Q.1) The value of $\int_0^{\pi} \frac{(\cos x)^{\sin x}}{(\cos x)^{\sin x} + (\sin x)^{\cos x}} dx$

$\int_0^{1} \frac{(\cos x)^{\sin x}}{(\cos x)^{\sin x} + (\sin x)^{\cos x}} dx$ is

(a) $\frac{\pi}{4}$

(b) 0

(c) $\frac{\pi}{2}$

(d) $\frac{1}{2}$

Ans –a

Q.2) Let

$$\lim_{x\to 0+} \int_{\in}^{x} \frac{bt\cos 4t - a\sin 4t}{t^2} dx = \frac{a\sin 4x}{x} - 1,$$

$(0 < x < \pi/4)$. Then a and b are given by

(a) $a = 2, b = 2$

(b) $a = 1/4, b = 1$

(c) $a = -1, b = 4$

(d) $a = 2, b = 4$

Ans –b

Q.3) Let $\int \frac{x^{1/2}}{\sqrt{1-x^3}} dx = \frac{2}{3} g(f(x)) + C$; then

(a) $f(x) = \sqrt{x}, g(x) = x^{3/2}$

(b) $f(x) = x^{3/2}, g(x) = \sin^{-1} x$

(c) $f(x) = \sqrt{x}, g(x) = \sin^{-1} x$

(d) $f(x) = \sin^{-1} x, g(x) = x^{3/2}$

Ans –b

Q.4) If $x\frac{dy}{dx} + y = x\frac{f(xy)}{f'(xy)}$, then if $|f'(xy)|$ is equal to

(a) Ce^{x^2/x^3}

(b) Ce^{x^2}

(c) Ce^{2x^2}

(d) $Ce^{x^2/3}$

Ans -a

Q.5) A curve passes through the point (3, 2) for which the segment of the tangent line contained between the co-ordinate axes is bisected at the point of contact. The equation of the curve is

(a) $y = x^2 - 7$

(b) $x = \frac{y^2}{2} + 2$

(c) $xy = 6$

(d) $x^2 + y^2 - 5x + 7y + 11 = 0$

Ans -c

Q.6) Let $f(x) = \int_{\sin x}^{\cos x} e^{-1^2} dt$. Then $f^{-1}\left(\frac{\pi}{4}\right)$ equals

(a) $\sqrt{\frac{1}{e}}$

(b) $-\sqrt{\frac{2}{e}}$

(c) $\sqrt{\frac{2}{e}}$

(d) $-\sqrt{\frac{1}{e}}$

Ans –b

Q.7) The point of contact of the tangent to the parabola $y^2 - 9x$ which passes through the point (4, 10) and makes an angle θ with the positive side of the axis of the parabola where $\tan\theta > 2$, is

(a) $\left(\frac{4}{9}, 2\right)$

(b) $(4, 6)$

(c) (4, 5)

(d) $\left(\frac{1}{4}, \frac{1}{6}\right)$

Ans –a

Q.8) Let $f(x) = (x-2)^{17}(x+5)^{24}$. Then

(a) f does not have a critical point at $x = 2$

(b) f has a minimum at $x = 2$

(c) f has neither a maximum not a minimum at $x = 2$

(d) f has a maximum at $x = 2$

Ans –c

Q.9) The solution of $\cos y \frac{dy}{dx} = e^{x+\sin y} + x^2 e^{\sin y}$, is $f(x) + e^{-\sin y} = C$. (C is arbitrary real constant) where $f(x)$ is equal to

(a) $e^x + \frac{1}{2}x^3$

(b) $e^{-x} + \frac{1}{3}x^3$

(c) $e^{-x} + \frac{1}{2}x^3$

(d) $e^x + \frac{1}{3}x^3$

Ans –d

Q.10) If the equation of one tangent in the circle with centre at $(2,-1)$ from the origin in $3x + y = 0$, then the equation of the other tangent through the origen is

(a) $3x - y = 0$

(b) $x + 3y = 0$

(c) $x - 3y = 0$

(d) $x + 2y = 0$

Ans –c

Q.11) Area of the figure bounded by the parabola $y^2 + 8x = 16$ and $y^2 - 24x = 48$ is

(a) $\frac{11}{9}$ sq unit

(b) $\frac{32}{3}\sqrt{6}$ sq unit

(c) $\frac{16}{3}$ sq unit

(d) $\frac{24}{5}$ sq unit

Ans –b

Q.12) A particle moving in a straight line starts from rest and the acceleration at any time t is $a - kt^2$, where a and k are positive constants. The maximum velocity attained by the particle is

(a) $\frac{2}{3}\sqrt{\frac{a^3}{k}}$

(b) $\frac{1}{3}\sqrt{\frac{a^3}{k}}$

(c) $\sqrt{\frac{a^3}{k}}$

(d) $2\sqrt{\frac{a^3}{k}}$

Ans –a

Q.13) If $\vec{a} = \hat{\imath} + \hat{\jmath} - \hat{k}, \vec{b} = \hat{\imath} - \hat{\jmath} + \hat{k}$ and $\vec{c}$ is unit vector perpendicular to $\vec{a}$ and coplanar with $\vec{a}$ and $\vec{b}$, then unit vector $\vec{d}$ perpendicular to both $\vec{a}$ and $\vec{c}$ is

(a) $\pm\frac{1}{\sqrt{6}}(2\hat{\imath} - \hat{\jmath} + \hat{k})$

(b) $\pm\frac{1}{\sqrt{2}}(\hat{\jmath} + \hat{k})$

(c) $\pm\frac{1}{\sqrt{6}}(\hat{\imath} - 2\hat{\jmath} + \hat{k})$

(d) $\pm\frac{1}{\sqrt{2}}(\hat{\jmath} - \hat{k})$

Ans –b

Q.14) Let $a_n = (1^2 + 2^2 + \ldots\ldots\ldots n^2)^n$ and $b_n = n^n(n!)$. Then

(a) $a_n < b_n \forall n$

(b) $a_n > b_n \forall n$

(c) $a_n = b_n$ for infinitely many n

(d) $a_n < b_n$ if n be given and $a_n > b_n$ if n be odd

Ans –b

Q.15) If a, b, c are in G.P. and $\log a - \log 2b, \log 2b - \log 3c, \log 3c - \log a$ are in A.P., then a, b, c are the lengths of the sides of a triangle which is

(a) Acute angled

(b) Obtuse angled

(c) Right angled

(d) Equilateral

Ans –b

Q.16) If $|z - 25i| \le 15$, then maximum $\arg(z)$ – Minimum $\arg(z)$ is equal to

(a) $2\cos^{-1}\left(\frac{3}{5}\right)$

(b) $2\cos^{-1}\left(\frac{4}{5}\right)$

(c) $\frac{\pi}{2}+\cos^{-1}\left(\frac{3}{5}\right)$

(d) $\sin^{-1}\left(\frac{3}{5}\right)-\cos^{-1}\left(\frac{3}{5}\right)$

Ans –b

Q.17) If $z=x-iy$ and $z^{1/3}=p+iq(x,y,p,q\in R)$, then $\left(\frac{x}{p}+\frac{y}{q}\right)$ is equal to

(a) 2

(b) -1

(c) 1

(d) -2

Ans –a

Q.18) If a,b are odd integers, then the roots of the equation $2ax^2+(2a+b)x+b=0, a\neq 0$ are

(a) Rational

(b) Irrational

(c) Non-real

(d) Equal

Ans –a

Q.19) The number of the zeroes at the end of $\lfloor 100$ is

(a) 21

(b) 22

(c) 23

(d) 24

Ans –d

Q.20) Let $f(x)\leq 2^{n+1}, g(n)=1+(n+1)2^n$ for all is a N. Then

(a) $f(n)>g(n)$

(b) $f(n)<g(n)$

(c) $f(n)$ and $g(n)$ are unit comparable

(d) $f(n)>g(n)$ if n be even and $f(n)<g(n)$ if n

Ans –b

Q.21) A is set containing n elements P and Q are into subsets of A. then the number of ways of choosing P and Q so that $P\cap Q=0$ is

(a) $2^{2n}\ {}^{2n}C_n$

(b) 2^n

(c) 3^n-1

(d) 3^n

Ans –d

Q.22) There are n white and n black balls marked 1, 2, 3, ……..n. The number of ways in which we can arrange these balls in a row so that neighbouring balls are of different colours is

(a) $(n!)^2$

(b) $(2n)!$

(c) $2(n!)^2$

(d) $\frac{(2n)!}{(n!)^2}$

Ans –c

Q.23) If $\Delta(x)=\begin{vmatrix} x-2 & (x-1)^2 & x^2 \\ x-1 & x^2 & (x+1)^2 \\ x & (x+1)^2 & (x-2)^2 \end{vmatrix}$, the coefficient of x is $\Delta(x)$ is

(a) 2

(b) -2

(c) 3

(d) -4

Ans –b

Q.24) Under which of the following condition(s) does(do) the system of equations $\begin{pmatrix} 1 & 2 & 4 \\ 2 & 1 & 2 \\ 1 & 2 & (a-4) \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix}=\begin{pmatrix} 6 \\ 4 \\ n \end{pmatrix}$ possesses(posses) unique solution?

(a) $\forall a\in R$

(b) $a=8$

(c) For all integral values of a

(d) $a \neq 8$

Ans –d

Q.25) If $A = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ and $A^{2018} = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, then $(a + d)$ equals

(a) $1 + 1$

(b) 0

(c) 2

(d) 2018

Ans –b

Q.26) Let S, T, U be three non-vuled sets and $f: S \to T, g: T \to U$ and composed mapping $g: f: S \to U$ be defined. Let $g \cdot f$ be injective mapping. Then

(a) f, g both are injective

(b) Neither f nor g is injective

(c) f is obviously injective

(d) g is obviously injective

Ans –c

Q.27) If $p = \begin{bmatrix} 1 & \alpha & 3 \\ 1 & 3 & 1 \\ 2 & 4 & 4 \end{bmatrix}$ is the adjacent of the 3×3 matrix A and det A = 4, then a is equal to

(a) 4

(b) 11

(c) 5

(d) 0

Ans –b

Q.28) A, B, C are mutually exclusive events such that $P(A) = \frac{3x+1}{3}, P(B) = \frac{1-x}{4}$ and $(C) = \frac{1-2x}{2}$. Then the set of possible values of x are in

(a) [0 , 1]

(b) $\left[\frac{1}{3}, \frac{1}{2}\right]$

(c) $\left[\frac{1}{3}, \frac{2}{3}\right]$

(d) $\left[\frac{1}{3}, \frac{13}{3}\right]$

Ans –b

Q.29) A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1 only. The probability that the determinant chosen is non-zero is

(a) $\frac{3}{16}$

(b) $\frac{3}{8}$

(c) $\frac{1}{4}$

(d) $\frac{5}{8}$

Ans –b

Q.30) For the mapping $f: R \cdot (t) \to R - (2)$, given by $f(x) = \frac{2x}{x-1}$ which of the following is correct?

(a) f is one-one but not onto

(b) f is onto but not one-one

(c) f is neither one-one not onto

(d) f is both one-one and onto

Ans –d

Q.31) If the algebraic sum of the distance from the points (2, 0), (0, 2) and (1, 1) is a variable straight line be zero, then the line passes through the fixed point

(a) $(-1, 1)$

(b) $(1, -1)$

(c) $(-1, -1)$

(d) $(1, 1)$

Ans –d

Q.32) The side AB of ΔABC is fixed and is of length $2a$ unit. The vertex moves in the plane such that the vertical angle is always constant and is α. Let x-axis be along AB and the origin be at A. Then the locus of the vertex is

(a) $x^2 + y^2 + 2ax \sin \alpha + a^2 \cos \alpha = 0$

(b) $x^2 + y^2 - 2ax - 2ay \cot \alpha = 0$

(c) $x^2 + y^2 - 2ax\cos\alpha - a^2 = 0$
(d) $x^2 + y^2 - ax\sin\alpha - ay\cos\alpha = 0$
Ans –b

Q.33) If $(\cot\alpha_1)(\cot\alpha_2)\ldots\ldots(\cot\alpha_n)$ is given by
(a) $\frac{1}{2^{n/2}}$
(b) $\frac{1}{2^n}$
(c) $\frac{1}{2n}$
(d) 1
Ans –a

Q.34) A line passes through the point $(-1, 1)$ and makes an angle $\sin^{-1}\left(\frac{3}{5}\right)$ in the positive direction of x-axis. If this line meets the curve $x^2 = 4y - 9$ at A and B, then |AB| is equal to
(a) $\frac{4}{5}$ unit
(b) $\frac{5}{4}$ unit
(c) $\frac{3}{5}$ unit
(d) $\frac{5}{3}$ unit
Ans –a

Q.35) Two circles $S_1 = px^2 + py^2 + 2g'x + 2f'y + d = 0$ and $S_2 = x^2 + y^2 + 2gx + 2fy + d' = 0$ have a common chord PQ. The equation of PQ is
(a) $S_1 - S_2 = 0$
(b) $S_1 + S_2 = 0$
(c) $S_1 - pS_2 = 0$
(d) $S_1 + pS_2 = 0$
Ans –c

Q.36) If the sum of the distances of a point from two perpendicular lines in a plane is 1 unit, then its locus is
(a) A square
(b) A circle
(c) A straight line
(d) Two intersecting lines
Ans –a

Q.37) Let P be a point on (2, 0) and Q be a variable point on $(y-6)^2 = 2(x-4)$. Then the locus of mid-point of PQ is
(a) $y^2 + x + 6y + 12 = 0$
(b) $y^2 - x + 6y + 12 = 0$
(c) $y^2 + x - 6y + 12 = 0$
(d) $y^2 - x - 6y + 12 = 0$
Ans –d

Q.38) AB is a chord of a parabola $y^2 = 4ax, (a > 0)$ with vertex A. BC is drawn perpendicular to AB meeting the axis at C. The projection of BC on the axis of the parabola is
(a) a unit
(b) $2a$ unit
(c) $8a$ unit
(d) $4a$ unit
Ans –d

Q.39) Let $P(3\sec\theta, 2\tan\theta)$ and $Q(3\sec\emptyset, 2\tan\emptyset)$ be two points on $\frac{x^2}{9} - \frac{y^2}{4} = 1$ such that $+\emptyset = \frac{\pi}{2}, 0 < \theta, \emptyset < \frac{\pi}{2}$. Then the ordinate of the point of intersection of the normal at P and Q is
(a) $\frac{13}{2}$
(b) $-\frac{13}{2}$
(c) $\frac{5}{2}$
(d) $-\frac{5}{2}$
Ans –b

Q.40) The equation of the plane through the intersection of the planes $x + y + z = 1$ and $2x + 3y - z + 4 = 0$ and parallel to the x-axis is

(a) $y + 3z + 6 = 0$
(b) $y + 3z - 6 = 0$
(c) $y - 3z + 6 = 0$
(d) $y - 3z - 6 = 0$
Ans –c

Q.41) The line $x - 2y + 4z + 4 = 0, x + y + z - 8 = 0$ intersect the plane $x - y + 2z + 1 = 0$ at the point
(a) $(-2, 5, 1)$
(b) $(2, -5, 1)$
(c) $(2, 5, -1)$
(d) (2, 5, 1)
Ans – d

Q.42) AB is a variable chord of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. If AB subtends a right angle at the origin O, then $\frac{1}{OA^2} + \frac{1}{OB^2}$ equals to
(a) $\frac{1}{a^2} + \frac{1}{b^2}$
(b) $\frac{1}{a^2} - \frac{1}{b^2}$
(c) $a^2 + b^2$
(d) $a^2 - b^2$
Ans –a

Q.43) The values of a, b, c for which the function $f(x) = \begin{cases} \frac{\sin(a+1)x + \sin x}{x}, & x < 0 \\ c, & x = 0 \\ \frac{(x+bx^2)^{1/2} - x^{1/2}}{bx^{1/2}}, & x > 0 \end{cases}$ is continuous at $x = 0$ are
(a) $a = \frac{3}{2}, b = -\frac{3}{2}, c = \frac{1}{2}$
(b) $a = -\frac{3}{2}, c = \frac{3}{2}, b$ is arbitrary non-zero real number
(c) $a = -\frac{5}{2}, b = -\frac{3}{2}, c = \frac{3}{2}$
(d) $a = -2, b \in R - \{0\}, c = 0$
Ans –d

Q.44) Let $f(x) = a_0 - a_t, |x| + a_2|x^2| + a_3|x^3|$, where a_0, a_1, a_2, a_3 are real constants. Then $f(x)$ is differentiable at $x = 0$
(a) Whatever be a_0, a_1, a_2, a_3
(b) For no values of a_0, a_1, a_2, a_3
(c) Only if $a_1 = 0$
(d) Only if $a_1 = 0, a_3 = 0$
Ans –c

Q.45) If $y = e^{\tan^{-1} a}$ then
(a) $(1 - x^2)y_2 + (2x - 1)y_1 = 0$
(b) $(1 + x^2)y_2 + 2xy = 0$
(c) $(1 - x^2)y_2 - y_1 = 0$
(d) $(1 + x^2)y_2 + 3xy_1 + 4y = 0$
Ans –a

Q.46) Domain of $y = \sqrt{\log_{10} \frac{3x - x^2}{2}}$ is
(a) $x < 1$
(b) $2 < x$
(c) $1 \leq x \leq 2$
(d) $2 < x < 3$
Ans –c

Q.47) Let $f: [a, b] \to R$ be continuous in $[a, b]$, differentiable in (a, b) and $f(a) = 0 = R(b)$. Then
(a) There exists at least one point $c \in (a, b)$ for which $f'(c) = f(c)$
(b) $f'(x) = f(x)$ does not hold at any point of (a, b)
(c) At every point of $(a, b), f'(x) > f(x)$
(d) At every point of $(a, b), f'(x) < f(x)$
Ans –a

Q.48) $\lim_{x \to 0} \left(\frac{1}{x} \mathbf{In} \sqrt{\frac{1 + xx}{1 - x}} \right)$ is
(a) ½
(b) 0
(c) 1

(d) Does not exist

Ans –c

Q.49) Let f be derivable in [0, 1], then

(a) There exists $c \in (0,1)$ such that $\int_0^c f(x)dx = (1-c)f(c)$

(b) There does not exist any point $d \in (0,1)$ for which $\int_0^d f(x)dx = (1-d)f(\mathrm{d})$

(c) $\int_0^c f(x)dx$ does not exist, for any $c \in (0,1)$

(d) $\int_0^c f(x)dx$ is independent of $c, c \in (0,1)$

Ans –b

Q.50) $\mathrm{I} = \int \cos(\mathrm{In}\, x)dx$. The $I =$

(a) $\frac{x}{2}\{\cos(\mathrm{In}\, x) + \sin(\mathrm{In}\, x)\} + c$

(b) $x^2\{\cos(\mathrm{In}\, x) - \sin(\mathrm{In}\, x)\} + c$

(c) $x^2 \sin(\mathrm{In}\, x) + c$

(d) $x \cos(\mathrm{In}\, x) + c$

Ans – a

Q.51) If $\bar{\alpha}$ is a unit vector, $\bar{\beta} = \hat{\imath} + \hat{\jmath} - \hat{k}, \bar{\gamma} = \hat{\imath} + \hat{k}$, then the maximum value of $[\bar{\alpha}\ \bar{\beta}\ \bar{\gamma}]$ is

(a) 3

(b) $\sqrt{3}$

(c) 2

(d) $\sqrt{6}$

Ans – d

Q.52) The maximum value of $f(x) = e^{\sin x} + e^{\cos x}; x \in R$ is

(a) $2e$

(b) $2\sqrt{e}$

(c) $2e^{1/\sqrt{2}}$

(d) $2e^{-1/\sqrt{2}}$

Ans – c

Q.53) A straight line meets the co-ordinate axes at A and B. A circle is circumscribed about the triangle OAB. O being the origin. If m and n are the distances of the tangent to the circle at the origin from the points A and B respectively. The diameter of the circle is

(a) $m(m+n)$

(b) $m+n$

(c) $n(m+n)$

(d) $1/2(m+n)$

Ans – d

Q.54) Let the tangent and normal at any point $P(at^2, 2at), (a > 0)$, on the parabola $y^2 = 4ax$ meet the axis of the parabola at T and G respectively. Then the radius of the circle through P, T and G is

(a) $a(1+t^2)$

(b) $(1+t^2)$

(c) $a(1-t^2)$

(d) $(1-t^2)$

Ans – a

Q.55) From the point $(-1, -6)$, two tangents are drawn to $y^2 = 4x$. Then the angle between the two tangents is

(a) $\pi/3$

(b) $\pi/4$

(c) $\pi/6$

(d) $\pi/2$

Ans – d

Q.56) If x satisfies the inequality $\log_{25} x^2 + (\log_5 x)^2 < 2$, then x belongs to

a) $\left(\frac{1}{5}, 5\right)$

b) $\left(\frac{1}{25}, 5\right)$

c) $\left(\frac{1}{5}, 25\right)$

d) $\left(\frac{1}{25}, 25\right)$

Ans - b

Q.57) The solution of $\det(A - \lambda l_2) = 0$ be 4 and 8 and $A = \begin{pmatrix} 2 & 3 \\ x & y \end{pmatrix}$. Then

a) $x = 4, y = 10$

b) $x = 5, y = 8$

c) $x = 3, y = 9$

d) $x = -4, y = 10$

Ans - d

Q.58) The value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assumes the least value is

a) 0

b) 1

c) 2

d) 3

Ans - b

Q.59) $f: X \to R, X = \{x | 0 < x < |\}$ is defined as $f(x) = \frac{2x-1}{1-|2x-1|}$. Then

a) f is only injective

b) f is only bijective

c) f is bijective

d) f is neither injective

Ans - c

Q.60) If P_1P_2 and P_3P_4 are two focal chords of the parabola $y^2 = 4ax$ then the chords P_1P_3 and P_2P_4 intersect on the

a) directrix of the parabola

b) axis of the parabola

c) latus-reactum of the parabola

d) y-axis

Ans - a

Q.61) PQ is a double ordinate of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ such that ΔOPQ is an equilateral triangle, O being the centre of the hyperbola. Then the eccentricity e of the hyperbola satisfies

a) $1 < e < \frac{2}{\sqrt{3}}$

b) $3 = \frac{2}{\sqrt{3}}$

c) $e = 2\sqrt{3}$

d) $e > \frac{2}{\sqrt{3}}$

Ans - d

Q.62) Let f be a non-negative function defined in $\left[0, \frac{\pi}{2}\right], f'$ exists and be continuous for all x and $\int_0^x \sqrt{1 - (f'(t))^2}\, dt = \int_0^x f(t)dt$ and $f(0) = 0$. Then

a) $f\left(\frac{1}{2}\right) < \frac{1}{2}$ and $f\left(\frac{1}{3}\right) > \frac{1}{3}$

b) $f\left(\frac{1}{2}\right) > \frac{1}{2}$ and $f\left(\frac{1}{3}\right) < \frac{1}{3}$

c) $f\left(\frac{4}{3}\right) < \frac{4}{3}$ and $f\left(\frac{2}{3}\right) < \frac{2}{3}$

d) $f\left(\frac{4}{3}\right) > \frac{4}{3}$ and $f\left(\frac{2}{3}\right) > \frac{2}{3}$

Ans - c

Q.63) $\lim_{x\to 0}\left(\frac{x^2+1}{x+1} - ar - b\right).(a, b \in R) = 0$. Then

a) $a = 0, b = 1$

b) $a = 1, b = -1$

c) $a = -1, b = 1$

d) $a = 0, b = 0$

Ans - b

Q.64) If the transformation $z = \log\tan\frac{x}{2}$ reduces the differential equation $\frac{d^2y}{dx^2} + \cot x\frac{dy}{dx} + 4y\,\text{cosec}^2\,x = 0$ into form $\frac{d^2y}{dx^2} + ky = 0$ then k is equal to

a) -4

b) 4

c) 2

d) -2

Ans - a

Q.65) If I is the greatest of $I_1 = \int_0^1 e^{-x}\cos^2 x\ dx, I_2 = \int_0^1 e^{-x^2}\cos^2 x\ dx, I_3 = \int_0^1 e^{-x^2}\,dx, I_4 = \int_0^1 e^{-x^2/2}\,dx$, then

a) $I = I_1$

b) $I = I_2$

c) $I = I_3$

d) $I = I_4$

Ans - d

Q.66) Let $\Delta = \begin{vmatrix} \sin\theta\cos\phi & \sin\theta\sin\phi & \cos\theta \\ \cos\theta\cos\phi & \cos\theta\sin\phi & -\sin\theta \\ -\sin\theta\sin\phi & \sin\theta\cos\phi & 0 \end{vmatrix}$.

Then

a) Δ is independent of θ

b) Δ is independent of φ

c) Δ is a constant

d) $\left(\frac{d\Delta}{d\theta}\right)_{0=\pi/2} = 0$

Ans – b, d

Q.67) Let z_1 and z_2 be two non-zero complex numbers. Then

a) Principal value of $\arg(z_1z_2)$ may not be equal to Principal value of $\arg z_1 +$ Principal value of $\arg Z_2$

b) Principal value of $\arg(z_1z_2) =$ Principal value of $\arg z_1 +$ Principal value of $\arg z_2$

c) Principal value of $\arg\left(\frac{z_1}{z_2}\right) =$ Principal value of $\arg z_1 -$ Principal value of $\arg z_2$

d) Principal value of $\arg\left(\frac{z_1}{z_2}\right)$ may not be $\arg z_1 - \arg z_2$

Ans – a, d

Q.68) Chords of an ellipse are drawn through the positive end of the mirror axis. Their midpoint lies on

a) A circle

b) A parabola

c) An ellipse

d) A hyperbola

Ans - c

Q.69) Consider the equation $y = y_1 = m(x - x_1)$. If m and x_1 are fixed and different lines are drawn for different value of y_1, then

a) The lines will pass through a fixed point

b) There will be a set of parallel lines

c) All lines intersect the line $x = x_1$

d) All lines will be parallel to the line $y = x_1$

Ans – b, c

Q.70) Let R and S be two equivalence relations on a non-void set A. Then

a) $R \cup S$ is equivalence relation

b) $R \cap S$ is equivalence relation

c) $R \cap S$ is not equivalence relation

d) $R \cup S$ is not equivalence relation

Ans - b

Q.71) Twenty metrres of wire is available to fence off a flower bed in the form of a circular sector. What must the radius of the circle be, if the area of the flower bed be greatest?

a) 10 m

b) 4 m

c) 5 m

d) 6 m

Ans - c

Q.72) The line $y = x + 5$ touches

a) The parabola $y^2 = 20\,x$

b) The ellipse $9x^2 + 16y^2 = 144$

c) The hyperbola $\frac{x^2}{29} = \frac{y^2}{4} = 1$

d) The circle $x^2 + y^2 = 25$

Ans – a, b, c

Q.73) Let $p(x)$ be a polynomial with real co-efficient, $p(0) = 1$ and $p'(x) > 0$ for all $x \in R$. Then

a) $p(x)$ has at least two real roots

b) $p(x)$ has only one positive real root

c) $p(x)$ may have negative real roots

d) $p(x)$ has infinitely many real roots

Ans - c

Q.74) Let $f(x) = x^2 + x \sin x - \cos x$. Then

a) $f(x) == 0$ has at least one real root

b) $f(x) = 0$ has no real root

c) $f(x) = 0$ has at least one positive root

d) $f(x) =$ has at least one negative root

Ans – c, d

Q.75) From a balloon rising vertically with uniform v ft/sec a piece of stone is let go. The height of the balloon above the ground when the stone reaches the ground after 4 sec is $[g = 32\ ft/\sec^2]$

a) 220 ft

b) 240 ft

c) 256 ft

d) 260 ft

Ans - c