

Question No.1

4.00

Bookmark ☐

The statement “The dual space of a non-empty normed linear space is non-empty” follows from

- ☐ closed graph theorem
- ☐ Riez representation theorem
- ☐ Uniform boundedness theorem
- ☐ Hahn-Banach theorem

Question No.2

4.00

Bookmark ☐

Let V be a normed vector space. All norms on V are equivalent if V is

- ☐ finite dimensional
- ☐ reflexive
- ☐ complete
- ☐ an inner product space

Question No.3

4.00

Bookmark ☐

Choose the correct meaning of the italicized idiom.

Anil got me into trouble by giving a *false colour* to my statement.

- ☐ Colouring the sentence
- ☐ Giving a wrong character
- ☐ Giving good impression
- ☐ Giving a wrong colour box

Question No.4

4.00

Bookmark ☐

The general solution of $\frac{d^3y}{dx^3} - \frac{6d^2y}{dx^2} + \frac{11dy}{dx} - 6y = 0$ is

- ☐ $y = A + Be^{2x} + ce^{3x}$
- ☐ $y = Ae^x + Be^{2x} + ce^{3x}$
- ☐ $A - Be^{2x} + ce^{3x}$
- ☐ $y = Ae^x + be^{2x} - ce^{3x}$

Question No.5

4.00

Bookmark ☐

The derived set of the set $X = \left\{ \frac{1}{m} + \frac{1}{n} : m, n = 1, 2, 3, \dots \right\}$ is

- ☐ $\left\{ \frac{1}{n} : n = 1, 2, 3, \dots \right\}$
- ☐ $\{0\}$
- ☐ X
- ☐ $X \cup \{0\}$

Question No.6

4.00

Bookmark ☐

In any system of particles, suppose we do not assume that the internal force come in pairs. Then the fact that the sum of internal force is zero follows from

- ☐ Principle of virtual energy
- ☐ Newton's Second law
- ☐ Conservation of angular momentum
- ☐ Conservation of energy

Question No.7

4.00

The equation $(\alpha xy^3 + y \cos x)dx + (x^2 y^2 + \beta \sin x)dy = 0$ is exact for

- ☐ $\alpha = 1, \beta = \frac{2}{3}$
- ☐ $\alpha = \frac{2}{3}, \beta = 1$
- ☐ $\alpha = 1, \beta = \frac{3}{2}$
- ☐ $\alpha = \frac{3}{2}, \beta = 1$

Question No.8

4.00

Bookmark ☐

Let ℓ_2 be the set of real sequences $\{x_n\}$ such that $\sum_{n=1}^{\infty} |x_n|^2 < \infty$. For $x \in \ell_2$, define $\|x\|^2 = \sum_{n=1}^{\infty} |x_n|^2$. Let $S = \{x \in \ell_2 : \|x\| < 1\}$. Then

- ☐ interior of S is compact
- ☐ S is compact
- ☐ closure of S is not compact
- ☐ closure of S is compact

Question No.9

4.00

Bookmark ☐

Assertion: - India's president is appointed on a five-year term

Reason: -PratibhaPatil was appointed as India's first woman president in 2007

- ☐ A is true but R is false
- ☐ Both A and R are true and R is not the correct explanation of A
- ☐ A is false but R is true
- ☐ Both A and R are true and R is the correct explanation of A

Question No.10

4.00

Bookmark ☐

If $\{a_n^2\}$ is convergent, then $\{a_n\}$ is

- ☐ may converge
- ☐ must converge
- ☐ may diverge to ∞
- ☐ must diverge

Question No.11

4.00

Bookmark ☐

Let $y_1(x)$ & $y_2(x)$ be the solutions of the linear differential equation

$y'' - \frac{3}{x}y' + (\sin 2x)y = 0$ on the interval $[1, \infty)$ for which $y_1(1) = 0, y_1'(1) = 3$ and

$y_2(1) = 2, y_2'(1) = 1$. Then the Wronskian is

- ☐ $6x^3$
- ☐ $-6x^3$
- ☐ $-2x^2$
- ☐ $2x^2$

Question No.12

4.00

Bookmark ☐

The four vectors $(1,1,0,0)$, $(1,0,0,1)$, $(1,0,a,0)$ and $(0,1,a,b)$ are linearly independent if

- ☐ $a \neq -2, b \neq 0$
- ☐ $a \neq 0, b \neq -2$
- ☐ $a \neq 0, b \neq 2$
- ☐ $a \neq 2, b \neq 0$

Question No.13

4.00

Bookmark ☐

The only two limit points of the set $\left\{-1 - \frac{1}{n} : n \in \mathbb{N}\right\} \cup \left\{1 + \frac{1}{n} : n \in \mathbb{N}\right\}$ are

- ☐ $\pm 1/2$
- ☐ ± 1
- ☐ ± 2
- ☐ 0

Question No.14

4.00

Bookmark ☐

The function $f(z) = \frac{e^z - 2}{z - 2}$ has

- ☐ an essential singularity at $z = 2$
- ☐ a simple pole at $z = 2$
- ☐ a double pole at $z = 2$
- ☐ a regular point at $z = 2$

Question No.15

4.00

Bookmark ☐

Let X and Y be normed linear spaces. Every linear map from X to Y is continuous if

- ☐ $\dim(Y) = 1$
- ☐ $\dim(X) < \infty$
- ☐ $X = \ell^2$
- ☐ $\dim(Y) < \infty$ D

Question No.16

4.00

Bookmark ☐

Let $f(x) \in \mathbb{Z}[x]$ be a polynomial of degree ≥ 2 . Pick each correct statement from below:

- ☐ If $f(x)$ is irreducible in $\mathbb{Z}[x]$, then it is irreducible in $\mathbb{Q}[x]$
- ☐ If $f(x)$ is irreducible in $\mathbb{Z}[x]$, then it is irreducible in $\mathbb{F}_p[x]$
- ☐ If $f(x)$ is irreducible in $\mathbb{Q}[x]$, then it is irreducible in $\mathbb{Z}[x]$
- ☐ If $f(x)$ is irreducible in $\mathbb{Z}[x]$, then it is irreducible in $\mathbb{R}[x]$

Question No.17

4.00

Bookmark ☐

In a code language, 321 means "Hot Black Coffee", 536 means "Very Hot Summer", and 589 means "Summer and Winter". Which digit stands for "Very" ?

- ☐ 6
- ☐ 5
- ☐ 9
- ☐ 3

Question No.18

4.00

Bookmark ☐

The equation $y - 2x = a$ represents the orthogonal trajectories of the family

- ☐ $x^2 + 2y^2 = c$
- ☐ $y = ce^{-2x}$
- ☐ $xy = c$
- ☐ $x + 2y = c$

Question No.19

4.00

In $\mathbb{R}^3$ with usual topology, let $V = \{(x, y, z) \in \mathbb{R}^3 : x^2 + y^2 + z^2 = 1, y \neq 0\}$ and $W = \{(x, y, z) \in \mathbb{R}^3 : y = 0\}$. Then $V \cup W$ is

- ☐ connected and compact
- ☐ compact but not connected
- ☐ neither connected nor compact
- ☐ connected but not compact

Question No.20

4.00

Bookmark ☐

The number of arbitrary constants in a differential equation of order m and degree n is p . Then

- ☐ $p = m$
- ☐ $p < m$
- ☐ $p < n$
- ☐ $p = n$

Question No.21

4.00

Bookmark ☐

Study the following information carefully and answer the question below it

The Director of an MBA college has decided that six guest lectures on the topics of Motivation, Decision Making, Quality Circle, Assessment Centre, Leadership and Group Discussion are to be organised on each day from Monday to Sunday.

- (i) One day there will be no lecture (Saturday is not that day), just before that day Group Discussion will be organised.
- (ii) Motivation should be organised immediately after Assessment Centre.
- (iii) Quality Circle should be organised on Wednesday and should not be followed by Group Discussion
- (iv) Decision Making should be organised on Friday and there should be a gap of two days between Leadership and Group Discussion

How many lectures are organised between Motivation and Quality Circle?

- ☐ Two
- ☐ Four
- ☐ One
- ☐ Three

Question No.22

4.00

Bookmark ☐

Let E be a connected subset of $\mathbb{R}$ with at least two elements. Then the number of elements in E is

- ☐ Exactly two
- ☐ Uncountable
- ☐ Countably infinite
- ☐ More than two but finite

Question No.23

4.00

Bookmark ☐

The topology τ on the real line $\mathbb{R}$ generated by all the closed intervals $[d, d+1]$ with length 1 is

- ☐ standard topology
- ☐ neither discrete nor Hausdorff
- ☐ discrete
- ☐ indiscrete

Question No.24

4.00

Bookmark ☐

$f(z) = e^z$ is conformal

- ☐ at every point $\mathbb{C}$
- ☐ only at $z = 0$
- ☐ at no point in $\mathbb{C}$
- ☐ at every point except 0 in $\mathbb{C}$

Question No.25

4.00

Bookmark ☐

Let $K(x,y)$ be a given real function defined for $0 \leq x \leq 1$, $0 \leq y \leq 1$ and $f(x)$ a real valued function defined for $0 \leq x \leq 1$ and λ an arbitrary complex number.

Then $\int K(x,y)\phi(y)dy = f(x), 0 \leq x \leq 1$ is the

- ☐ Linear Fredholm integral equation of first kind (for a function $\phi(x)$)
- ☐ Linear Fredholm integral equation of second kind (for a function $\phi(x)$)
- ☐ Volterra integral equation of second kind (for a function $\phi(x)$)
- ☐ Volterra integral equation of second kind (for a function $\phi(x)$)

Question No.26

4.00

Bookmark ☐

Every bilinear transformation maps circles or straight lines into

- ☐ straight lines
- ☐ circles
- ☐ circles or straight lines respectively
- ☐ straight lines or circles respectively

Question No.27

4.00

Bookmark ☐

Given, $f(z) = \int_C \frac{z^2 - z + 1}{z - 1} dz$ where C is a circle $|z| = \frac{1}{4}$

- ☐ $f(z)$ is not analytic
- ☐ $f(z) \neq 0$
- ☐ $f(z)$ is analytic everywhere within C
- ☐ $f(z)$ has no simple pole

Question No.28

4.00

Bookmark ☐

The integrating factor of the differential equation $dx + (1 + x + y)dy = 0$ is

- ☐ $-\frac{1}{x+y}$
- ☐ $\frac{1}{x+y}$
- ☐ $x + y$
- ☐ $\log(x + y)$

Question No.29

4.00

Bookmark ☐

The number of multiples of 10^{44} that divides 10^{55} is

- ☐ 121
- ☐ 2
- ☐ 1
- ☐ 144

Question No.30

4.00

Bookmark ☐

The last two digits of 7^{81} are a

- ☐ 37
- ☐ 17
- ☐ 7
- ☐ 47

Question No.31

4.00

Bookmark ☐

The set of natural numbers $\mathbb{N}$ is a

- ☐ dense set
- ☐ somewhere dense set
- ☐ dense in itself
- ☐ non dense set

Question No.32

4.00

Bookmark ☐

Obtain the missing term.

300, 296, 287, 271, ?, 210

- ☐ 246
- ☐ 250
- ☐ 244
- ☐ None of the above

Question No.33

4.00

Bookmark ☐

Ramesh had a cold and couldn't go to the party, so I bought him a cake to make up for his _____

- ☐ disappointment
- ☐ disillusion
- ☐ depression
- ☐ disgust

Question No.34

4.00

Bookmark ☐

Given the functional $F = F(x, y, y')$, the differential equation $\frac{\partial F}{\partial y} - \frac{d}{dx} \left(\frac{\partial F}{\partial y'} \right) = 0$ is referred as

- ☐ Lagrange's equation
- ☐ Cayley equation
- ☐ Hamilton equation
- ☐ Euler's characteristic equation

Question No.35

4.00

Bookmark ☐

The set of all limits points of the set of all rational numbers is

- ☐ $\mathbb{Q}$
- ☐ $\emptyset$
- ☐ $\mathbb{R}$
- ☐ $\mathbb{R} \setminus \mathbb{Q}$

Question No.36

4.00

Bookmark ☐

A non-separable Banach space is

- ☐ $L^\infty[0, 1]$
- ☐ $L^1[0, 1]$

◦ $C[0, 1]$

◦ $L^2[0, 1]$

Question No.37

4.00

Bookmark ☐

The number of group homomorphisms from the symmetric group S_3 to $\mathbb{Z}_6$ is

- 6
- 3
- 1
- 2

Question No.38

4.00

Bookmark ☐

A topological space X is totally disconnected, if

- its only connected subsets are empty set and set X itself
- its only connected subsets are set X itself
- its only connected subsets are empty set
- its only connected subsets are one-point set

Question No.39

4.00

Bookmark ☐

The space ℓ_p is a Hilbert space if and only if

- $p = \infty$
- $p = 2$
- p is even
- $p > 1$

Question No.40

4.00

Bookmark ☐

The number of elements in the set

$\{m : 1 \leq m \leq 1000, m \text{ and } 1000 \text{ are relatively prime}\}$ is

- 400
- 250
- 300
- 100

Question No.41

4.00

Bookmark ☐

Consider $\mathbb{Z}_5$, the field of congruence modulo 5 classes and let $f(x) = x^5 + 4x^4 + 4x^3 + 4x^2 + x + 1$. Then the multiplicities of zeros 1 and 3 of $f(x)$ over $\mathbb{Z}_5$ are respectively

- 1 and 4
- 2 and 2
- 2 and 3
- 1 and 2

Question No.42

4.00

Bookmark ☐

Let $S : \mathbb{R}^6 \rightarrow \mathbb{R}^6$ be a linear mapping satisfying $S^2 = 0$. Then the rank of S is

- ☐ > 3
- ☐ ≤ 3
- ☐ 5
- ☐ 6

Question No.43

4.00

Bookmark ☐

Statements: Some bats are snakes, No snake is dangerous

Conclusion:

I. Some dangerous animals are snakes

II. Some bats are not dangerous.

- ☐ If only conclusion I follows
- ☐ If either I or II follows
- ☐ If only conclusion II follows
- ☐ If neither I nor II follows

Question No.44

4.00

Bookmark ☐

The radius of convergence of the power series $\sum n^p z^n$ is

- ☐ ∞
- ☐ 0
- ☐ 1
- ☐ 2

Question No.45

4.00

Bookmark ☐

A connected regular graph G with 10 vertices and 25 edges is

- ☐ planar
- ☐ bi-partite
- ☐ Eulerian
- ☐ non-planar

Question No.46

4.00

Bookmark ☐

The number non-isomorphic fields with exactly 6 elements is

- ☐ 0
- ☐ 3
- ☐ 1
- ☐ 2

Question No.47

4.00

Bookmark ☐

If a function f is analytic within and on a simple closed contour C , then

$\int_C f(z) dz$ is

- ☐ ∞
- ☐ 1
- ☐ 0
- ☐ non-zero

Question No.48

4.00

Bookmark ☐

Given $f(z) = \log z$

- ☐ $\frac{df(z)}{dz}$ is defined for $z = 0$
- ☐ $f(z)$ is not analytic
- ☐ $f(z)$ does not satisfies Cauchy –Riemann equation
- ☐ $f(z)$ is analytic

Question No.49

4.00

Bookmark ☐

The sequence $\{a_n\}$ where $a_n = \frac{1}{n} + \frac{1}{n^2} + \frac{1}{n^3} + \dots$ is

The sequence $\{a_n\}_n$ where $a_n = \frac{1}{1.3} + \frac{1}{3.5} + \dots + \frac{1}{(2n-1)(2n+1)}$ is

- ☐ Neither monotone in increasing nor decreasing
- ☐ Monotone increasing and bounded
- ☐ Monotone increasing and unbounded
- ☐ Monotone decreasing and bounded

Question No.50

4.00

Bookmark ☐

The set of all real numbers x such that $||3 - x| - |x + 2|| = 5$ is

- ☐ $(-\infty, -2]$
- ☐ $(-\infty, -2] \cup [3, \infty)$
- ☐ $(-\infty, -3] \cup [2, \infty)$
- ☐ $[3, \infty)$

Question No.51

4.00

Bookmark ☐

Every bounded sequence of real numbers has

- ☐ either a convergent or a divergent subsequence
- ☐ a convergent subsequence
- ☐ neither convergent nor divergent subsequence
- ☐ a divergent subsequence

Question No.52

4.00

Bookmark ☐

It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the cars is:

- ☐ 1:2
- ☐ 3:4
- ☐ 2:3
- ☐ 1:4

Question No.53

4.00

Bookmark ☐

Any solution of homogeneous Volterra integral equations of the second kind

$\phi(x) - \lambda \int_0^x K(x, y)\phi(y)dy = 0$ in L_2 -space is

- ☐ necessarily a non-zero function
- ☐ constant
- ☐ necessarily a zero function
- ☐ absolute function

Question No.54

4.00

Bookmark ☐

Let E be the set of all numbers in $[0, 1]$ such that the decimal representation of x does not contain the digit 7. Then the Lebesgue measure of E is

- ☐ 0.9
- ☐ 1
- ☐ 0.7
- ☐ 0

Question No.55

4.00

Bookmark ☐

Based on the given information, answer the following question.

1. Six friends P, Q, R, S, T and U are members of a club and play different games of Football, Cricket, Tennis, Basketball, Badminton and Volleyball
2. T who is taller than P and S plays Tennis.
3. The tallest among them plays Basketball.
4. The shortest among them plays volleyball.

4. The shortest among them plays volleyball.
 5. Q and S neither play Volleyball nor Basketball.
 6. R plays Volleyball
 7. T is between Q who plays Football and P in order of height

What does S Play?

- ☐ Cricket
☐ Badminton
☐ Either Cricket or Badminton
☐ None of the above

Question No.56

4.00

Bookmark ☐

For an ideal spring mass arrangement

- ☐ The Hamiltonian equation of motion is $\ddot{x} - x = 0$
☐ The Hamiltonian equation of motion is $\ddot{x} + \frac{k}{m} x = 100$
☐ The Hamiltonian equation of motion is $\ddot{x} = kx$
☐ The Hamiltonian equation of motion is $\ddot{x} + \frac{k}{m} x = 0$

Question No.57

4.00

Bookmark ☐

Let $f : [a, b] \longrightarrow \mathbb{R}$ be a continuous function, such that $f(a) < f(b)$. Then

- ☐ $f([a, b]) \supseteq [f(a), f(b)]$
☐ $f([a, b]) \neq [f(a), f(b)]$
☐ $f([a, b]) \subseteq [f(a), f(b)]$
☐ $f([a, b]) = [f(a), f(b)]$

Question No.58

4.00

Bookmark ☐

A connected graph G is bipartite if and only if

- ☐ G contains no odd cycles
☐ G contains no even cycles
☐ G contains even number of vertices
☐ G contains odd number of vertices

Question No.59

4.00

Bookmark ☐

Based on the information given, answer the below question.

1. A,B,C,D,E and F are travelling in a bus.
 2. There are two reporters, two mechanics, one photographer and one writer in the group.
 3. Photographer A is married to D who is a reporter.
 4. The writer is married to B who is of the same profession as that of F.
 5. A,B,C,D are two married couples and no one in this belong to the same profession.
 6. F is the brother of C.

How is C related to F?

- ☐ Brother
☐ Brother-in-law
☐ Sister
☐ Cannot be determined

Question No.60

4.00

Bookmark ☐

Let $T : \mathbb{R}^3 \longrightarrow \mathbb{R}^3$ be a linear mapping defined by $T(x, y, z) = (0, x, y)$ for $x, y, z \in \mathbb{R}$. Then the kernel of T^2 is equal to

- ☐ $\{(x, y, z) : x = 0\}$
☐ $\{(x, y, z) : x = y = z\}$
☐ $\{(x, y, z) : y = z = 0\}$
☐ $\{(x, y, z) : y \neq z\}$

Question No.61

4.00

Bookmark ☐

$$\begin{bmatrix} & \\ 0 & i \end{bmatrix}$$

The matrix $\begin{bmatrix} & \\ -i & 0 \end{bmatrix}$ is a

- ☐ skew-Hermitian matrix
- ☐ skew-symmetric matrix
- ☐ Hermitian matrix
- ☐ symmetric matrix

Question No.62

4.00

Bookmark ☐

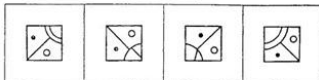
Select the option which improves the underlined part of the sentences.
The Prime Minister called on the President.

- ☐ to
- ☐ in
- ☐ No improvement
- ☐ by

Question No.63

4.00

Bookmark ☐



- (A)
- (B)
- (C)
- (D)
- ☐ B
- ☐ D
- ☐ A
- ☐ C

Question No.64

4.00

Bookmark ☐

Identify the underlined part of speech:
Sorry, I don't know any foreign languages

- ☐ adverb
- ☐ pronoun
- ☐ adjective
- ☐ noun

Question No.65

4.00

Bookmark ☐

The eigenvalues of a Hermitian matrix are

- ☐ rationals
- ☐ real
- ☐ complex
- ☐ purely imaginary

Question No.66

4.00

Bookmark ☐

Let G be a group of order 77. Then the center of G is isomorphic to

- ☐ $\mathbb{Z}_{77}$
- ☐ $\mathbb{Z}_1$
- ☐ $\mathbb{Z}_7$
- ☐ $\mathbb{Z}_{11}$

Question No.67

4.00

Bookmark ☐

Let G be a simple group of order 168. Then the number of subgroups of G of order 7 is

- ☐ 1
- ☐ 8
- ☐ 7
- ☐ 28

Question No.68

4.00

Bookmark ☐

$\limsup$ and $\liminf$ of the sequence $x_n = \frac{n}{2} - \left[\frac{n}{2}\right]$ are

- ☐ unequal
- ☐ 0
- ☐ equal
- ☐ do not exist

Question No.69

4.00

Bookmark ☐

Let $T : \mathbb{R}^3 \longrightarrow \mathbb{R}^3$ be a linear transformation defined by $T(x, y, z) = (y, 0, z)$ for $x, y, z \in \mathbb{R}$. Then the rank of T is

- ☐ 1
- ☐ 3
- ☐ 0
- ☐ 2

Question No.70

4.00

Bookmark ☐

The differential equation $\frac{d^2y}{dx^2} + \sin(x+y) = \sin x$ is

- ☐ non-linear and non-homogeneous
- ☐ linear and homogeneous
- ☐ non-linear and homogeneous
- ☐ linear and non-homogeneous

Question No.71

4.00

Bookmark ☐

The functional $\int_0^1 (y'^2 + 4y^2 + 8ye^x) dx$, $y(0) = \frac{-4}{3}$, $y(1) = \frac{-4e}{3}$ possesses:

- ☐ strong minima on $y = \frac{-4}{3}e^x$
- ☐ strong minima on $y = \frac{-1}{3}e^x$
- ☐ strong maxima on $y = \frac{-4}{3}e^x$
- ☐ weak maxima on $y = \frac{-1}{3}e^x$

Question No.72

4.00

Bookmark ☐

Choose the best synonym of the italicized word.
Each one of us is the subject of *derision* at some time or the other in our life.

- ☐ criticism
- ☐ laughter
- ☐ ridicule
- ☐ irony

Question No.73

4.00

Bookmark ☐

If $u = x$ is a solution of the differential equation $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = 0$, then

the second linearly independent solution of the above differential equation is

- ☐ x^2
- ☐ x^n
- ☐ x^2
- ☐ $1/x$

Question No.74

4.00

Bookmark ☐

If $f(z)$ is an analytic function on z , then

- ☐ $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |Re f(z)|^2 = 0$
- ☐ $\left(\frac{\partial^2}{\partial x^2}\right) [Re f(z)]^2 = 2|f'(z)|^2$
- ☐ $\frac{\partial}{\partial x} [Re f(z)]^2 = 2|f'(z)|^2$
- ☐ $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |Re f(z)|^2 = 2|f'(z)|^2$

Question No.75

4.00

Bookmark ☐

Choose the missing term: 3F,6G,11I,18L, ?

- ☐ 27O
- ☐ 26N
- ☐ 28Q
- ☐ 27P

Question No.76

4.00

Bookmark ☐

Any function $f(x, y)$ is called a harmonic function

- ☐ If $f(x, y)$ possessing first order partial derivatives
- ☐ If $f(x, y)$ satisfies Laplace equation
- ☐ If $f(x, y)$ possessing continuous first order partial derivatives and satisfies Laplace equation
- ☐ If $f(x, y)$ possessing continuous first and second order partial derivatives

Question No.77

4.00

Bookmark ☐

The kinetic energy for the harmonic oscillator is

- ☐ $-\frac{1}{2} m x^2$
- ☐ $m x$
- ☐ $\frac{1}{2} m x^2$
- ☐ $\frac{1}{2} m x$

Question No.78

4.00

Bookmark ☐

Let V be the vector space of all skew-symmetric matrices of order $n \times n$.

Then $\dim V$ is

- ☐ n^2
- ☐ n
- ☐ $\frac{n(n-1)}{2}$
- ☐ $\frac{n(n+1)}{2}$

Question No.79

4.00

Bookmark ☐

If $f(x) = \begin{cases} -1; & x < -1 \\ -x; & -1 \leq x \leq 1 \\ 1; & x > 1 \end{cases}$ is continuous

- ☐ At $x = 1$ but not at $x = -1$
- ☐ At $x = -1$ but not at $x = 1$
- ☐ At none of $x = 1$ and $x = -1$
- ☐ At both $x = 1$ and $x = -1$

Question No.80

4.00

Bookmark ☐

The closure of the set $A = \{3/2, 4/2, 5/4, 6/5, \dots\}$ with respect to usual topology on $\mathbb{R}$ is

- ☐ $\bar{A} = \{1\}$
- ☐ $\bar{A} = \{1, 2, 3/2, 4/2, \dots\}$
- ☐ $\bar{A} = \{1, 2, 3, 4, \dots\}$
- ☐ $\bar{A} = \Phi$

Question No.81

4.00

Bookmark ☐

The connected subsets of the real line with the usual topology are

- ☐ only compact intervals
- ☐ only bounded intervals
- ☐ all intervals
- ☐ only semi-infinite intervals

Question No.82

4.00

Bookmark ☐

The differential equation $\frac{dy}{dx} = \sqrt{y}$ with initial condition $y(0) = 0$ has

- ☐ a unique solution
- ☐ infinitely many solutions
- ☐ no solution
- ☐ two distinct solutions

Question No.83

4.00

Bookmark ☐

Let W be the subspace of the vector space $\mathbb{R}^3$ generated by $(-3, 0, 1)$, $(1, 2, 1)$ and $(3, 0, -1)$. Then the dimension of W is

- ☐ 2
- ☐ 3
- ☐ 1
- ☐ 0

Question No.84

4.00

Bookmark ☐

Let $B = \{(x, y) \in \mathbb{R}^2 : x \geq 0, y \geq 0\}$. Then B is closed in $\mathbb{R}^2$ with usual topology because

- ☐ it is compact
- ☐ its complement is open
- ☐ it does not contain all its limit points
- ☐ it is connected

Question No.85

4.00

Bookmark ☐

Choose the correct meaning of the italicized idiom.
Sheela's work seems to be a *Penelope's web*.

- ☐ Declining
- ☐ Difficult
- ☐ In her best form
- ☐ Endless

Question No.86

4.00

Bookmark ☐

Good restaurants serving pure vegetarian food are very hard to _____.

- ☐ come by
- ☐ get in
- ☐ take to
- ☐ go through

Question No.87

4.00

Bookmark ☐

Let S be a non-empty Lebesgue measurable subset of $\mathbb{R}$ such that every subset of S is measurable. Then the measure of S is equal to the measure of any

- ☐ bounded subset of S
- ☐ subset of S
- ☐ countable subset of S
- ☐ closed subset of S

Question No.88

4.00

Bookmark ☐

The number of edges in a tree on n vertices is

- ☐ $n + 1$
- ☐ $n - 1$
- ☐ $n - 2$
- ☐ n

Question No.89

4.00

Bookmark ☐

Generalized coordinates are

- ☐ A set of independent coordinates excesses in number to describe completely the state of configuration of dynamical system
- ☐ A set of dependent coordinates excesses in number to describe completely the state of configuration of dynamical system
- ☐ A set of independent coordinates sufficient in number to describe completely the state of configuration of dynamical system
- ☐ A set of dependent coordinates sufficient in number to describe completely the state of configuration of dynamical system

Question No.90

4.00

Bookmark ☐

The value of the integral $\int_{|z|=4} \frac{dz}{z^2-1}$ is

- ☐ πi

☐ $-\pi i$

☐ $2\pi i$

☐ 0

Question No.91

4.00

Bookmark ☐

Which of the following statement is wrong?

- ☐ Every separable metric space is second countable
- ☐ Every separable space is second countable
- ☐ Every second countable space is separable
- ☐ Every second countable space is a lindelof space

Question No.92

4.00

Bookmark ☐

Find out the missing term:

1, 2, 3, 6, 11, 20, 37, 68, ?

- ☐ 126
- ☐ 105
- ☐ 124
- ☐ 125

Question No.93

4.00

Bookmark ☐

Choose the correct meaning of the italicized idiom.

He had great difficulty to *save his bacon* when he was blackmailed.

- ☐ Threaten somebody
- ☐ Put bacon in the refrigerator
- ☐ Escape death
- ☐ Save pork

Question No.94

4.00

Bookmark ☐

Let $\mathbb{R}$ be the field of real numbers and f be an automorphism of $\mathbb{R}$. Then for all $x \in \mathbb{R}$,

- ☐ $f(x) = x^2$
- ☐ $f(x) = -x$
- ☐ $f(x) = -x^2$
- ☐ $f(x) = x$

Question No.95

4.00

Bookmark ☐

The differential equation $|\frac{dy}{dx} + y| = 0, y(0) = 1$ has

- ☐ finite number of solutions
- ☐ unique solution
- ☐ no solution
- ☐ infinite number of solutions

Question No.96

4.00

Bookmark ☐

A bead slides on a wire in the shape of a cycloid described by the equations $x = a(\theta - \sin \theta)$
 $y = a(1 + \cos \theta)$
 where $0 \leq \theta \leq 2\pi$

- ☐ The kinetic energy of the bead is $ma^2 \theta^2$
- ☐ The potential energy of the bead is ma^2
- ☐ The equation of motion of the bead is $\theta^2(1 - \cos \theta)$
- ☐ The Lagrangian is $ma^2 \theta^2(1 - \cos \theta) - mga(1 + \cos \theta)$

Question No.97

4.00

Bookmark ☐

Choose the best antonym of the italicized word.
 Ravi and Raghu are really *obstinate* men.

- ☐ friendly
- ☐ understanding
- ☐ compliant
- ☐ considerate

Question No.98

4.00

Bookmark ☐

In the complex plane e^z assumes

- ☐ every value
- ☐ every positive value
- ☐ every value excepting zero
- ☐ every negative value

Question No.99

4.00

Bookmark ☐

Let $f(z) = \begin{cases} \frac{|z|}{\operatorname{Re} z} & \operatorname{Re} z \neq 0; \\ 0 & \operatorname{Re} z = 0. \end{cases}$

Then

- ☐ is neither continuous nor differentiable at $z = 0$
- ☐ has a non-zero limit as $z \rightarrow 0$
- ☐ is continuous but not differentiable at $z = 0$
- ☐ is differentiable at $z \rightarrow 0$

Question No.100

4.00

Bookmark ☐

A metric space is always

- ☐ separable
- ☐ first countable
- ☐ Lindelof
- ☐ second countable