31) The bilinear transformation which maps the points $z=1, z=0, z=-1$ of z-plane into $w=i, w=0, w=-i$ of w-plane respectively is

(a) $w=iz$ (b) $w=z$ (c) $w=i(z+1)$ (d) $w=-i(z+1)$

32) If the power series $\sum a_n z^n$ is convergent but the series $\sum |a_n z^n|$ is not convergent then the series $\sum_{n=0}^{\infty} a_n z^n$ is said to be

(a) Divergent (b) oscillatory (c) Conditionally Convergent (d) None

33) value of $\frac{2!}{2\pi i} \int_{|z|=3} \frac{z^2+3z+4}{(z-1)^3} dz$ is

(a) 2 (b) 0 (c) πi (d) $-\pi i$

34) A function which has poles as its only singularities in the finite part of the plane is said to be

(a) an analytic function (b) an entire function

(c) a meromorphic function (d) isomorphic function

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

(a) zeros (b) singularities (c) Poles (d) Simple points.

36) Find the eign values of $\begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix}$

(a) 3, 1 (b) −3, 1 (c) 5, 1 (d) −5, 1

37) The product of the eigen values of the matrix $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$ is

(a) −7 (b) −6 (c) 11 (d) −12

38) If the characteristic equation of a matrix (3×3) is $\lambda^3 - S_1\lambda^2 + S_2\lambda - S_3 = 0$ then S_3 is

(a) Trace of the matrix (b) Sum of the maindiagonal elements.

(c) determinant of the matrix (d) Sum of the minors of the main diagonal elements.

39) If one of the root of $3x^3 - 23x^2 + 72x - 70 = 0$ is $3+\sqrt{-5}$ then the other roots are

(a) $3-\sqrt{5}$, 2 (b) $3-\sqrt{-5}$, 5/3 (c) $3-\sqrt{5}$, 1 (d) $3-\sqrt{-5}$, −1

40) If the roots of the equation $2x^3+6x^2+5x+d=0$ are in Arithmetic progression then the value of d is

(a) 5 (b) 2 (c) 0 (d) 1

(41) The value of $D^n(ax+b)^{-1}$ is

(a) $n!\, a^n (ax+b)^{-n-1}$ (b) $\frac{(-1)^{n-1}(n-1)!}{(ax+b)^n}$ (c) $\frac{(-1)^n n!\, a^n}{(ax+b)^{n+1}}$

(d) $(n-1)!\, a^{n-1}(ax+b)^{-n}$.

(42) Evaluate $\int_0^\infty e^{-x^2} x^9\, dx$

(a) 11 (b) 12 (c) 13 (d) 14

(43) Evaluate $\int_0^{\pi/2} \sin^5 x \cos^3 x\, dx$

(a) $\frac{1}{3}\beta(3,2)$ (b) $\frac{1}{2}\beta(3,2)$ (c) $\frac{1}{2}\beta(2,3)$ (d) $\frac{1}{3}\beta(2,3)$

(44) Evaluate $\int_0^2 \int_1^3 \int_1^2 xyz\, dx\, dy\, dz$

(a) 12 (b) 13 (c) 14 (d) 15

(45) change of order of integration in $\int_0^1 \int_0^x f(x,y)\, dy\, dx$ is

(a) $\int_0^a \int_0^y f(x,y)\, dx\, dy$ (b) $\int_0^1 \int_1^y f(x,y)\, dx\, dy$

(c) $\int_{-1}^1 \int_0^x f(x,y)\, dy\, dx$ (d) $\int_0^1 \int_y^1 f(x,y)\, dx\, dy$

(46) Let $S=[0,1)$ the least upper bound for S is

(a) 0 (b) 1 (c) ϕ (d) 2

(47) The union of any collection of open sets is

(a) open set (b) closed set (c) $\{0\}$ (d) ϕ

(48) If a sequence of real number has a cluster points, then

(a) it is convergent (b) it is divergent

(c) limit exist (d) existence of limit not definite.

(49) The radius of convergent of the series

$1 - \frac{x}{1} + \frac{x^2}{2!} - \frac{x^3}{3!} + \cdots$ is

(a) ∞ (b) zero (c) 1 (d) none of these

(50) It is given that at $x=1$, the function $x^4 - 62x^2 + ax + 9$ attains its maximum value in the interval $[0,2]$. Find the value of 'a'

(a) 12 (b) 120 (c) 100 (d) 20

51) In LPP, to convert ≤ type of inequality into equations, we have to

(a) Assume them to be equal (b) Add surplus variables
(c) Subtract slack variables (d) Add slack variables

52) In simplex method the key row indicates

(a) Incoming variable (b) outgoing variable
(c) slack variable (d) surplus variable

53) The Dual of a Dual is

(a) primal (b) Dual (c) primal dual (d) none of these.

54) In transportation problem, the column which is introduced in the matrix to balance the rim requirements, is known as

(a) key column (b) Idle column (c) Slack column (d) Dummy column

55) In transportation problem, MODI stands for

(a) modern distribution (b) Mendel's distribution method
(c) modified distribution method (d) model index method

56) The residue of the function $f(z) = \frac{z+1}{(z-1)(z-2)}$ at $z=1$ is

(a) -2 (b) 2 (c) 1 (d) -1.

57) find the fixed point of $w = \frac{3z-4}{z-1}$

(a) $z=2$ (b) $z=1$ (c) $z=3$ (d) $z=4$

58) Find the analytic function whose real part is given by x^2-y^2 is

(a) z^2+ constant (b) z^3+ constant (c) z+ constant (d) z^4+ constant.

59) which of the following(s) is/are harmonic function(s)?

(a) $u = \sinh x \cos y$ (b) $u = \frac{1}{2}\log(x^2+y^2)$
(c) $u = x^2+y^2$ (d) $u = x^2-y^2$.

60) If $f(z)$ is analytic in a simply connected domain D then for every closed path c in D

(a) $\oint_c f(z)\,dz = 0$ (b) $\oint_c f(z)\,dz = 1$ (c) $\oint_c f(z)\,dz \neq 0$ (d) $\oint_c f(z)\,dz \neq 1$.

61) If the degree of the reciprocal equation is odd and signs of a_0 and a_n are same, then one of its roots is

(a) $x=1$ (b) $x=-1$ (c) $x=0$ (d) $x=\pm 1$

62) The roots of the reciprocal equation $6x^4-35x^3+62x^2-35x+6=0$ are

(a) $2, \frac{1}{2}, 3, \frac{1}{3}$ (b) $-2, -\frac{1}{2}, 3, -\frac{1}{3}$ (c) $1, -1, 2, \frac{1}{2}$ (d) $-1, -1, 2, -\frac{1}{2}$

63) The equation whose roots exceeds by 2 for the equation $4x^4+32x^3+83x^2+76x+21=0$ is

(a) $4x^4+13x^2+9=0$ (b) $4x^4-13x^2+9=0$

(c) $4x^4-3x^2+3=0$ (d) none of these

64) To remove the second term from the equation $x^4+20x^3+143x^2+430x+462=0$ diminish the roots by

(a) 4 (b) 5 (c) -5 (d) 3

65) If $\frac{\sin x}{x} = \frac{863}{864}$ find an approximate value of x

(a) $4^\circ 46'$ (b) $7^\circ 29'$ (c) $8^\circ 20'$ (d) $3^\circ 6'$

66) $\int_0^a \int_0^b xy(x-y)\,dx\,dy =$

(a) $\frac{a^2b^2}{6}$ (b) $\frac{a^2b^2(a-b)}{6}$ (c) $\frac{a^2b^2(b-a)}{6}$ (d) $\frac{a^2b^2(b-a)}{2}$

67) The n^{th} derivative of $e^x \sin x$ is

(a) $2^{n/2}\sin\left(x+\frac{n\pi}{4}\right)e^x$ (b) $2^{n-1}\sin\left(x+\frac{n\pi}{4}\right)e^x$

(c) $2^n\cos\left(x+\frac{n\pi}{4}\right)e^x$ (d) $2^{n/2}\cos\left(x+\frac{n\pi}{4}\right)e^x$

68) If $u=x^2+y^2+z^2$ where $x=e^t$, $y=e^t\sin t$ and $z=e^t\cos t$ then $\frac{du}{dt}$ is

(a) $2e^{2t}$ (b) $4e^{2t}$ (c) $6e^{2t}$ (d) $8e^{2t}$

69) The envelope of the family of the curves $(x-\alpha)^2+y^2=4\alpha$ is

(a) $y^2=4(x-1)$ (b) $y^2=4(x+1)$ (c) $y^2=2x(x-1)$ (d) $y^2=2(x-1)$

70) If $\frac{dy}{dx}$ at the given point is not defined, then we can find the radius of curvature by using

(a) $\frac{\left[1+(dx/dy)^2\right]^{3/2}}{d^2y/dx^2}$ (b) $\frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2}}{d^2x/dy^2}$ (c) $\frac{\left[1+\left(\frac{dx}{dy}\right)^2\right]^{3/2}}{d^2x/dy^2}$ (d) $\frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2}}{d^2y/dx^2}$

71) A real-valued function f has discontinuity of second kind at $x=a$ if
(a) neither $f(a^+)$ nor $f(a^-)$ exist (b) $f(a^+)$ exist only
(c) $f(a^-)$ exist only (d) $f(a^+)$ and $f(a^-)$ both exist.

72) What is the value of $\lim_{x\to 0} \frac{e^x - x - 1}{x^2}$
(a) 0 (b) 1/2 (c) 2 (d) e

73) A subset in R is compact iff it is
(a) both open and bounded (b) open and unbounded
(c) closed and unbounded (d) both closed and bounded.

74) If f is Riemann integrable on $[a,b]$ then
(a) $\left|\int_a^b f(x)\,dx\right| \le \int_a^b |f(x)|\,dx$ (b) $\left|\int_a^b f(x)\,dx\right| \ge \int_a^b |f(x)|\,dx$
(c) $\left|\int_a^b f(x)\,dx\right| = \int_a^b |f(x)|\,dx$ (d) None of these

75) If $f(x+y) = f(x).f(y)$ for all x and y. Suppose that $f(3)=3$ and $f'(0)=11$. Then $f'(3)$ is equal to
(a) 22 (b) 33 (c) 28 (d) 29

76) Consider the matrix given, when is a pay off matrix of a game. Identify the dominance in it

$$A \quad \begin{array}{c} \\ P \\ Q \\ R \end{array}\begin{array}{c} \begin{array}{ccc} X & Y & Z \end{array} \\ \begin{pmatrix} 1 & 7 & 3 \\ 5 & 6 & 4 \\ 7 & 2 & 0 \end{pmatrix} \end{array}$$

(a) P dominates Q (b) Y dominates Z
(c) Q dominates R (d) Z dominates Y

77) In the game given the saddle point is

$$A \quad \begin{array}{c} \\ \\ I \\ II \\ III \end{array}\begin{array}{c} B \\ \begin{array}{ccc} I & II & III \end{array} \\ \begin{pmatrix} 2 & -4 & 6 \\ 0 & -3 & -2 \\ 3 & -5 & 4 \end{pmatrix} \end{array}$$

(a) −2 (b) 0 (c) −3 (d) 2

78) The lead-time is the time (a) To place orders for materials (b) of receiving materials (c) Between receipt of material and using materials (d) Between placing the order and receiving the materials.

79) If the operating characteristics of a queue are dependent on time, then it is said to be (a) Transient state (b) Busy state (c) steady state (d) Explosive state.

80) Use graphical method to solve the LPP max $z = 3x_1 + 2x_2$ s.t $5x_1 + x_2 \ge 10$, $x_1 + x_2 \ge 6$, $x_1 + 4x_2 \ge 12$, $x_1, x_2 \ge 0$ the solution is
(a) 13 (b) 20 (c) bounded (d) unbounded.

(81) The function $f(z) = \dfrac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2 (z-2)}$ have the poles

(a) $m = 1, 2$ (b) $m = -1, -2$ (c) $m = 2$ only

(d) $m = 1$ only

(82) The transformation $w = \dfrac{az+b}{cz+d}$ is said to be normalized, if $ad - bc$ is equal to

(a) 0 (b) 1 (c) 2 (d) 3.

(83) Evaluate $\int_L \dfrac{z+2}{z} dz$ where L is the semi-circle $z = 2e^{it}$, $0 \le t \le \pi$

(a) $4 + 2\pi i$ (b) $2\pi i$ (c) $-4 + 2i\pi$ (d) $4 - 2\pi i$

(84) Evaluate $\int_c \dfrac{e^z}{z-2} dz$ where c is the circle $|z| = 3$

(a) e^3 (b) ie^2 (c) $2\pi i e^2$ (d) e^2

(85) Consider the transformation $w = T_1(z) = \dfrac{z+2}{z+3}$ then find $T_1^{-1}(w)$

(a) $\dfrac{2-3w}{w-1}$ (b) $\dfrac{2+3w}{w-1}$ (c) $\dfrac{4+3w}{w+1}$ (d) $\dfrac{2-3w}{w+1}$

(86) The annual demand of an item is 3200 units. The unit cost is Rs 6/- and inventory carrying charges 25% per annum. If the cost of one procurement is Rs 150. then determine EOQ.

(a) 1600 (b) 800 (c) 1200 (d) 1000

(87) If an activity has zero slack, it implies that
(a) it lies on the critical path
(b) it is a dummy activity
(c) the project is progressing well
(d) none of the above.

(88) The activity that can be delayed without affecting the execution of the immediate succeeding activity is determined by
(a) total float (b) free float
(c) independent float (d) none of the above.

(89) While applying the cutting-plane method, dual simplex is used to maintain
(a) optimality (b) feasibility
(c) both (a) and (b) (d) none of the above

(90) The method used for solving an assignment problem is called
(a) reduced matrix method (b) MODI method
(c) Hungarian method (d) vogel's approximation method.

(91) The series $\sum \frac{1}{n(\log n)^p}$ is divergent if
(a) $p>1$ (b) $p \leq 1$ (c) $p<1$ (d) $p=1$

(92) The sequence $\langle (-1)^n n \rangle$ is
(a) Bounded below (b) Bounded above
(c) Bounded below as well as bounded above
(d) Neither bounded below nor bounded above.

(93) Neighbourhood of $1/2$ is the set
(a) $[-1/2, 1/2]$ (b) $(0, 1/2]$ (c) $(-\infty, \infty)$ (d) none of these

94) For any set A, A^0 (interior of A) is
(a) open (b) neither open nor closed (c) closed (d) none of these

95) The series $\sum \frac{1}{n^p (n+1)^p}$ is
(a) convergent if $p<1$ (b) convergent if $p>1/2$
(c) Convergent if $p \leq 1/2$ (d) Convergent if $p=0$

96) General equation of straight line in polar system is
(a) $r\cos(\theta-\alpha)=p$ (b) $r\sin(\theta-\alpha)=p$ (c) $r\sin\theta=p$ (d) $r\cos\theta=p$

97) Find the equation of the polar of the point $(2,3)$ with respect to the conic $y^2-4x=0$ is
(a) $2x+3y+4=0$ (b) $2x-3y+4=0$ (c) $3x+2y+4=0$ (d) $3x-2y+4=0$

98) Equation $\frac{l}{r}=1+e\cos\theta$ is parabola if
(a) $e=0$ (b) $e>1$ (c) $e<1$ (d) $e=1$

99) If $x=r\cos\theta$, $y=r\sin\theta$ then $\frac{\partial(x,y)}{\partial(r,\theta)}$ is
(a) $1/r$ (b) r (c) $-1/r$ (d) $-r$

100) If $z=xy\,f(x/y)$ then $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=$ (a) z (b) 0 (c) $\frac{1}{z}$ (d) $2z$

101) The value of $\log_3 e - \log_9 e + \log_{27} e - \log_{81} e + \cdots \infty$
(a) $\frac{\log 3}{\log 2}$ (b) $\frac{\log 2}{\log 3}$ (c) $\log 1$ (d) $\log 6$.

102) For the two similar matrices A and B, there exists a non singular matrix P such that
(a) $A^{-1}PA=B$ (b) $B^{-1}PB=A$ (c) $P^{-1}AP=B$ (d) none of these

103) The remainder when 2^{1000} is divisible by 17 is
(a) 2 (b) 3 (c) 1 (d) 4

104) Expand $\sin 5\theta$ in terms of power of sine is
(a) $16\sin^5\theta-20\sin^3\theta+5\sin\theta$ (b) $16\sin^5\theta+20\sin^3\theta+5\sin\theta$
(c) $16\sin^5\theta-10\sin^3\theta+5\sin\theta$ (d) $16\sin^5\theta-10\sin^3\theta-5\sin\theta$

105) The imaginary part of $\log(1+i)^{1-i}$ is
(a) $\frac{1}{2}\log 2+\pi/2$ (b) $\pi/4-\frac{1}{2}\log 2$
(c) $\frac{\pi}{2}-\frac{1}{2}\log 2$ (d) $\frac{\pi}{2}+\frac{1}{2}\log 3$

(106) $y = x\frac{dy}{dx} + \frac{x}{dy/dx}$ is of degree

(A) zero (B) Two (C) Three (D) One

(107) The general solution of the equation $ydx - xdy = 0$ is

(A) $\frac{x}{y} = c$ (B) $x+y=c$ (C) $xy = c$ (D) $x-y=c$

(108) A first order differential equation $M(x,y)dx + N(x,y)dy = 0$ is exact if

(A) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ (B) $\frac{\partial M}{\partial x} \neq \frac{\partial N}{\partial y}$ (C) $\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial y}$ (D) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

(109) The integration factor for the differential equation $2ydx + xdy = 0$ is

(A) x (B) y (C) xy (D) y^2

(110) For the equation $y' + p(x)y = r(x)$ to be homogeneous

(A) $r(x) \neq 0$ (B) $r(x) = 0$ (C) $r(x) = p(x)$ (D) $p(x) = 0$

(111) Which of the following is not a solution of $y'' + y = 0$?

(A) $y = \sin x$ (B) $y = \cos x$ (C) $y = 3\cos x$ (D) $y = \sin x + \frac{1}{2}$.

(112) The homogeneous differential equation $M(x,y)dx + N(x,y)dy = 0$ can be reduced to a differential equation, in which the variables are seperated, by the substitution

(A) $y = vx$ (B) $xy = v$ (C) $x+y = v$ (D) $x-y = v$

(113) The relation $z = (x+a)(y+b)$ represents the partial differential equation

(A) $z = \frac{p}{q}$ (B) $z = pq$ (C) $z = p-q$ (D) $z = p+q$

(114) The partial differential equation formed by eliminating arbitrary functions from the relation $z = f(x+at) + g(x-at)$ is

(A) $\frac{\partial^2 z}{\partial t^2} = a^2\frac{\partial^2 z}{\partial x^2}$ (B) $a^2\frac{\partial z}{\partial t} = \frac{\partial z}{\partial x}$ (C) $a\frac{\partial^2 z}{\partial t^2} + \frac{\partial^2 z}{\partial x^2} = 0$ (D) None of these

115. Statement (a) Singular solution contains no arbitrary constants.
Statement (b) singular solution can be obtained from complete primitive.

(A) (a) is true, (b) is false (B) (a) and (b) both true
(C) (a) and (b) both false (D) None of these.

116. The complete integral of P.D.E $z = px + qy - 2\sqrt{pq}$ is

(A) $z = ax + by + 2\sqrt{ab}$ (B) $z = ax + y - 2\sqrt{ab}$
(C) $z = ax + by + 2\sqrt{pq}$ (D) $z = ax + by - 2\sqrt{ab}$

117. A particular integral of the differential equation $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = \cos x$ is

(A) $\frac{1}{25}(3\sin x + 4\cos x)$ (B) $\frac{x}{25} e^{3x}$
(C) $\frac{1}{25}(4\sin x + 3\cos x)$ (D) $\frac{1}{9}(4\sin x - 8\cos x)$.

118. If $y'' + 5y' + 6y = e^{-t}$, given that $y(0) = 0$ and $y'(0) = 0$ then

(A) $L(y) = \frac{1}{(s+1)(s+2)(s+3)}$ (B) $L(y) = \frac{1}{(s-1)(s-2)(s-3)}$
(C) $L(y) = \frac{1}{(s-1)(s+2)(s-3)}$ (D) $L(y) = \frac{1}{(s+1)(s-2)(s+3)}$

119. $L^{-1}\left[\frac{1}{s(s+1)}\right] =$ ______.

(A) $1 - e^{-t}$ (B) $1 + e^{-t}$ (C) $1 + e^{t}$ (D) $1 - e^{-t}$

120. $\int_0^\infty e^{-x} x^4 \, dx$ is

(A) 24 (B) 120 (C) 720 (D) ∞

121. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ and $r = |\vec{r}|$, then ∇r^4 is

(A) r^2 (B) $4r^2\vec{r}$ (C) 0 (D) 1

(122) If $\overline{F} = x^2y\,\overline{i} + xz\,\overline{j} + 2yz\,\overline{k}$, div curl $\overline{F}$ = ___ .

(A) $x+y$ (B) $x-y$ (C) 0 (D) $y-x$

(123) If $(x+y+az)\overline{i} + (bx+2y-z)\overline{j} + (-x+cy+2z)\overline{k}$ is irrotational then a, b, c are respectively

(A) $-1, 1, -1$ (B) $1, 1, -1$ (C) $1, -1, -1$ (D) $-1, 1, 1$.

(124) If $\overline{r}$ is the position vector of the point (x, y, z), then div $\overline{r}$ and curl $\overline{r}$ are respectively

(A) $0, 1$ (B) $3, 0$ (C) $0, 0$ (D) $3, 3$

(125) If $\vec{c} = c_1\hat{i} + c_2\overline{j} + c_2\overline{k}$ is constant vector, then div $(\overline{r} \times \overline{c})$ is where $\overline{r} = x\overline{i} + y\overline{j} + z\overline{k}$.

(A) 1 (B) -1 (C) 0 (D) 3

(126) Maximum directional derivative of $\phi = xyz$ at $(1, 2, 3)$ is

(A) -14 (B) 14 (C) -7 (D) 7

(127) Equation of the normal to the surface $xyz = 4$ at the point $(1, 2, 2)$ is

(A) $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-2}{1}$ (B) $\frac{x-1}{4} = \frac{y-2}{2} = \frac{z-2}{1}$

(C) $\frac{x-1}{2} = \frac{y-2}{2} = \frac{z-2}{2}$ (D) None of these

(128) If S is any closed surface $\iint_S \nabla \times \overline{F} \cdot d\vec{s}$ is

(A) πa^2 (B) $\frac{4}{3}\pi$ (C) 0 (D) 4π

(129) The value of $\oint (x\,dy - y\,dx)$ around the circle $x^2+y^2=1$ is

(A) 2π (B) π (C) 0 (D) 3π

(130) If V is the volume of the region enclosed by the surface S then $\frac{1}{3}\iint_S \overline{r} \cdot d\overline{s}$ is

(A) 3V (B) 4V (C) V (D) 0

(131) The Fourier Series of an odd function $f(x)$ in $(-\pi,\pi)$ is

(A) $a_0 + a_1\cos x + a_2\cos 2x + \cdots$ (B) a_0

(C) $b_1\sin x + b_2\sin 2x + \cdots$ (D) 2π

(132) $F[f*g] =$ ____ . (Where $F[f(x)] = F(s)$ and $F[g(x)] = G(s)$)

(A) $F(s)+G(s)$ (B) $F(s)G(s)$ (C) $F(s)-G(s)$ (D) $\frac{F(s)}{G(s)}$.

(133) Let $\frac{a_0}{2} + \sum_{n=1}^{\infty}(a_n\cos nx + b_n\sin nx)$ be the Fourier Series of $f(x)$ in $-\pi \le x \le \pi$. Then for the function $f(x) = x\cos x$

(A) f is even and $b_n = 0$ (B) f is odd and $a_n = 0$

(C) f is odd and $b_n = 0$ (D) f is odd and $a_5 = 0$

(134) If f is an integrable function on $(-\infty,\infty)$, then $\lim_{n\to\infty}\int_{-\infty}^{\infty} f(x)\cos nx\, dx =$ ____ .

(A) $\cos x$ (B) $\frac{1}{2\pi}$ (C) 0 (D) ∞

(135) Which one of the following is not true?

(A) $F[f(x)] = F(s)$, the $F[f(2x)] = \frac{1}{2}F\left(\frac{s}{2}\right)$

(B) $F[f(x)] = F(s)$, then $F[\overline{f(-x)}] = \overline{F(s)}$

(C) $F[f(x)] = F(s)$, then $F[x^n f(x)] = \frac{d^n F(s)}{ds^n}$

(D) $F[f(x)] = F(s)$, then $F[e^{-|x|}] = \sqrt{\frac{2}{\pi}}\left(\frac{1}{s^2+1}\right)$.

(136) The set of all non-singular square matrices of same order with respect to matrix multiplication is

(A) Quasi-group (B) Monoid

(C) Group (D) Abelian group.

137) The generators of a group $G = \{a, a^2, a^3, a^4, a^5, a^6 = e\}$ are

(A) a and a^5 (B) a^2 and a^4 (C) a^3 and a^5 (D) a^2 and a^3

138) If G is a group and $a \in G$ such that $a^2 = a$ then a is equal to

(A) Inverse (B) Zero element (C) None-zero element (D) Identity

139) Given permutation $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 1 & 2 & 5 & 4 & 3 \end{pmatrix}$ is equivalent to

(A) $(1,6,3,2)(2,1)$ (B) $(1,6,3,2)(1,1)$

(C) $(1,6,3,2)(4,5)$ (D) $(1,6,3,2)(5,4)$

140) If $G = \{(0,1,2,3,4), +_5\}$ the order of 2 is

(A) One (B) Two (C) Four (D) Five

141) An ideal $M \neq R$ in a ring R is a maximal ideal of R if U is an ideal of R and $M \subset U \subset R$ then

(A) Either $M = U$ or $R = U$ (B) $M = U = R$

(C) $M = U \neq R$ (D) $M \neq U \neq R$

142) The homomorphism ϕ of rings R into R' is an isomorphism iff the kernel $I(\phi)$ is

(A) $I(\phi) = 0$ (B) $I(\phi) = R$ (C) $I(\phi) = R'$ (D) $I(\phi) = 0,\ 0 \in R'$

143) Every integral domain is not a

(A) Field (B) Commutative ring

(C) Ring (D) Abelian group with respect to addition.

144) If the ring R is finite and commutative with unit element, then

(A) Every prime ideal is maximal ideal (B) Every ideal is maximal ideal.

(C) Every maximal ideal is prime ideal (D) (A) and (C) both are true.

(145) If I is a ideal in a ring R then

(A) R/I is a ring (B) RI is a ring

(C) $R+I$ is a ring (D) $R-I$ is a ring.

(146) Choose the correct statement:

(A) The vectors $(1,0,0)$, $(0,1,0)$, $(1,1,0)$ and $(2,1,0)$ in R^3 are linearly independent over R.

(B) The vectors $(1,0,0)$, $(1,1,0)$, $(1,1,1)$ and $(0,1,0)$ in R^3 are linearly independant over R

(C) $T: R^2 \to R^2$ defined by $T(a,b) = (a, a+b)$ is not a linear transformation.

(D) $(2,-3,1)$, $(0,1,2)$, $(1,1,2)$ in R^3 form a basis of R^3 over R

(147) Every group of prime order is

(A) Cyclic (B) not Cyclic (C) Commutative but not Cyclic (D) None of these.

(148) Which of the following Statement is/are true?

Statement (1): Any group of prime order can have no proper subgroup

Statement (2): Any group of prime order can have a proper subgroup.

(A) (1) is false (B) (1), (2) are true

(C) (1) is true (2) is false (D) Both (1), (2) are false.

(149) $\dim F_{10}[x]$ is

(A) 10 (B) 11 (C) 9 (D) 8

(150) Which is not a vector space?

(A) $C(R)$ (B) $R(Q)$ (C) $Q(R)$ (D) $R^2(R)$

(151) For a chi-square test, in a 2x4 contingency table, the number of degrees of freedom taken is

(A) 1 (B) 2 (C) 3 (D) 0

(152) For a frequency distribution, the coefficient of variation is 5 and the standard deviation is 2, the mean of the distribution is

(A) 10 (B) 20 (C) 30 (D) 40

(153) If X is a poisson variate suchthat $P(X=0) = P(X=1) = k$, the value of k is

(A) e (B) $2e$ (C) e^{-1} (D) e^{-2}

(154) If X is a normal variate with probability density function $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\left(\frac{x-\mu}{\sigma\sqrt{2}}\right)^2}$, $-\infty < x < \infty$, then the median is

(A) 0 (B) μ (C) $-\mu$ (D) 1

(155) The standard error of mean of a random sample of size n from a population with variance σ^2 is

(A) $\frac{\sigma^2}{n}$ (B) $\frac{\sigma}{\sqrt{n}}$ (C) $\sqrt{\frac{\sigma}{n}}$ (D) $\frac{\sigma}{n}$

(156) If X is a continuous random variable with probability density function $f(x) = Ax^2$, $0 \le x \le 1$, then the value of A is

(A) 0 (B) 1 (C) 2 (D) 3

(157) The mean and variance of a binomial distribution are 4 and $\frac{4}{3}$ respectively find $P(X=0)$.

(A) $\frac{728}{729}$ (B) $\frac{1}{729}$ (C) $\frac{1}{728}$ (D) $\frac{3}{16}$

(158) The fourth kumulant of poisson distribution with mean λ is

(A) $\lambda^2+\lambda$ (B) λ^2 (C) λ (D) 1

159) $P(A) = 0.4$, $P(A \cup B) = 0.7$, if A and B are two independent events, the value of $P(B)$ is

(A) 0.3 (B) 0.4 (C) 0.5 (D) 0.6

160) The empirical relation between the mean, median and mode is

(A) Mode = 3Median − 2Mean (B) Median = 3Mean − 2Mode

(C) Mode = 2Median − 3Mean (D) Mean = 3Median − 2Mode

161) In a distribution if $\beta_2 = 3$, then the distribution is

(A) mesocurtic (B) Leptocurtic

(C) platycurtic (D) Rectangular

162) If the two regression lines are perpendicular, then the correlation coefficient between them is

(A) 1 (B) ± 1 (C) Lessthan 1 (D) 0

163) In test of significance the level of significance is the probability of

(A) Type II error (B) Type-I error (C) Std. error (D) probable error.

164) While computing a weighted index, the current period quantities are used in the :

(A) Laspeyre's method (B) Paaschee method

(C) Marshall Edgeworth method (D) Fisher's ideal method.

165) If X is a normal variate with $\mu = 20$ and $\sigma = 5$. Then $p(X < 10)$ is

(A) 0.0228 (B) 0.033 (C) 0.1010 (D) 0.0202

(166) Force of 60N is exerted on the box kept on the floor with the coefficient of static friction of 0.4. Find the friction force.

(A) 20N (B) 22 N (C) 24N (D) 26 N

(167) The angle between two Forces, when the resultant is maximum and minimum respectively are

(A) 0° and 360° (B) 0 and 180° (C) 180° and 0° (D) 90° and 0°

(168) Which of the following is not true?

(A) A force couple is a way to produce without a net force

(B) Net force of a couple is zero

(C) Moment of a couple is zero

(D) Two equal and opposite force whose line of action are different forms a couple.

(169) Static friction always — dynamic friction.

(A) always equal (B) always greater than

(C) always less than (D) can't compare.

(170) Newton First law is also called the

(A) Law of gravity (B) Law of motion

(C) Law of Inertia (D) Law of constant speed.

(171) If two equal forces of magnitude P act at angle α, their resultant will be

(A) $\frac{P}{2}\cos\frac{\alpha}{2}$ (B) $P\sin\frac{\alpha}{2}$ (C) $2P\tan\frac{\alpha}{2}$ (D) $2P\cos\frac{\alpha}{2}$

(172) The product of either of the forces of the couple with the arm of the couple is called

(A) resultant couple (B) moment of forces

(C) moment of the couple (D) Resulting couple

(173) A single force and a couple acting in the same plane upon a rigid body

(A) balance each other (B) can not balance each other

(C) produce moment of couple (D) are equivalent.

(174) Unit of acceleration in F.P.S

(A) 1 metre/second^2 (B) 1 cm/second^2

(C) 1 foot/second^2 (D) 1 pound/second^2

(175) A train moving at 30m/sec reduces its speed to 10m/sec in a distance of 240m, the acceleration at a distance of 240m is

(A) $\frac{5}{3}$ (B) $2/3$ (C) $\frac{1}{12}$ (D) $\frac{1}{6}$.

(176) The acceleration component in radical direction is

(A) $\ddot{r}$ (B) $\ddot{r} - \dot{\theta}^2$ (C) $2\dot{r}\dot{\theta} + r\ddot{\theta}$ (D) $\ddot{r} - r\dot{\theta}^2$

(177) The resultant of two forces P and Q is of magnitude P. let α be the angle between P and Q. Then $\cos\alpha$ is

(A) $\frac{Q}{2P}$ (B) $\frac{Q}{P}$ (C) $-\frac{Q}{2P}$ (D) $\frac{2P}{Q}$

(178) If I is the intersection of any two angle bisector of the ΔABC. If forces of magnitudes P, Q, R acting along the bisectors IA, IB, IC are in equilibrium then $P:Q:R =$

(A) $\sin A : \sin B : \sin C$ (B) $\cos\frac{A}{2} : \cos\frac{B}{2} : \cos\frac{C}{2}$

(C) $\cos A : \cos B : \cos C$ (D) $\sin\frac{A}{2} : \sin\frac{B}{2} : \sin\frac{C}{2}$

(179) The equation of the path of projectile if a particle is projected with a velocity $\bar{u}$ making an angle α to the horizontal

(A) $y = x\tan\alpha - \frac{gx}{2u^2\cos\alpha}$ (B) $y = x\tan\alpha - \frac{gx^2}{2u^2\cos^2\alpha}$

(C) $y = x\tan\alpha - \frac{gx^2}{2u^2\cos\alpha}$ (D) $y = x\tan\alpha - \frac{gx^2}{2u\cos\alpha}$

(180) A particle is projected with a velocity $\vec{u}$ at an angle α to the horizontal up the inclined plane whose inclination is β to the horizontal then the range on the inclined plane is

(A) $\dfrac{2u^2\sin(\alpha-\beta)\cos\alpha}{g\cos^2\beta}$

(B) $\dfrac{2u^2\sin(\alpha-\beta)\cos\alpha}{g}$

(C) $\dfrac{2u^2\sin(\alpha-\beta)}{g\cos^2\beta}$

(D) $\dfrac{u^2\sin(\alpha-\beta)\cos\alpha}{g\cos^2\beta}$