Answer Key :Maths

Type: Maths

1) If u=√(x^2+y^2+z^2) , then (∂^2 u)/(∂x^2)+(∂^2 u)/(∂y^2)+(∂^2 u)/(∂z^2) is equal to

Options:

- 1.4u
- 2.2/u
- 3.2u
- 4.-u/2

Correct Option: 2

Type: Maths

2) The volume of the solid generated by the revolution of finite region bounded by the curve y=x^2+1 and y=5 about the line x=3 is

Options:

- 1.9π
- 2.25π
- 3.64π
- 4.9π/25

Correct Option: 3

Type: Maths

3) Ques is:

The integral $\oint_C (ydx - xdy)$ is evaluated along the circle, $x^2 + y^2 = \frac{1}{4}$ traversed in counter clockwise direction. The integral is equal to

Options:

- 1.0
- 2.(-π)/4
- 3.(-π)/2
- 4.π/4

Correct Option: 3

Type: Maths

4) Ques is:

Let $A = \begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix}$. Then the smallest positive integer n such that $A^n = I$ is

Options:

- 1.1
- 2.2
- 3.4
- 4.6

Correct Option: 4

Type: Maths

5) Ques is:

Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & 1 & 1 \\ 2 & 3 & a \end{bmatrix}$ and $B = \begin{bmatrix} 1 \\ 3 \\ b \end{bmatrix}$. Then the system $AX = B$ over the real numbers has

Options:

- 1.no solution whenever b≠7
- 2.an infinite number of solutions whenever a≠2
- 3.an infinite number of solutions whenever a=2 and b≠7
- 4.a unique solution if a≠2

Correct Option: 4

Type: Maths

6) Which of the following subsets of R^4 is a basis of R^4? B_1={(1,0,0,0),(1,1,0,0),(1,1,1,0),(1,1,1,1)} B_2={(1,0,0,0),(1,2,0,0),(1,2,3,0),(1,2,3,4)} B_3={(1,2,0,0),(0,0,1,1),(2,1,0,0),(5,-5,0,0)}

Options:

- 1.B_1 and B_2 but not B_3
- 2.B_1 , B_2 and B_3
- 3.B_1 and B_3 but not B_2
- 4.Only B_1

Correct Option: 1

Type: Maths

7) Consider R^3 with the standard inner product. Let W be a subspace of R^3 spanned by (1,0,-1). Which of the following is a basis for orthogonal complement of W?

Options:

- 1.{(1,0,1),(0,1,0)}
- 2.{(1,2,1),(0,1,1)}
- 3.{(2,1,2),(4,2,4)}
- 4.{(2,-1,2),(1,3,1),(-1,-1,-1)}

Correct Option: 1

Type: Maths

8) Let A be a closed subset of R, A≠∅, A≠R. Then A is

Options:

- 1.the closure of the interior of A
- 2.a countable set
- 3.a compact set
- 4.not open

Correct Option: 4

Type: Maths

9) Qus is:

The power series $\sum_{n=0}^{\infty}\left[\frac{2+(-1)^n}{3^n}\right]^n x^n$ converges

Options:

- 1.only for x=0
- 2.for all x∈R
- 3.only for -1<x<1
- 4.only for -1<x≤1

Correct Option: 2

Type: Maths

10) The function f:C→C defined by f(z)=e^z+e^(-z) has

Options:

- 1.finitely many zeros
- 2.non zeros
- 3.only real zeros
- 4.infinitely many zeros

Correct Option: 4

Type: Maths

11) Ques is:

A function $f : \mathbb{C} \to \mathbb{C}$ is said to be analytic at ∞, if the function g defined by $g(w) = f\left(\frac{1}{w}\right)$ is analytic at 0 with an appropriate value given for $g(0)$. Which of the following statement is true?

Options:

- 1.Any non-constant polynomial is analytic at ∞
- 2.For any z_0 in C , the function f(z)= (1/(e^(z-z_0) is analytic at ∞
- 3.If f is analytic at ∞ then lim_(z→∞) 〖f(z)〗 exists and finite
- 4.Any entire function can be extended to an analytic function at ∞

Correct Option: 3

Type: Maths

12) Let f be a non -constant entire function. Which of the following properties is possible for f for each z∈C ?

Options:

- 1.Re f(z)=Im f(z)
- 2.|f(z)|<1
- 3.Im f(z)<0
- 4.f(z)≠0

Correct Option: 4

Type: Maths

13) Let S_7 denote the group of permutations of the set {1,2,3,4,5,6,7}. Which of the following is true ?

Options:

- 1.There are no elements of order 6 in S_7
- 2.There are no elements of order 7 in S_7
- 3.There are no elements of order 8 in S_7
- 4.There are no elements of order 10 in S_7

Correct Option: 3

Type: Maths

14) The total number of non - isomorphic groups of order 122 is

Options:

- 1.2
- 2.1
- 3.61
- 4.4

Correct Option: 1

Type: Maths

15) In the group of all invertible 4 x 4 matrices with entries in the field of 3 elements and 3-sylow subgroup has cardinality

Options:

- 1.3
- 2.81
- 3.243
- 4.729

Correct Option: 4

Type: Maths

16) Let R be a commutative ring with unity. Which of the following is true?

Options:

- 1.If R is finitely many prime ideals, then R is a field.
- 2.If R has finitely many ideals, then R is finite
- 3.If R is a P.I.D., then every subring of R with unity is a P.I.D.
- 4.If R is an integral domain which has finitely many ideals, then R is a field

Correct Option: 4

Type: Maths

17) Ques is:

The boundary value problem $x^2y'' - 2xy' + 2y = 0$, subject to the boundary conditions $y(1) + \alpha y'(1) = 1, y(2) + \beta y'(2) = 2$ has a unique solution if

Options:

- 1.α= -1, β= 2
- 2.α= -1, β= -2
- 3.α= -2, β= 2

- 4.α= -3, β= 2/3

Correct Option: 1

Type: Maths

18) Ques is:

The differential equation
$\frac{dy}{dx} = 60(y^2)^{1/5}\ ;\ x > 0, y(0) = 0$ has

Options:

- 1.a unique solution
- 2.Two solutions
- 3.no solution
- 4.Infinite number of solutions

Correct Option: 4

Type: Maths

19) Ques is:

The solution of the Cauchy problem for the first order PDE $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = z$, on $D = \{(x, y, z) | x^2 + y^2 \neq 0, z > 0\}$ with the initial condition $x^2 + y^2 = 1, z = 1$ is

Options:

- 1.z=x^2+y^2
- 2.z=(x^2+y^2)^2
- 3.z=(2 - (x^2+y^2))^(1/2)
- 4.z=(x^2+y^2)^(1/2)

Correct Option: 4

Type: Maths

20) Ques is:

Let $P(x, y)$ be a particular integral of the partial differential equation $\frac{\partial^2 z}{\partial x^2} - \frac{\partial z}{\partial y} = 2y - x^2$. Then $P(2, 3)$ equals

Options:

- 1.2
- 2.8
- 3.12
- 4.10

Correct Option: 3

Type: Maths

21) Ques is:

Let $u(x,t)$ be a smooth solution to the following wave equation
$\frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial x^2} = 0$ for $(x,t) \in \mathbb{R}^2$
Which of the following is False?

Options:

- 1.u(x-θ,t) also solves the wave equation for any fixed θ∈R
- 2.∂u/∂x also solves the wave equation
- 3.u(3x,9t) also solves the wave equation
- 4.u(3x,3t) also solves the wave equation

Correct Option: 3

Type: Maths

22) Ques is:

Compute the value of variable x_2 at the 2nd iteration of Jacobi method for the following system of linear equations

$$4x_1 + 2x_2 - x_3 = 3$$
$$2x_1 - 6x_2 + x_3 = 7$$
$$-3x_1 + 2x_2 + 8x_3 = 4$$

Consider the initial approximation $x_1(0)^{\square} = 1, x_2(0)^{\square} = 1, x_3(0)^{\square} = 1$.

Options:

- 1.0.885714
- 2.0.895833
- 3.-0.895833
- 4.-0.885714

Correct Option: 3

Type: Maths

23) The value of integration ∫_0^1 〖1/(1+x) dx〗 by Simpson1/3 rule with 4 subintervals is

$$\int_0^1 \frac{1}{1+x}\,dx$$

Options:

- 1.0.697024
- 2.0.694444
- 3.0.693254
- 4.0.693147

Correct Option: 3

Type: Maths

24) Number of iterations required by Bisection method to achieve the accuracy 0.005 in solving equation x^3-3=0 in the interval [1,2], is around

Options:

- 1.8
- 2.9
- 3.6
- 4.7

Correct Option: 1

Type: Maths

25) Ques is:

Let $f = \mathbb{R}^n \to \mathbb{R}$ be a linear map $f(0, \ldots, 0) = 0$.
Then the set $\{f(x_1, x_2, \ldots, x_n): \sum_{j=1}^{n} x_j^2 \leq 1\}$ equals

Options:

- 1.[-a, a] for some a∈R,a≥0
- 2.[0, 1]
- 3.[0, a] for some a∈R,a≥0
- 4.[a, b] for some a,b ∈R,0≤a<b

Correct Option: 1

Type: Maths

26) Ques is:

Let V denote the vector space for all sequence $a = (a_1, a_2, \ldots)$ of real numbers such that $\sum 2^n |a_n|$ converges.
Define $\|.\|: V \to \mathbb{R}$ by $\| a \| = \sum 2^n |a_n|$. Which of the following are true?

Options:

- 1.V contains only the sequence (0,0,…)
- 2.V is finite dimensional
- 3.V has a countable linear basis
- 4.V has a complete normed space

Correct Option: 4

Type: Maths

27) Ques is:

Which of the following subsets of $\mathbb{R}^n$ is compact (with respect to the usual topology of $\mathbb{R}^n$)?

Options:

- 1. $\{(x_1,x_2,\ldots,x_n):|x_i|<1,1\leq i\leq n\}$
- 2. $\{(x_1,x_2,\ldots,x_n):x_1+x_2+\cdots x_n=0\}$
- 3. $\{(x_1,x_2,\ldots,x_n):x_i\geq 0,1\leq i\leq n\}$
- 4. $\{(x_1,x_2,\ldots,x_n):1\leq x_i\leq 2^i,1\leq i\leq n\}$

Correct Option: 4

Type: Maths

28) Let A be a nonempty subset of a topological space X. Which of the following statements is true?

Options:

- 1.If A is connected, then its closure $\bar{A}$ is not necessarily connected
- 2.If A is path connected, then its closure $\bar{A}$ is path connected.
- 3.If A is connected, then its interior is not necessarily connected.
- 4.If A is connected, then its interior is connected.

Correct Option: 3

Type: Maths

29) Which of the following is not correct?

Options:

- 1.Degeneracy in an LPP may arise at the initial stage.
- 2.A degeneracy solution can never be optimum.
- 3.Degeneracy may be a temporary phenomenon.
- 4.The big- M method and the Two- phase method do not require the same number of iteration for solving an LPP.

Correct Option: 2

Type: Maths

30) In an assignment problem, the minimum number of lines covering all zeros in a reduced cost matrix of order n can be

Options:

- 1.at the most n
- 2.at the least n
- 3.n - 1
- 4.n + 1

Correct Option: 1