the value of λ is Find out -
01

(i) 3

(ii) 2

(iii) 4

(iv) 0

2.do all sections -

(a) Find the prime value of $\cot^{-1}(-1/\sqrt{3})$.
01

(b) Show that the function $f(x)=|x|$, $x=0$ Continuous at $x=0$. 01

(c) Differential equation Rank and power of $xy \frac{d^2y}{dx^2} + x \left(\frac{dy}{dx} \right)^2 - y \frac{dy}{dx} = 0$ 01

(d) The line joining two points $(-2, 4, -5)$ and $(1, 2, 3)$ Find the cosin. 01

(e) यदि $P(A) = 7/13$, $P(B) = 9/13$ और $P(A \cap B) = 4/13$ find out the value of $P(A/B)$ 01

3. Do all sections -

- (a) If $A = \{12\}$ and $B = \{34\}$ Number of relationships between A and B Find out. 02
- (b) If $y = A \sin x + B \cos x$, prove that it is : $d^2y/dx^2 + y = 0$. 02
- (c) Find the angle between Vectors $i - 2j + 3k$ and $3i - 2j + k$. 02
- (d) If $x[2/3] + y[-1/1] = [10/5]$, then find the values of x and y. 02

4. Divide all sections –

- (a) Show that the given function is an incremental function at $f(x) = 7x - 3, R$. 02
- (b) The perpendicular unit vector of each vector $(a+b)$ and $(a-b)$ is known a where $a = i + j + k$, $b = i + 2j + 3k$. 02
- (c) Find the area of a parallelogram whose adjacent sides are $a = 3i + j + 4k$ and $b = i + j + 4k$ 02
- (d) A and B are given such events where $P(A) = 1/2$ $P(A \cup B) = 3/5$ and Find the value of $P(B) = P$, P. If the events are mutually exclusionary. 02

5. Do all sections -

- (a) Prove that the set of integers Z consists of $R = \{(a, b) : \text{Number } 2, (a-b), a \text{ Divide the total number of units in the country.}\}$ The relation given by the 05
- (b) If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ then prove $(AB)^{-1} = B^{-1}A^{-1}$ is. 05
- (c) Determine the differential of the function $(\sin x)^{\cos x}$ with respect to x. 05
- (d) Find the value of $\int_{-\pi/4}^{\pi/4} \sin^2 x \, dx$ 05
- (e) Lines $r = i + 2j - 4k + \lambda (2i + 3j + 6k)$ and $r = 3i + 3j - 5k + \mu (2i + 3j + 6k)$ Find the minimum distance between the two axis. 05

6. Do all sections -

$$f(x) = \begin{cases} \frac{|x|}{x}, & \text{यदि } x \neq 0 \\ 0, & \text{यदि } x = 0 \end{cases}$$

(a) Show that

It is discontinuous at $x=0$.

(b) The area of the region bounded by the curves $y=\cos x$ between $x = 0$ and $x = 2\pi$ is known 05

(c) Find the value of P so that $\frac{1-x}{3} = \frac{7y-14}{2P} = \frac{z-3}{2} = \frac{7-7x}{3P} = \frac{y-5}{1} = \frac{6-z}{5}$ Be perpendicular to each other. 05

(d) Minimise $Z = 3x + 2y$ under the following constraints. $x + y \geq 8$, $3x + 5y \leq 15$, $x \geq 20$, $y \geq 20$ 05

(e) In a hostel, 60% of the students speak Hindi, 40% speak English and 20% They both read newspapers. A student is chosen at random. 05

(i) Find the probability that he is neither Hindi nor English. She reads the newspaper.

(ii) If she reads a Hindi newspaper, her English language is 21 What is the probability that she is also a newspaper reader?

7.Solve any one of the following clauses.

(a) If $A^{-1} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$ और $B = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

find the value of $(AB)^{-1}$. 08

(b) The following equation systems

$$3x - 2y + 3z = 8$$

$$2x + y - z = 1$$

$$4x - 3y + 2z = 4$$

Solve the problem by matrix method. 08

8.Solve any one of the following clauses.

(a) Prove that the largest cone within a sphere of radius R is $\frac{8}{27}$ Volume is cone of the volume of the sphere. 08

(b) Find the broad solution of the differential equation $dy/dx - y = \cos x$. 08

9. Solve any one of the following clauses.

(a) Find the value of $\int_0^{\pi/2} \log \sin x \, dx$ 08

(b) What is the value of $\int_0^{\pi} \frac{x \, dx}{a^2 \cos^2 x + b^2 \sin^2 x}$ 08