

PPSC LECTURER MATH (2017)

Available questions

1. A cyclic group of order n is generated by
(A) n elements (B) $(n-1)$ elements (C) 1 element (D) None of these
2. Let G be a group of order 13.
(A) G is not cyclic (B) G is Non abelian (C) G is commutative (D) None of these
3. Identity element in a cyclic group is
(A) Infinite (B) Unique (C) Prime number (D) None of these
4. $\forall a, b \in G, (ab)^2 = a^2b^2$ then
(A) G is cyclic (B) G may be Abelian (C) G is abelian (D) None of these
5. Which of the following statement is correct.
(A) A group can have more than one identity element
(B) The Null set can be considered to be a group
(C) The set of all real numbers is a group under subtraction
(D) To each element of a group there corresponds only one inverse element.
6. The unit matrix of order n has rank:
(A) zero (B) n (C) 1 (D) None of these
7. If determinant $|A|=2$ then $|A|^5$
(A) 12 (B) 32 (C) 60 (D) None of these
8. If $\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$ is invertible under matrix multiplication then its inverse is:

(A) $\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$ (B) $\frac{1}{a^2+b^2} \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$
(C) $\frac{1}{a^2+b^2} \begin{bmatrix} a & b \\ -b & a \end{bmatrix}$ (D) $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$
9. A homogeneous system of linear equations has a non trivial solution if:
(A) The number of unknowns exceeds the number of equations
(B) The number of equations exceeds the number of unknowns
(C) The number of unknowns proceeds the number of equations
(D) None of these
10. A Square matrix A such that $A^2=A$ is called
(A) Involutary (B) Idempotent (C) Nilpotent (D) Symmetric
11. Cofactors of the elements of second row of the determinant $\begin{bmatrix} 1 & 2 & 3 \\ -4 & 3 & 6 \\ 2 & -7 & 9 \end{bmatrix}$
(A) -39, 3, 11 (B) 6, 5, 4 (C) 3, 11, -39 (D) 13, 1, 3

12. A system of m homogeneous linear equations $AX=O$ has a non trivial solution if and only if
 (A) Rank $A = n$ (B) Rank $A < n$ (C) Rank $A > n$ (D) None of these
13. The intersection of two infinite sets :
 (A) Always infinite (B) Always finite (C) May not be infinite (D) None of these
14. Least upper bound of a set, if exists is:
 (A) Infinite (B) Finite (C) Unique (D) Always in fraction
15. The greatest lower bound of a set:
 (A) Always belong to set (B) Not belong to set
 (C) May or may not belong to set (D) None of these
16. If $a, b \in R$ then:
 (A) $|ab| > |a||b|$ (B) $|ab| \geq |a||b|$ (C) $|ab| < |a||b|$ (D) $|ab| \leq |a||b|$
17. A convergent sequence converges to :
 (A) A unique limit (B) Many limits (C) Any two limits (D) None of these
18. Every pair of real numbers a and b satisfies one and only one of the conditions:
 $a > b, a = b, b < a$. This property of real numbers is known as:
 (A) Transitive law (B) Associative law (C) Trichotomy law (D) Commutative law
19. $1 + z + \frac{z^2}{2!} + \frac{z^3}{3!} + \dots$ converges to:
 (A) e^z (B) e^{-z} (C) $-ze^z$ (D) None of these
20. The degree of the differential equation of all tangent lines to the parabola $y^2=4ax$ is
 (A) 3 (B) 1 (C) 2 (D) 4
21. The order of differential equation is defined as :
 (A) The highest degree of variable (B) The order of highest derivative
 (C) The power of variable in the solution (D) None of these
22. The Differential equation $(1 - x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + n(n+1)y = 0$ is
 (A) Bessel equation (B) Legendre equation
 (C) Poisson Equation (D) None of these
23. If a and b are parallel or anti-parallel vectors ,then
 (A) $a \times b = 0$ (B) $a \times b = -b \times a = b$ (C) $a \times b = 0$ (D) None of these
24. The Vector equation of a line through a point with position vector 'a' and parallel to a vector 'b' is (t is scalar) .
 (A) $r = ta + b$ (B) $r = a + tb$ (C) $r = (1-t)a + tb$ (D) None of these
25. If a and b are unit vectors and θ is the angle between them, then value of $|\cos\frac{\theta}{2}| =$
 (A) $\frac{1}{2}|a + b|$ (B) $\frac{1}{2}|a - b|$ (C) $|\frac{a-b}{a+b}|$ (D) $|\frac{a+b}{a-b}|$

26. The work done by the force $F = 2i - j - k$ through a displacement $r = 3i + 2j - 5k$ is
 (A) 3 (B) 6 (C) 9 (D) 12
27. Any three vectors A, B, C are coplanar if and only if:
 (A) $A \cdot (B \times C) = 0$ (B) $A \times (B \cdot C) = 0$ (C) $A \cdot (B \cdot C) = 0$ (D) $A \times (B \times C) = 0$
28. The vectors $2i - j + k$ and $3i - 4j - 4k$ are:
 (A) Parallel (B) Collinear (C) Coplanar (D) None of these
29. If the angle between the vectors is $\frac{\pi}{4}$ then value of $\frac{a \times b}{a \cdot b}$ is equal to.
 (A) 1 (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{1}{\sqrt{2}}$ (D) $\frac{1}{2}$
30. If a and b are the vectors such that $a \cdot b = 0$ and $a \times b = 0$ then
 (A) a and b are parallel vectors (B) a and b are mutually perpendicular vectors
 (C) a and b are zero vectors (D) None of these
31. The Volume of Parallelepiped with sides $a = 6i - 2j$ $b = j + 2k$ $c = i + j + k$ is
 (A) 3 Cubic Units (B) 10 Cubic Units (C) 15 Cubic Units (D) 20 Cubic Units
32. A particle of mass m moves in a circle of radius r with constant speed v, the force F acting on the particle is:
 (A) $F = \frac{mv}{r^2}$ (B) $F = \frac{mv^2}{r^2}$ (C) $F = \frac{mv^2}{r}$ (D) None of these
33. The center of mass of a thin rod of a length ℓ is:
 (A) $\frac{\ell}{4}$ (B) $\frac{\ell}{3}$ (C) $\frac{\ell}{2}$ (D) None of these
34. The centre of mass of a semi circular lamina $x^2 + y^2 = a^2$ in the upper half lies on :
 (A) The Origin (B) x-axis (C) y-axis (D) None of these
35. Moment of inertia of uniform solid sphere of a radius a and mass M about a diameter is
 (A) $\frac{1}{2} Ma^2$ (B) $\frac{1}{3} Ma^2$ (C) Ma^2 (D) $\frac{2}{5} Ma^2$
36. If the radial and transverse velocities of a particle be non zero constants, then path described by particle is:
 (A) Ellipse (B) A Spiral (C) A Circle (D) None of these
37. The path described by a particle moving with zero velocity and acceleration is a:
 (A) Circle (B) Straight line (C) Point (D) None of these
38. Any body of 4Kg falls freely from rest at a height of 4.9 m. The momentum of body when it hits the ground is:
 (A) 39 Kg m/s (B) 39.8 Kg m/s (C) 39.2 Kg m/s (D) None of these
39. If F is the magnitude of friction R is normal reaction and μ the coefficient of friction, then
 (A) $FR = \mu$ (B) $F = \mu R$ (C) $F = \frac{\mu}{R}$ (D) None of these

40. The power set $P(X)$ of a non empty set X is :
 (A) The smallest topology on X (B) The largest topology on X
 (C) Not a topology on X (D) None of these
41. If T_1 and T_2 are topologies on X such that $T_1 \subseteq T_2$ then
 (A) T_2 is said to be finer than T_1 (B) $T_2 \subseteq T_1$
 (C) T_1 is said to be finer than T_2 (D) None of these
42. A point $x \in A$ is said to be interior point of A if there exist an open set U such that
 (A) $x \in U \subseteq A$ (B) $(A \cap U) \setminus \{x\} = \emptyset$ (C) $U \subseteq A$ (D) None of These
43. A subset A of a topological space X is said to be dense if:
 (A) $\bar{A} = A$ (B) $\bar{A} = \emptyset$ (C) $\bar{A} = X$ (D) None of these
44. A point x of a topological space X is said to be a limit point of a subset A of X if for every open set U containing x we have:
 (A) $(A \cap U) \setminus \{x\} = \emptyset$ (B) $(A \cap U) \setminus \{x\} \neq \emptyset$ (C) $(A \cap U) = \emptyset$ (D) None of these
45. Which of the following statement is true?
 (A) An isolated point of A is always a limit point of A (B) An isolated point can never be limit point
 (C) limit point of A belongs to compliment of A (D) None of these
46. Let $X = \{a, b, c\}$ and $T = \{\emptyset, X, \{b\}, \{a, d\}, \{a, b, d\}, \{a, c, d, e\}\}$ if $A = \{a, b, c\}$ then $\text{Int}(A) =$
 (A) $\{a\}$ (B) $\{b\}$ (C) $\{c\}$ (D) None of these
47. A sequence $\{x_n\}$ of the points of metric space X is said to be convergent to $x \in X$ if for each $\varepsilon > 0$ there exist a positive integer n_0 such that $n > n_0$
 (A) $d(x_n, x) < \varepsilon$ (B) $d(x_n, x) \leq \varepsilon$ (C) $d(x_n, x) > \varepsilon$ (D) None of these
48. Area of parallelogram with base x and altitude y is
 (A) $x+y$ (B) $x-y$ (C) xy (D) None of these
49. If the external angle of parallelogram is 120° then its adjacent angle is
 (A) 60° (B) 45° (C) 90° (D) None of these
50. For the standard linear equation $ax+b = 0$
 (A) $a \neq 0, b = 0$ (B) $a = 0, b \neq 0$ (C) Both A and B (D) None of these
51. Degree of the polynomial $P(x) = 5x^4y^2 + 3x^2 + 5y$ is
 (A) 4 (B) 6 (C) 8 (D) 2
52. When a polynomial is divided by its factor then remainder is equal to:
 (A) 1 (B) 0 (C) Negative integer (D) None of these
53. Normal and Tangent of a Circle at the point of Contact are
 (A) Parallel (B) Perpendicular (C) Both A and B (D) None of these

54. External angle of regular octagon is
 (A) 45° (B) 60° (C) 30° (D) 90°
55. $\lim_{x \rightarrow \infty} \frac{\sin 2x}{x} =$
 (A) 2 (B) 0 (C) Does not exist (D) 1
56. The curve $x^4 + y^4 - 2x^2 - 2y^2 + 1 = 0$ has singular points
 (A) 4 (B) 2 (C) 1 (D) 3
57. The Asymptotes of the curve $y = x^3$ is
 (A) $y = x$ (B) $y = 0$ (C) $x = 0$ (D) None of these
58. The Latusrectum of Parabola $y^2 = 4ax$
 (A) $2a$ (B) $-2a$ (C) $4a$ (D) a
59. The equation $ax^2 + by^2 + 2gx + 2fy + c = 0$ represents
 (A) Parabola (B) Hyperbola (C) Ellipse (D) None of these
60. If a complex number lies in 2^{nd} quadrant then its conjugate lies in which quadrant??
 (A) 1^{st} (B) 2^{nd} (C) 3^{rd} (D) 4^{th}
61. Degree and Order of differential equation $1 + (y')^2 = y$ is
 (A) 1,2 (B) 1,1 (C) 2,1 (D) 2,2
62. The general solution of 3^{rd} order differential equation contains _____ number of arbitrary constants.
 (A) 1 (B) 2 (C) 3 (D) 4
63. The selling price of an article is Rs 118 and profit is 50 . What would be the cost price?
 (A) 78 (B) 77.66 (C) 80 (D) 78.66
64. A boat can travel with the speed of 13 Km/h in water, if the speed of stream is 4Km/h at what time the boat to go 68 Km down stream?
 (A) 3 hours (B) 4 hours (C) 5 hours (D) 2 hours

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