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Way to Knowledge

PPSC LECTURER MATHEMATICS - 2017

1. **The differential equation $(1 - x^2)y'' - 2xy' + n(n + 1)y = 0$ is:**
    (A) Bessel equation   (B) Legendre equation
    (C) Poisson equation   (D) None of these

2. **If a and b are parallel or anti parallel, then:**
    (A) $\underline{a} \times \underline{b} \neq 0$ (B) $\underline{a} \times \underline{b} = -\underline{b} \times \underline{a} = \underline{b}$
    (C) $\underline{a} \times \underline{b} = 0$ (D) None of these

3. **The vector equation of a line through a point with position vector a and parallel to vector b is (t is any scalar)**
    (A) $\underline{r} = t\underline{a} + \underline{b}$ (B) $\underline{r} = \underline{a} + t\underline{b}$
    (C) $\underline{r} = (1 - t)\underline{a} + t\underline{b}$ (D) None of these

4. **The angle between the vectors a and b is $\frac{\pi}{4}$, then $\frac{a \times b}{a\,b}$ is equal to:**
    (A) 1 (B) $1/\sqrt{2}$
    (C) $\sqrt{\frac{3}{2}}$ (D) $\frac{1}{2}$

5. **If a and b are unit vectors and θ is the angle between them, then the value of $\left|cos\ \frac{\theta}{2}\right|$ is:**
    (A) $\frac{1}{2}|a + b|$ (B) $\frac{1}{2}|a - b|$
    (C) $\left|\frac{a-b}{a+b}\right|$ (D) $\left|\frac{a+b}{a-b}\right|$

6. **The work done by a force $\overline{F} = 2\hat{\imath} - \hat{\jmath} - \hat{k}$ through a displacement $\overline{r} = 3\hat{\imath} + 2\hat{\jmath} - 5\hat{k}$ is:**
    (A) 3   (B) 6
    (C) 9   (D) 12

7. **Any three vectors $\overline{A}, \overline{B}$ and $\overline{C}$ are coplanar if and only if:**
    (A) $\overline{A}.\left(\overline{B} \times \overline{C}\right) = 0$ (B) $\overline{A} \times \left(\overline{B}.\overline{C}\right) = 0$
    (C) $\overline{A}.\left(\overline{B}.\overline{C}\right) = 0$ (D) $\overline{A} \times \left(\overline{B} \times \overline{C}\right) = 0$

8. **The vectors $2\hat{\imath} - \hat{\jmath} + \hat{k}$ and $3\hat{\imath} - 4\hat{\jmath} - 4\hat{k}$ are:**
    (A) Parallel   (B) Collinear
    (C) Coplanar   (D) None of these

9. **If a and b are vectors such that $\underline{a}.\underline{b} = 0$ and $\underline{a} \times \underline{b} = 0$, then:**
    (A) a and b are parallel   (B) a and b are mutually perpendicular
    (C) a and b are zero vector   (D) None of these

10. **The volume of the parallelopiped with sides $\overline{A} = 6\hat{\imath} - 2\hat{\jmath}$, $\overline{B} = \hat{\jmath} + 2\hat{k}$, $\overline{C} = \hat{\imath} + \hat{\jmath} + \hat{k}$ is:**
    (A) 3 cubic units   (B) 10 cubic units
    (C) 15 cubic units   (D) 20 cubic units

11. **A particle of mass m movies 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

12. **The centre of mass of a thin rod of a length l is:**
    (A) $\frac{l}{4}$ (B) $\frac{l}{3}$
    (C) $\frac{l}{2}$ (D) None of these

13.   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

14.   The moment of inertia of uniform solid sphere of 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) $\frac{2}{5}Ma^2$

15.   If the radial and transverse velocities of a particle be non-zero constants, then the path described by the particle is:
       (A) An ellipse   (B) A spiral
       (C) A circle   (D) None of these

16.   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

17.   A body of 4kg falls freely from rest at a height of 4.9m. The momentum of a body when it hits the ground is:
       (A) $39.6 \ kg \ m/s$ (B) $39.8 \ kg \ m/s$
       (C) $39.2 \ kg \ m/s$ (D) None of these

18.   The escape velocity of the body to leave the Earth's gravitational field is given by:
       (A) $R\sqrt{2g}$ (B) $\sqrt{2gR}$
       (C) $\sqrt{\frac{2g}{R}}$ (D) None of these

19.   If F is the magnitude of friction, R that of normal reaction and μ the coefficient of friction, then
       (A) $FR = \mu$ (B) $F = \mu R$
       (C) $F = \mu\sqrt{R}$ (D) None of these

20.   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

21.   If τ_1 and τ_2 are two topologies on X such that $\tau_1 \subseteq \tau_2$, then:
       (A) τ_2 is said to be finer than τ_1 (B) $\tau_2 \subseteq \tau_1$
       (C) τ_1 is said to be coarser than τ_2 (D) None of these

22.   A point $x \in A$ is said to be an interior point of A if there exists an open set U such that:
       (A) $\{A \cap U\}\backslash\{x\} = \emptyset$ (B) $A \cap U = \emptyset$
       (C) $U \subseteq A$ (D) None of these

23.   A subset A of a topological space X is said to be dense in X if:
       (A) $\overline{A} = A$ (B) $\overline{A} = \emptyset$
       (C) $\overline{A} = X$ (D) None of these

24.   A point x of a topological space X is said to be the limit point of a subset A of X if every open set U containing x, we have:
       (A) $\{A \cap U\}\backslash\{x\} = \emptyset$ (B) $A \cap U = \emptyset$
       (C) $\{A \cap U\}\backslash\{x\} \neq \emptyset$ (D) None of these

25.   Which of the following statement is true?
       (A) The limit point of a set A is always a point of A
       (B) The limit point of a set A may or may not be the point of A
       (C) The limit point of a set A always belonging to the compliment of A
       (D) None of these

26.   **A point $x \in A$ is said to be an isolated point of A if there exists an open set U containing x such that:**
(A) $A \cap U = \{x\}$ (B) $A \cap U = \emptyset$
(C) $A \subset U$ (D) None of these

27.   **Which of the following statement is true?**
(A) An isolated point of A is always a point of A
(B) An isolated point of A can never be the limit point of A
(C) The limit point of a set A always belongs to the compliment of A
(D) None of these

28.   **The set $X = \{a, b, c, d, e\}$ with topology $\tau = \{\emptyset, \{b\}, \{a, d\}, \{a, b, d\}, \{a, c, d, e\}, X\}$, If $A = \{a, b, c\}$, then:**
(A) $A^\circ = \{a\}$ (B) $A^\circ = \{b\}$
(C) $A^\circ = \{c\}$ (D) None of these

29.   **A sequence $\{x_n\}$ of points of a metric space X is said to be convergent to $x \in X$. If for each $\varepsilon > 0$, there exists a positive integer n_o, such that $n \geq n_o$**
(A) $d(x_n, x) < \varepsilon$ (B) $d(x_n, x) = \varepsilon$
(C) $d(x_n, x) > \varepsilon$ (D) None of these

30.   **Area of a parallelogram with base x and altitude y is:**
(A) xy (B) $x + y$
(C) $2x + 2y$ (D) None of these

31.   **$\underline{\{10\}}$ are the lengths of sides of:**
(A) Right triangle   (B) Equilateral triangle
(C) Obtuse triangle   (D) None of these

32.   **If the external angle of the parallelogram is $120°$. Then its adjacent internal angle is:**
(A) $45°$ (B) $50°$
(C) $60°$ (D) None of these

33.   **The standard linear equation $ax + b = 0$**
(A) $a \neq 0, b = 0$ (B) $a = 0, b \neq 0$
(C) $a \neq 0, b \neq 0$ (D) None of these

34.   **The degree of the polynomial $5x^4 y^2 + 3x^2 + 5y$ is:**
(A) 4   (B) 3
(C) 6   (D) None of these

35.   **If the polynomial is divided by its factor, the remainder is equal to:**
(A) 0   (B) 2
(C) A negative number   (D) None of these

36.   **The normal and the tangent of a circle at the point of contacts are:**
(A) Perpendicular   (B) Parallel
(C) Not parallel   (D) None of these

37.   **The external angle of a regular octagon is:**
(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$
(C) $\frac{\pi}{2}$ (D) None of these

38. The value of $\displaystyle\lim_{x \to \infty} \frac{\sin 2x}{x}$ is:

(A) 0   (B) 1

(C) ∞ (D) -1

39. If $f(x) = \frac{1}{x^2 - 3x + 2}$, then range of f is:

(A) $\mathbb{R}$ (B) $\mathbb{R} - \{1, 2\}$

(C) $\mathbb{R}^+$ (D) None of these

40. $\int log\ x\ dx = $:

(A) $x(\log x - 1) + c$ (B) $\log x + c$

(C) $x + c$ (D) None of these

41. $\displaystyle\int \frac{1 - \sin 2x}{\cos 2x} dx = $:

(A) $\log(\sin x + \cos x) + c$ (B) $\log(\sin x - \cos x) + c$

(C) $\log(\cos x - \sin x) + c$ (D) None of these

42. The normal equation of the parabola $yz = 4ax$ and its latus rectum is:

(A) $\frac{1}{3} a^2$ (B) $\frac{2}{3} a^2$

(C) $\frac{4}{3} a^2$ (D) None of these

43. If the complex number lies in the third quadrant then its conjugate lies in the quadrant:

(A) First   (B) Second

(C) Third   (D) None of these

44. The center of sphere $x^2 + y^2 + z^2 + 2x + 4y + 9z + 13 = 0$ is the point:

(A) $\left(-1, -2, -\frac{9}{2}\right)$ (B) $\left(-1, -2, \frac{9}{2}\right)$

(C) $(1, 2, 3)$ (D) None of these

45. $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ is the equation of:

(A) Paraboloid   (B) Hyperboloid

(C) Ellipsoid   (D) None of these

50. The curve $x^4 + y^4 - 2x^2 - 2y^2 + 1 = 0$ has singular points:
(A) Two
(B) Three
(C) Four
(D) None of these

51. The asymptote to the curve $y = x^2$ is:
(A) $y = 0$
(B) $x = 0$
(C) $y = x$
(D) None of these

52. The equation $ax^2 + ay^2 + 2gx + 2fy + c = 0$ represents:
(A) General equation of parabola
(B) General equation of ellipse
(C) Hyperbola
(D) None of these

53. Angle b/w the straight lines L: $\frac{x-2}{1} = \frac{z+1}{1}$, M: $\frac{x-3}{1} = \frac{y-3}{-1} = \frac{z+1}{3}$
(A) $40°$
(B) $40.1°$
(C) $40.2°$
(D) None of these

54. A cyclic group of order n is generated by:
(A) n elements
(B) $(n-1)$ elements
(C) One element
(D) None of these

55. Let G be a group of order 13, then
(A) G is not cyclic
(B) G is non-abelian
(C) G is commutative
(D) None of these

56. Identity element in a cyclic group is:
(A) Infinite
(B) Unique
(C) Prime number
(D) None of these

57. $\forall\, a, b \in G$, $(ab)^2 = a^2 b^2$ then:
(A) G is cyclic
(B) G may be abelian
(C) G is abelian
(D) None of these

58. 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 with respect to subtraction
(D) To each elements of a group there corresponds only one inverse element.

59. The unit matrix of order n has rank:
(A) zero
(B) n
(C) 1
(D) None of these

60. If determinant $|A| = 2$, then
(A) $|A^4| = 12$
(B) $|A^5| = 32$
(C) $|A^6| = 60$
(D) None of these

61. 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) $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$

62. A homogeneous system of linear equation has a non-trivial solution if:
(A) The number of unknowns exceeds the number of equation
(B) The number of equations exceeds the number of unknowns
(C) The number of unknown proceeds the number of equations
(D) None of these

63. A square matrix A such that $A^2 = A$ is called:
(A) involutary
(B) Idempotent
(C) Nilpotent
(D) Symmetric

64. Cofactors of the elements of the second of the row of the determinant $\begin{bmatrix} 1 & 2 & 3 \\ -4 & 3 & 6 \\ 2 & -7 & 9 \end{bmatrix}$ are:
(A) $-39,\ 3, 11$
(B) $6, 5, 4$
(C) $3, 11, -39$
(D) $13, 1, 3$

65.   A system of m homogenous linear equations $AX = 0$ in n variables has a non-trivial solution if and only if:
(A) $Rank\ A = n$ (B) $Rank\ A < n$
(C) $Rank\ A > n$ (D) Symmetric

66.   The intersection of two infinite sets:
(A) Always infinite   (B) Always finite
(C) May not be infinite   (D) None of these

67.   Least upper bound of a set, if exists is:
(A) Infinite   (B) Finite
(C) Unique   (D) Always in fraction

68.   The greatest lower bound of a set:
(A) Always belong to the set   (B) Not belong to the set
(C) May or may not belong to the set   (D) None of these

69.   If $a, b \in \mathbb{R}$, then:
(A) $|ab| > |a|.|b|$ (B) $|ab| \geq |a|.|b|$
(C) $|ab| < |a|.|b|$ (D) $|ab| \leq |a|.|b|$

70.   A convergent sequence converges to:
(A) A unique limit   (B) Many limits
(C) Any two limits   (D) None of these

71.   Every pair of real numbers a and b satisfy one and only one of the conditions $a > b, a = b, b > a$, the property of real number is known as the:
(A) Transitive law   (B) Associative law
(C) Trichotomy law   (D) Commutative law

72. $1 + z + \frac{z^2}{2!} + \frac{z^3}{3!} + \frac{z^4}{4!} + \cdots$ **converge to:**
(A) e^z (B) e^{-z}
(C) $-z^{e^2}$ (D) None of these

73.   The degree of the differential equation is defined as:
(A) The highest degree of variable   (B) The order of the highest derivative
(C) The power of the variable in the solution   (D) None of these

77.   The differential equation $Mdx + N\ dy = 0$ is defined as an exact differential equation if:
(A) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ (B) $\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$
(C) $\frac{\partial M}{\partial y} = -\frac{\partial N}{\partial x}$ (D) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

78.   The differential equation $[1 + (y')^2]^{1/2} = y''$ has the order and degree respectively:
(A) $2, 1$ (B) $2, 2$
(C) $1, 2$ (D) None of these

79.   The differential equation $\frac{dy}{dx} = \frac{x^2 + xy + 9y}{9x^3 + y^3}$ is:
        (A) Exact   (B) Homogeneous
        (C) Cauchy   (D) None of these

80.   A general solution of 3rd order differential equation contains:
        (A) One constant   (B) Two constants
        (C) Three constants   (D) None of these

81.   The famous speech, which had the refrain "I have a dream" was delivered by:
        (A) Dr. Martin Luther King Jr.   (B) John Fitzgerald Kennedy
        (C) Abraham Lincoln   (D) Winston Churchill

82.   Montagu- Chelmsford reforms introduced a system called:
        (A) Monarchy   (B) Theocracy
        (C) Democracy   (D) Diarchy

83.   X- Ray was discovered by:
        (A) Hahn   (B) Hubble
        (C) Roenigen   (D) Rutherford

84.   When was the first population census conducted in Pakistan?
        (A) 1947   (B) 1949
        (C) 1951   (D) 1953

85.   Which Pakistani former cricket player is popularly known as the Asian bradmnan?
        (A) Zaheer Abbas   (B) Javid Miandad
        (C) Hanif Muhammad   (D) Majid Khan

86.   During the Khilafat Movement, "Chaura Chauri" tragedy assumed great significance. Which of the following
        incidents was peculiar to that:
        (A) Country wide strike of the trades   (B) A police station was burnt in a village
        (C) communal riots erupted   (D) The people refused to pay Government taxes

87.   Which of the following is not one of the official language of the UN?
        (A) Arabic   (B) Chinese
        (C) Spanish   (D) German

88.   The bomb blasts on the Samjhota Express train, resulting in the death of 68 passengers took place in:
        (A) September 2005   (B) February 2006
        (C) February 2007   (D) December 2008

89.   In information Technology what does HTML stand for?
        (A) Hyper text method language   (B) Hyper text markup language
        (C) Hyper text markup logie   (D) Hyperlink Text markup language

90.   Ctrl + N in MS word is used to:
        (A) Save Document   (B) Minimize Document
        (C) Open new Document   (D) Close Document

91.   **The selling price of an article is Rs. 118 and the profit earned is 50% , what would be the cost price?**
(A) 78.65   (B) 80
(C) 77   (D) 66.76

92.   **A boat can travel with a speed of 13 km/hr in still water. If the speed of the stream is 4km/hr , at what time the boat to go 68 km downstream.**
(A) 2 hours   (B) 3 hours
(C) 4 hours   (D) 6 hours

93.   **"To fight tooth and nail" means:**
(A) To fight a losing battle   (B) To bite and use nails in a fight
(C) To oppose resolutely   (D) To fight unwillingly

94.   **What is a Sciolist?**
(A) A fake intellectual   (B) scissor tester
(C) A scientist that works alone   (D) A socialist

95.   **What is the antonym of "vindictive"?**
(A) Careless   (B) Forgiving
(C) Revengeful   (D) Refined

96.   **Find the correctly spelt word:-**
(A) Enterpreneur   (B) Entrepranore
(C) Entrepreneur   (D) Enterepnure

97.   **Which of the following is the fastest running terrestrial animal:**
(A) Horse   (B) Giraffe
(C) Cheetah   (D) Hound Dogs

98.   **The process by which a substance absorbs moisture upon exposure to atmosphere is called:**
(A) Deliquescence   (B) Efflorescence
(C) Dehydrogenation   (D) Desalination

99.   **"بنت العنب" کا مفہوم کیجئے۔**
(B) مے فروش کی بیٹی   (A) انگور کی بیٹی(شراب)
(D) بربن زادی   (C) کسان کی بیٹی

100.   **اردو ادب کے ناولوں "میدانِ عمل" اور "چوگان بستی" کے مصنف ہیں۔**
(B) منشی پریم چند   (A) قیسی رام پوری
(D) ڈپٹی نذیر احمد   (C) عبدالعلیم شرر