

SECTION 1 - SECTION 1

Question No.1

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

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

Question No.2

The polynomial $f(x)=X^5+5$ is

- Irreducible over Q
- Not Irreducible over Q
- Irreducible over R
- Irreducible over C

Question No.3

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

- 7
- 1
- 8
- 28

Question No.4



- 8
- 6
- 4
- 12

Question No.5



- 6
- 2
- 3
- 1

Question No.6



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Question No.7

The function $f(x) = x|x|$ is

- differential at origin
- continuous but not differential at origin
- not continuous at origin
- Nowhere differentiable

Question No.8



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Question No.9

Using the transformation $u = W/y$ in the PDE $xu_x = u + yu_y$, the transformed equation has a solution of the form $W =$

- $f(x/y)$
- $f(xy)$
- $f(x + y)$
- $f(x - y)$

Question No.10



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Question No.11



- N is left ideal but not right ideal of R
- N is neither left nor right ideal of R
- N is left and right ideal of R
- N is right but not left ideal of R

Question No.12



A letter is known to have come either from TATANAGAR or from CALCUTTA on the envelope just two consecutive letters TA are visible. What is the probability that the letter came from CALCUTTA

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Question No.13



What is the maximum possible height of a binary tree on $2n+1$ ($n>0$) vertices?

- n
- n^2
- $n-1$
- $2n+1$

Question No.14



A bounded entire function is constant. This statement is

- Liouville's theorem
- Morera theorem
- Cauchy theorem
- Schwarz lemma

Question No.15



If n is the order of element a of group G then $a^n = e$, an identity element iff _____

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Question No.16



A continuous image of compact set is

- unbounded
- Compact
- may or may not be compact
- non-compact

Question No.17



Every bounded sequence of real numbers has

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

Question No.18



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Question No.19



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Question No.20



- > 3
- 6
- 5
- ≤ 3

Question No.21



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Question No.22



Which of the following statement is true?

- The repeating decimal represents integers
- The repeating decimal does not represents a rational number
- The repeating decimal represents an irrational number
- The repeating decimal represents a rational number

Question No.23



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Question No.24



If f is bounded entire function, then

- f is decreasing
- f is equal to zero

- f is constant
- f is increasing

Question No.25



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Question No.26

Which of the following is true

- A regular normal space is completely regular
- Continuous image of a T_2 space is a T_2 space
- Continuous image of a regular space is regular
- A regular space is always normal

Question No.27

It is 8:5 against the wife who is 40 years old living till she is 70 and 4:3 against her husband now 50 living till he is 80. Find the probability that both will be alive

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Question No.28



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Question No.29

If 'f' is a continuous mapping of a compact metric space X into a metric space Y, then

- f has a jump at $x=0$
- f is a step function
- f is not continuous
- f is uniformly continuous

Question No.30

If $(m, 3, 1)$ is a linear combination of vectors $(3, 2, 1)$ and $(2, 1, 0)$ in \mathbb{R}^3 , then the value of m is

- 1
- 5
- 2
- 1

Question No.31

The maximum degree of any vertex in a simple graph with 'P' vertices is

- p^2
- $P-1$
- $P(P-1)$
- $P+2$

Question No.32

If Mach number lies between 0.8

- none of these
- transonic
- sonic
- hypersonic

Question No.33

A sylow 3-subgroup of a group of order 12 has order

- 4
- 3
- 8
- 12

Question No.34

Which of the following is not normal

- A regular space
- Closed subspace of a normal space
- A metric space
- Euclidean space

Question No.35

Which of the following statement is wrong?

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

Question No.36



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

Question No.37

Generalized coordinates are

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

Question No.38

The eigenvalues of a Hermitian matrix are

- complex
- real
- purely imaginary
- rationals

Question No.39



A connected graph T without any cycle is called

- Circular graph
- Non cycle graph
- Tree graph
- Cycle graph

Question No.40



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Question No.41



Find the number of vertices are needed to construct a graph with 6 edges in which each of the vertex is of degree 2.

- 5
- 2
- 3
- 6

Question No.42



- a zero
- isolated essential singularity
- a pole
- non-isolated essential singularity

Question No.43



- f is continuous, but not differentiable anywhere.
- f is continuous
- f is differentiable everywhere
- f is not continuous

**Question No.44**

A topological space X is totally disconnected, if

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

Question No.45

If $c=(1\ 2\ 3\ 4)$ then c^2 is-----

- (2 4)
- (2 3) (3 1)
- (1 3) (2 4)
- (1 3)

Question No.46

Consider the polynomial ring $\mathbb{Q}[x]$. The ideal of $\mathbb{Q}[x]$ generated by x^2-3 is:

- both maximal and prime
- maximal but not prime
- neither maximal nor prime
- prime but not maximal

Question No.47

- 1
- 2
- 3
- 4

Question No.48

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

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**Question No.49**

If A is open set and B is a closed set in R, then

- B – A is semi open set
- B-A is closed
- B-A is null set
- B-A is open

Question No.50

The number non-isomorphic fields with exactly 6 elements is

- 2
- 1
- 3
- 0

Question No.51

- 1
- 0
- $\frac{3}{4}$
- $\frac{4}{3}$

Question No.52

- $154 A + 155 I$
- $309 A + 104 I$
- $511 A + 510 I$
- identity

Question No.53

The number of maximal ideals Z_{27} in is

- 2
- 3
- 0

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- 1

Question No.54



Let the characteristics equation of a matrix M be $\lambda^2 - \lambda - 1 = 0$, then

- M^{-1} does not exist
- $M^{-1} = M + 1$
- $M^{-1} = M - 1$
- M^{-1} but cannot determine from the data

Question No.55



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

Question No.56



The order of convergence of Rugula-False method for finding the root of transcendental and algebraic equations is

- 1.67
- 1.6
- 2
- none of these

Question No.57



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Question No.58



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Question No.59

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

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Question No.60



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Question No.61

A perfect set E of real number system R

- always contains a segment
- always contains no segment
- always a finite set
- may or may not contains a segment

Question No.62



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Question No.63

A function is analytic at all points of a bounded domain except at finitely many points, then these exceptional points are called

- poles
- singularities
- zeros
- simple points

Question No.64

The non-empty set of real numbers which is bounded below has _____

- Upper bound
- Supremum
- No lower bound
- Infimum

Question No.65



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Question No.66

The diagonal elements of skew-Hermitian matrix are _____

- Rational numbers
- Pure imaginary or zero
- Complex numbers
- Pure real numbers or zero

Question No.67



- I is a prime ideal but not maximal
- I is an ideal only
- I is a maximal ideal but not prime
- I is both maximal and prime

Question No.68

Measure of a set of real number is zero iff-

- the set is uncountable
- the set is empty
- the set is finite
- the set is countable

Question No.69



- pole
- removable singularity
- non-isolated singularity
- isolated singularity

Question No.70

A connected graph G is Eulerian iff

- Every point of G has odd degree
- Every point of G have exactly degree zero
- Every point of G has even degree
- Every point of G are end vertices

Question No.71

Let V and W be subspaces of \mathbb{R}^n . Then

- $\dim(V + W)$ must be $\dim V + \dim W$
- $\dim(V + W) < \min(\dim V, \dim W)$
- $\dim(V + W) > \dim V + \dim W$
- $\dim(V + W) \geq \max(\dim V, \dim W)$

Question No.72

Let $U = \{(a, b, c, d) \in \mathbb{R}^4 : a + c + d = 0, b + d = 0\}$ be a subspace of \mathbb{R}^4 , then dimension of U is

- 1
- 3
- 4
- 2

Question No.73



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

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

Question No.74



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Question No.75



- one-one but not onto
- neither one-one nor onto
- both one-one and onto
- onto but not one-one

Question No.76



Consider the function $f(x) = x(x-2)$, the derivative of its inverse function at $x = 0$ is

- $1/2$
- not exist
- $-1/2$
- 0

Question No.77



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Question No.78



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Question No.79



General solution of the PDE, $p - qy \log y = z \log y$ is

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Question No.80



Every real continuous function f on $[a,b]$ is

- Measurable
- Differentiable
- Not Measurable
- a Constant function

Question No.81



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Question No.82



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**Question No.83**

Let D be an integral domain with unity and I be an ideal of D then

- If I is prime the D/I is field
- If I is maximal then D/I is not a field
- If I is prime then I is maximal
- If I is maximal then I is prime

Question No.84

Let n be a positive integer and a is an integer relatively prime to n . Then

**Question No.85**

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

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

Question No.86

The number of elements in the set $\{m : 1 \leq m \leq 1000, m \text{ and } 1000 \text{ are relatively prime}\}$ is

- 300
- 250
- 100
- 400

Question No.87

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Question No.88

The series $1.x + 1.2.x^2 + 1.2.3x^3 + \dots$ is

- none of these
- convergent everywhere except at $x = 0$
- divergent for $x = 0$
- divergent everywhere except at $x = 0$

Question No.89



- an irregular point
- a branch point
- a regular singular point
- an ordinary point

Question No.90



- 5 and 5
- 1 and 25
- 1 and 5
- 6 and 4

Question No.91



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Question No.92



- 3
- 2
- 4
- 1

Question No.93



- $V = A - B$
- $V = A \cdot B$
- none of these
- $V = A + B$

Question No.94



If $T: \mathbb{R}^2 \rightarrow \mathbb{R}$ is a linear mapping for which $T(1, 1) = 2$ and $T(0, 1) = -2$, then $T(\alpha, \beta)$ is equal to

- $4\alpha + 2\beta$
- $4\alpha - 2\beta$
- -2β
- $4\beta - 2\alpha$

Question No.95



An integer monic polynomial is a _____

- polynomial with lowest coefficient is 0
- Non-primitive polynomial
- polynomial without lowest coefficient as 1
- Primitive polynomial

Question No.96



A complete metric space which is not compact is _____

- $[0, 1]$
- $(0, 1)$
- \mathbb{R}
- \mathbb{Q}

Question No.97



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Question No.98



How many normal subgroup does a non-abelian group G of order 21 have other than the identity subgroup and G ?

- 7
- 1
- 0
- 3

Question No.99



The function $f(z) = |z|^2$ is

- everywhere differentiable
- nowhere continuous
- continuous everywhere but nowhere differentiable except at origin
- nowhere differentiable

Question No.100



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