Ques # :1

$$\frac{(1+2+\_\_\_\_+15)(1^2+2^2+\_\_\_\_+15^2)}{1^3+2^3+\_\_\_\_+(15)^3} =$$

1) 1
2) 31
3) 62
4) 31/2

Ques # :2

The variance of binomial distribution is -

1) always equal to its mean
2) less than from its mean
3) greater than from its mean
4) None of these

Ques # :3

If mean and standard deviation of a binomial variate X are 4 and $\sqrt{3}$ respectively, then $P(X \geq 1)$ is equal to

1) $1-\left(\frac{1}{3}\right)^{16}$
2) $1-\left(\frac{1}{4}\right)^{16}$
3) $1-\left(\frac{2}{3}\right)^{16}$
4) $1-\left(\frac{3}{4}\right)^{16}$

Ques # :4

The probabilities of dieing Mr. A and Mr. B in a leap year are p and q. In the end of year the probability of living of only one out of two, is equal to

1) p + q - pq
2) pq
3) p + q - 2 pq

4) p + q + pq

Ques # :5

A bag contains 8 white and 6 red balls. 5 balls are drawn randomly from the bag, the probability that 3 or more balls are white, is equal to

1) 317 / 1001
2) 658 / 1001
3) 210 / 1001
4) None of these

Ques # :6

n persons sit around a round table. The odds in favour that two particular persons sit together, is equal to

1) 2 : (n-3)
2) 2 : (n-2)
3) 2 : (n-1)
4) 2 : n

Ques # :7

A die is thrown 8 times. The probability of occuring third time 6 in eighth throw, is equal to-

1) $\frac{({}^{7}c_{2} \times 5^{5})}{6^{6}}$
2) $\frac{({}^{7}c_{2} \times 5^{5})}{6^{2}}$
3) $\frac{({}^{7}c_{2} \times 5^{5})}{6^{8}}$
4) None of these

Ques # :8

The probability of winning a game by the team A is 2/3. If A plays four games, then the probability of winning more than half of the games, is equal to

1) 16 / 27
2) 19 / 27
3) 19 / 81
4) 32 / 81

Ques # :9

Let α, β be the roots of the equation $ax^2 + bx + c = 0$. If $\Delta = b^2 - 4ac$ and $\alpha + \beta, \alpha^2 + \beta^2, \alpha^3 + \beta^3$ are in G.P., then

1) $\Delta \neq 0$
2) $b\Delta = 0$
3) $c\Delta = 0$
4) $c\Delta \neq 0$

Ques # :10

If 10 bulbs are faulty out of 100 bulbs. The probability that no bulb is faulty in a sample of 5 bulbs, is equal to

1) $\left(\frac{1}{2}\right)^5$
2) $\left(\frac{1}{10}\right)^5$
3) $\left(\frac{9}{10}\right)^5$
4) $\left(\frac{1}{10}\right)$

Ques # :11

If α, β, γ are unequal real numbers, then the three points, whose position vectors are $\alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$, $\beta\hat{i} + \gamma\hat{j} + \alpha\hat{k}$ and $\gamma\hat{i} + \alpha\hat{j} + \beta\hat{k}$ are

1) collinear
2) vertices of equilateral triangle
3) vertices of isoceles triangle
4) vertices of right angle triangle

Ques # :12

$\vec{a}.[(\vec{b} + \vec{c}) \times (\vec{a} + \vec{b} + \vec{c})]$ equals to

1) 0
2) $[\vec{a}\,\vec{b}\,\vec{c}] + [\vec{b}\,\vec{c}\,\vec{a}]$

3) $[\vec{a}\,\vec{b}\,\vec{c}]$

4) None of these

Ques # :13

If $\vec{a}$ and $\vec{b}$ be two such unit vectors that $\vec{a}+2\vec{b}$ and $5\vec{a}-4\vec{b}$ are mutually perpendicular then angle between $\vec{a}$ and $\vec{b}$ is equal to

1) $45°$

2) $60°$

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

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

Ques # :14

If $\hat{a}$, $\hat{b}$ and $\hat{c}$ be unit vectors and $|\hat{a}-\hat{b}|^2=|\hat{b}-\hat{c}|^2=|\hat{c}-\hat{a}|^2=9$, then $|2\hat{a}+5\hat{b}+5\hat{c}|$ equals to -

1) 3

2) 4

3) 6

4) 8

Ques # :15

If $\vec{a}$, $\vec{b}$ and $\vec{c}$ are non –coplanar vectors and $\vec{d}=\lambda\vec{a}+\mu\vec{b}+\nu\vec{c}$, then λ equals to –

1) $\frac{[\vec{d}\,\vec{b}\,\vec{c}]}{[\vec{b}\,\vec{a}\,\vec{c}]}$

2) $\frac{[\vec{b}\,\vec{c}\,\vec{d}]}{[\vec{b}\,\vec{c}\,\vec{a}]}$

3) $\frac{[\vec{b}\,\vec{d}\,\vec{c}]}{[\vec{a}\,\vec{b}\,\vec{c}]}$

4)

$$\frac{[\vec{c}\,\vec{b}\,\vec{d}\,]}{[\vec{a}\,\vec{b}\,\vec{c}]}$$

Ques # :16

A well with 14 metres inside diameter is dug 8 metres deep. Sand taken out of it has been evenly spread all around it to a width of 21 metres to form an embankment. The height of embankment is equal to-

1) 43 cm
2) 47.6 cm
3) 53.3 cm
4) 41 cm

Ques # :17

If the volumes of two cones are in the ratio 1 : 4 and their diameters are in ratio 4 : 5, then the ratio of their heights is -

1) 1 : 5
2) 5 : 4
3) 5 : 16
4) 25 : 64

Ques # :18

A cylinderical vessel 60 cm in diameter is partially filled with water. A sphere, 30 cm in diameter is gently dropped into the vessel. To what further height will water in the cylinder rise ?

1) 40 cm
2) 15 cm
3) 3.75 cm
4) cannot be determined, since height of the cylinder has not been given.

Ques # :19

A cone of height 7 cm and base radius 3 cm is carved from a rectangular block of wood (10 cm x 5 cm x 2 cm). The percentage of wood wasted is -

1) 66 %
2) 34 %
3) 46 %
4) 54 %

Ques # :20

ABCD is a trapezium whose sides AB= a cm and DC= b cm. AB and DC are parallel, E and F are mid-points of non parallel sides. The ratio in the areas of ABFE and EFCD is -

1) (a + 3b) : (3a + b)
2) (3a + b) : (a + 3b)
3) (2a + b) : (3a + b)
4) None of these

Ques # :21

D is the mid-point of the base BC of a triangle ABC. DM and DN are perpendiculars on AB and AC respectively. If DM = DN, then the triangle is -

1) isoscales
2) equilateral
3) right angled
4) None of these

Ques # :22

Two circles touch internally. The sum of their areas is 116 π sq cm and the distance between their centres is 6 cm. The radius of larger circle is –

1) 4 cm
2) 8 cm
3) 10 cm
4) 12 cm

Ques # :23

Which of the following statements is incorrect -

1) The circle is a locus of a point in 2D.
2) The locus of the points which are equidistant from three non-collinear points is the centre of the circle passing through the given points.
3) The locus of the points which are equidistant from three points on a line, is a line parallel to the given line.
4) None of these

Ques # :24

If O be the interior point in a triangle, then -

1) (AB+BC+CA) < (OA+OB+OC)
2) (AB+BC+CA) < 2(OA+OB+OC)
3) (AB+BC+CA) > 2(OA+OB+OC)
4) (AB+BC+CA) = 2(OA+OB+OC)

Ques # :25

If AD , BE and CF are the medians of a triangle ABC, then

1) $AB^2 + BC^2 + CA^2 = AD^2 + BE^2 + CF^2$
2) $3\,(AB^2 + BC^2 + CA^2) = 4\,(AD^2 + BE^2 + CF^2)$
3) $AB^2 + BC^2 + CA^2 = 3\,(AD^2 + BE^2 + CF^2)$
4) $AB^2 + BC^2 + CA^2 = 2\,(AD^2 + BE^2 + CF^2)$

Ques # :26

D, E, F are the mid-points of the sides BC, CA and AB respectively of a equilateral ΔABC , then which of the following is true ?

1) ΔDEF , ΔAFE , ΔBDF , ΔCDE are congruent .
2) ΔDEF , ΔAFE , ΔBDF , ΔCDE are similar.
3) ΔDEF , ΔAFE , ΔBDF , ΔCDE are of same area.
4) All of these.

Ques # :27

Let ABC be an equilateral triangle and BE $\perp$ CA and meeting CA at E , then $(AB^2 + BC^2 + CA^2)$ is equal to -

1) $3\,BE^2$
2) $4\,BE^2$
3) $6\,BE^2$
4) $2\,BE^2$

Ques # :28

Every composite number can be uniquely expressed as the product of primes. It is known as -

1) Fundamental theorem of algebra.
2) Fundamental theorem of arithmatic.

3) Euclid's lemma.
4) None of these

Ques # :29

The set G={1,2,3,.....m-1} , is an abelian group with respect to multiplication modulo m, if

1) m is any positive integer.
2) m is prime integer.
3) m is even integer.
4) m is odd integer.

Ques # :30

The order of permutation $\rho = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 7 & 8 & 9 & 6 & 4 & 5 & 2 & 3 & 1 \end{pmatrix}$ is

.

1) 3
2) 9
3) 6
4) 4

Ques # :31

Let C_o be the set of non zero complex numbers and $f : (C_o, x) \to (C_o, x)$ be a group homomorphism, where $f(z) = z^n$, $n \in N$. The kernel of f is :

1) {1}
2) {1, -1}
3) {1, 0, -1}
4) { n^{th} roots of unity }

Ques # :32

The number of generators of cyclic group ({ a , a^2 , a^3 , ..., $a^8 = e$ } , x), where e is identity element , is

1) 1
2) 2
3) 4
4) 3

Ques # :33

"Every homomorphic image of a group G is isomorphic to some quotient group of G." This theorem is known as :

1) Fundamental theorem of morphism.
2) Lagrange's theorem
3) Cayley's theorem
4) Euler's theorem

Ques # :34

If $f : R \to R$ is a function such that $f(1) = 3$, $f'(1) = 6$, then

$\lim\limits_{x\to 0} \left(\frac{f(1+x)}{f(1)}\right)^{\frac{1}{x}}$ is equal to –

1) 1
2) $e^{\frac{1}{2}}$
3) e^2
4) e^3

Ques # :35

If $f(x) = \begin{cases} x^{\alpha}\cos\frac{1}{x} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$ is continuous at $x = 0$, then -

1) $\alpha < 0$
2) $\alpha > 0$
3) $\alpha = 0$
4) $\alpha \geq 0$

Ques # :36

If $f(x) = \cos^{-1}\left[\sin\sqrt{\frac{(1+x)}{2}}\right] + x^x$, then $f'(1)$ is equal to –

1) 0
2) $\frac{1}{2}$
3)

4) $\frac{3}{4}$

$-\frac{1}{2}$

Ques # :37

The function $f(x) = \big||x|-1\big|$ is not differentiable at the points -

1) $x = 1$

2) $x = \pm 1$

3) $x = 0, \pm 1$

4) $x = -1$

Ques # :38

If $y = \tan^{-1}\left[\frac{x}{1+\sqrt{1-x^2}}\right] + \sin\left[2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right]$, then $\frac{dy}{dx} =$

1) $\frac{x}{\sqrt{1-x^2}}$

2) $\frac{1-2x}{2\sqrt{1-x^2}}$

3) $\frac{1-2x}{\sqrt{1-x^2}}$

4) $\frac{2x-1}{2\sqrt{1-x^2}}$

Ques # :39

If tangent line at the point (m^2, m^3) on the curve $y^2 = x^3$ is also normal at the point (M^2, M^3) on this curve, then value of m.M is -

1) $-\frac{4}{9}$

2) $-\frac{2}{3}$

3) $-\frac{1}{3}$

4) $-\frac{9}{4}$

Ques # :40

The function $f(x) = \tan^{-1}(\sin x + \cos x)$ is monotonic increasing, when -

1) $x < 0$

2) $x > 0$

3) $0 < x < \frac{\pi}{2}$

4) $0 < x < \frac{\pi}{4}$

Ques # :41

The maximum value of the function $\frac{1}{x} . \log_e x$ is-

1) e

2) 1/e

3) 2e

4) 2/e

Ques # :42

The height of the right circular cone with maximum volume inscribed in the sphere of diameter a, is

1) $\frac{2}{3}a$

2) $\frac{3}{4}a$

3) $\frac{1}{3}a$

4) $\frac{1}{4}a$

Ques # :43

If $y = e^{x+e^{x+e^{x+\cdots\infty}}}$, then $\frac{dy}{dx} =$

1) $\frac{y}{1+y}$

2)

$\frac{y}{y-1}$

3) $\frac{y}{1-y}$

4) $-\frac{y}{1+y}$

Ques # :44

$\int \frac{dx}{x^2\,(x^4+1)^{3/4}}$ equals to –

1) $\frac{(x^4+1)^{\frac{1}{4}}}{x}+c$

2) $-\frac{(x^4+1)^{\frac{1}{4}}}{x}+c$

3) $\frac{3}{4}\frac{(x^4+1)^{\frac{3}{4}}}{x}+c$

4) $\frac{4}{3}\frac{(x^4+1)^{\frac{3}{4}}}{x}+c$

Ques # :45

$\int_0^{\pi/2} |\sin x-\cos x|\,dx$ equals to -

1) 0

2) $2(\sqrt{2}+1)$

3) $2(\sqrt{2}-1)$

4) $\sqrt{2}-1$

Ques # :46

$\lim_{n\to\infty}\left[\frac{1}{\sqrt{n^2}}+\frac{1}{\sqrt{n^2+n}}+\frac{1}{\sqrt{n^2+2n}}+---+\frac{1}{\sqrt{n^2+(n-1)n}}\right]$

equals to –

1) $2\sqrt{2}$

2) 2

3) $2-2\sqrt{2}$

4) $2\sqrt{2}-2$

Ques # :47

$\int_{-\pi}^{\pi} \frac{\cos^2 x}{1+a^x} dx$ $(a > 0)$ equals to –

1) π

2) $a\pi$

3) $\frac{\pi}{2}$

4) 2π

Ques # :48

The area bounded by parabolas $y = (x+1)^2$ and $y = (x-1)^2$ and the straight line $y = \frac{1}{4}$ is –

1) 4

2) 1/6

3) 4/3

4) 1/3

Ques # :49

Between any two roots of the equation $e^x \cos x = 1$, there exists for the equation $e^x \sin x - 1 = 0$:--

1) Atleast one root

2) Exactly one root

3) No root

4) Infinite roots

Ques # :50

In the Lagrange's mean value theorem $f(x+h) = f(x) + hf'(x+\theta h)$, $0 < \theta < 1$ where $f(x) = ax^2 + bx + c$, the value of θ is –

1) 1/3

2) 1/2

3) 1/4
4) 1

Ques # :51

If A (3 , 1) , B (6 , 5) and C (x , y) are three points such that $\angle ACB = 90°$ and area of $\Delta ABC = 7$, then number of such points C is –

1) 0
2) 1
3) 2
4) 4

Ques # :52

If three non-zero numbers a,b,c are in H.P. , then the straight line $\frac{x}{a} + \frac{y}{b} + \frac{1}{c} = 0$ always passes through a fixed point, which is –

1) (1 , 1/2)
2) (1 , - 2)
3) (- 1 , - 2)
4) (- 1 , 2)

Ques # :53

If equation $2x^2 + 7xy + 3y^2 + 8x + 14y + \lambda = 0$ represents a pair of straight lines, then the value of λ is –

1) 2
2) 4
3) 6
4) 8

Ques # :54

The image of origin with respect to the straight line x + y + 1 = 0 is -

1) $(1, 1)$
2) $(-1, -1)$
3) $(-2, -2)$
4) $\left(-\frac{1}{2} , -\frac{1}{2}\right)$

Ques # :55

The locus of the centre of the circle, which touches externally the circle $x^2 + y^2 - 6x - 6y + 14 = 0$ and also touches y- axis, is –

1) $x^2 - 6x - 10y + 14 = 0$

2) $x^2 - 10x - 6y + 14 = 0$

3) $y^2 - 10x - 6y + 14 = 0$

4) $y^2 - 6x - 10y + 14 = 0$

Ques # :56

If the straight lines joining origin to the intersection points of straight line $y = 2\sqrt{2}\,x + c$ and circle $x^2 + y^2 = 2$ are mutually perpendicular, then –

1) $c^2 - 4 = 0$

2) $c^2 - 8 = 0$

3) $c^2 - 9 = 0$

4) $c^2 - 10 = 0$

Ques # :57

If the focal chord of parabola $y^2 = 16x$ is the tangent line of the circle $(x-6)^2 + y^2 = 2$, then the possible values of slopes of this chord are :

1) $\{-1, 1\}$

2) $\{-2, 2\}$

3) $\left\{-2, -\frac{1}{2}\right\}$

4) $\left\{-2, \frac{1}{2}\right\}$

Ques # :58

The angle between the tangent lines drawn from the origin to the parabola $y^2 = 4a\,(x-a)$, is -

1) $90°$

2) $30°$

3) $\tan^{-1}\left(\frac{1}{2}\right)$

4) 45°

Ques # :59

The coordinates of the focii of the ellipse $25(x+1)^2+9(y+2)^2=225$ are :

1) (-2 , 1) , (-2 , 6)
2) (-1 , 2) , (-1 , -6)
3) (-1 , -2) , (-2 , -1)
4) (-1 , -2) , (-1 , -6)

Ques # :60

If the sum of intercepts of the tangent line from the point $\left(3\sqrt{3}\cos\theta, \sin\theta\right)$ to the ellipse $\frac{x^2}{27}+y^2=1$, where $0<\theta<\frac{\pi}{2}$, is minimum, then the value of θ is –

1) $\frac{\pi}{3}$
2) $\frac{\pi}{6}$
3) $\frac{\pi}{8}$
4) $\frac{\pi}{4}$

Ques # :61

The equations of the asymptotes of the hyperbola $xy-3x+4y+2=0$ are –

1) $x+4=0\,, y+3=0$
2) $x-4=0\,, y-3=0$
3) $x+4=0\,, y-3=0$
4) $x-4=0\,, y+3=0$

Ques # :62

If a focal chord of the parabola $y^2=4ax$ makes α angle with the x-axis then the length of chord is -

1) $4a\sin^2\alpha$
2) $4a\,\mathrm{cosec}^2\alpha$
3) $4a\cos\alpha\,\mathrm{cosec}^2\alpha$

4) $4a\cos\alpha\ \text{cosec}\,\alpha$

Ques # :63

A straight line makes $\alpha, \beta, \gamma, \delta$ angles with the four diagonals of a cube, then $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta$ equals to –

1) 1
2) 2/3
3) 4/3
4) 0

Ques # :64

The projections of a line segment on the coordinates axes are 12 , 4 and 3 respectively, then the length of this line segment is -

1) 12
2) 13
3) 14
4) 7

Ques # :65

The shortest distance between the straight lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ is –

1) $\sqrt{30}$
2) $2\sqrt{30}$
3) $5\sqrt{30}$
4) $3\sqrt{30}$

Ques # :66

A plane meets the coordinate axes at the points A, B, C . If centroid of the ΔABC is (a,b,c) , then the equation of this plane is –

1) $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$
2) $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = \frac{1}{3}$

3) $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=3$

4) $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=4$

Ques # :67

If the equation $ax^2+ay^2+az^2+2ux+2vy+2wz+d=0 \ \ (a\neq 0)$ represents a sphere, then –

1) $u^2+v^2+w^2-d\geq 0$

2) $u^2+v^2+w^2-ad\geq 0$

3) $u^2+v^2+w^2-ad\leq 0$

4) $u^2+v^2+w^2-d\leq 0$

Ques # :68

If α, β are the roots of the equation $2x^2+6x+b=0 \ \ (b<0)$, then $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ is

1) $=-2$

2) <-2

3) >-2

4) None of these

Ques # :69

If $a\in Z$ and the equation $(x-a)(x-10)+1=0$ has integral roots, then the values of a are -

1) 10 , 8

2) 12 , 10

3) 12 , 8

4) 9 , 11

Ques # :70

The values of a for which $(a^2-1)x^2+2(a-1)x+2$ is positive for any real value of x , are

1) $a\geq 1$

2) $a\leq 1$

3) $a > -3$

4) $a \leq -3 \text{ or } a \geq 1$

Ques # :71

Two students while solving a quadratic equation in x, one copied the constant term incorrectly and got the roots 3 and 2. The other copied constant term and coefficient of x^2 correctly and got the roots -6 and 1 . The correct roots are :

1) 3 , - 2

2) 6 , - 1

3) -6 , - 1

4) - 3 , 2

Ques # :72

The coefficient of x^5 in the expansion of

$(1+x)^{21} + (1+x)^{22} + \ldots\ldots\ldots\ldots + (1+x)^{30}$ is

1) ${}^{51}C_5$

2) ${}^{9}C_5$

3) ${}^{31}C_6 - {}^{21}C_6$

4) ${}^{30}C_5 + {}^{20}C_5$

Ques # :73

If $(1+x)^n = c_o + c_1 x + c_2 x^2 + \ldots\ldots\ldots\ldots + c_n x^n$, then

$c_o{}^2 + c_1{}^2 + c_2{}^2 + \ldots\ldots\ldots + c_n{}^2$ is equal to

1) $\dfrac{(2n)!}{(n!)^2}$

2) 2^n

3) 2^{2n-2}

4) $\dfrac{(2n)!}{2(n!)^2}$

Ques # :74

If a, b, c, d are in G.P., then $(a^3 + b^3)^{-1}$, $(b^3 + c^3)^{-1}$ $(c^3 + d^3)^{-1}$ are in

1) A.P.
2) H.P.
3) G.P.
4) None of these

Ques # :75

If between given two real numbers, A_1, A_2 are two A.M., G_1, G_2 are two G.M. and H_1, H_2 are two H.M., then $\frac{A_1+A_2}{H_1+H_2}$ is equal to :

1) $\frac{G_1G_2}{H_1H_2}$
2) $\frac{H_1H_2}{G_1G_2}$
3) $\frac{H_1H_2}{A_1A_2}$
4) $\frac{G_1G_2}{A_1A_2}$

Ques # :76

If $\frac{1}{q+r}, \frac{1}{r+p}, \frac{1}{p+q}$ are in A.P., then true statement is :

1) p, q, r are in A.P.
2) p^2, q^2, r^2 are in A.P.
3) $\frac{1}{p}, \frac{1}{q}, \frac{1}{r}$ are in A.P.
4) $\frac{1}{p^2}, \frac{1}{q^2}, \frac{1}{r^2}$ are in A.P.

Ques # :77

If first term of an infinite G.P. is x and its sum is 5, then

1) $x \geq 10$
2) $-10 < x < 0$
3) $0 < x < 10$

4) $x < -10$

Ques # :78

On the sides of BC, CA and AB of a triangle ABC, there are 3, 4 and 5 interior points respectively. Number of triangles formed by these points taking as vertices is equal to

1) 220
2) 205
3) 210
4) 200

Ques # :79

Number of integers with seven digits, the sum of whose digits is 10 and which can be formed by only 1, 2 or 3 digits, is equal to

1) 55
2) 66
3) 88
4) 77

Ques # :80

How many kinds can 7 men and 7 women sit around a round table, while in the neighbourhood of each man, there is a woman ?

1) $(7!)^2$
2) $(6!) \cdot (7!)$
3) $(6!)^2$
4) $\frac{(7!)^2}{(6!)^2}$

Ques # :81

The number of permutations formed by the letters of the word CONSEQUENCE in which all three E occur simultaneously is equal to

1) $(9!)(3!)$
2) $\frac{9!}{2!\ 2!\ 3!}$
3) $\frac{9!}{2!\ 2!}$

4) $\frac{9!}{2!}$

Ques # :82

If $\Delta_1 = \begin{vmatrix} x & a \\ b & x \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} x & a & a \\ b & x & a \\ b & b & x \end{vmatrix}$, then

1) $\Delta_2 = 3\Delta_1^{\,2}$
2) $\frac{d}{dx}(\Delta_2) = 3\Delta_1^{\,2}$
3) $\frac{d}{dx}(\Delta_2) = 3\Delta_1$
4) $\frac{d}{dx}(\Delta_2) = 2\Delta_1$

Ques # :83

Let A and B are matrices of real numbers of order (3 x 3) , A is symmetric and B is skew symmetric and (A+B) (A-B) = (A-B) (A+B) if $(AB)^T = (-1)^k (AB)$, then possible values of k are :

1) 0 and 2
2) 1 and 3
3) 0 and 3
4) 2 and 3

Ques # :84

A relation R is defined on the set Z of integers as –
m R n $\Leftrightarrow$ (m+n) is odd, then

1) R is symmetric only
2) R is symmetric and transitive
3) R is reflexive and symmetric
4) R is reflexive and transitive

Ques # :85

If $f(x) = \sqrt{\log(\frac{5x-x^2}{4})}$ be a real function then domain of f is :

1) [1 , 4)
2) [0 , 1]
3) [0 , 5]
4) [1 , 4]

Ques # :86

If $f(x) = \begin{cases} x & , \ x \in Q \\ 0 & , \ x \notin Q \end{cases}$, $g(x) = \begin{cases} 0 & , \ x \in Q \\ x & , \ x \notin Q \end{cases}$ then the $(f - g)$ is –

1) one-one onto
2) one-one but not onto
3) onto but not one-one
4) neither one-one nor onto

Ques # :87

If z_1 , z_2 , z_3 be the vertices of an equilateral triiangle formed inside the circle $|z| = 2$ and $z_1 = 1 + i\sqrt{3}$, then –

1) $z_2 = -2$, $z_3 = 1 - i\sqrt{3}$
2) $z_2 = 2$, $z_3 = 1 - i\sqrt{3}$
3) $z_2 = -2$, $z_3 = -1 - i\sqrt{3}$
4) $z_2 = 1 - i\sqrt{3}$, $z_3 = -1 - i\sqrt{3}$

Ques # :88

If $|z + 4| \leq 3$, then maximum and minimum values of $|z + 1|$ are :

1) 6 , 1
2) 4 , 0
3) 4 , 1
4) 6 , 0

Ques # :89

$\tan 1^\circ \ \tan 2^\circ \ \tan 3^\circ \ \ldots\ldots\ldots\ldots \tan 89^\circ$ is equal to –

1) 0
2) 1
3) ∞

4) $\frac{1}{\sqrt{2}}$

Ques # :90

For $x \in (0,\pi)$ the equation
$\sin x + 2\sin 2x - \sin 3x = 3$ has -

1) infinite solutions
2) three solutions
3) one solution
4) no solution

Ques # :91

If $A + B + C = \pi$, then $\cos 2A + \cos 2B + \cos 2C$ is equal to

1) $4\cos A \cos B \cos C$
2) $1 + 4\cos A \cos B \cos C$
3) $-1 - 4\cos A \cos B \cos C$
4) $-1 + 4\sin A \sin B \sin C$

Ques # :92

If the perimeter of a triangle ABC is six times the arithmatic mean of sines of their angles and BC=1 , then angle A is equal to -

1) $\frac{\pi}{6}$
2) $\frac{\pi}{4}$
3) $\frac{\pi}{3}$
4) $\frac{\pi}{2}$

Ques # :93

If in a triangle ABC, the sides a, b, c are in A.P. then $\tan\frac{A}{2}$, $\tan\frac{B}{2}$, $\tan\frac{C}{2}$ are in –

1) A.P.
2) G.P.

3) H.P.

4) None of these

Ques # :94

The general solution of differential equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$ is :

1) $\tan y = \frac{1}{2}(x^2 - 1) + ce^{-x^2}$

2) $\tan y = (x^2 - 1) + ce^{-x^2}$

3) $\tan y = \frac{1}{2}(x^2 - 1) + ce^{x^2}$

4) $\tan y . e^{x^2} = (x^2 - 1)e^{x^2} + c$

Ques # :95

The singular solution of differential equation $y = px + a\sqrt{1 + p^2}$, where $p = \frac{dy}{dx}$, is

1) $y = cx + a\sqrt{1 + c^2}$

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

3) $x^2 + y^2 = a^2$

4) $y = cx - a\sqrt{1 + c^2}$

Ques # :96

The particular integral of differential equation $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = e^{2x} . \sin x$, is:

1) $\frac{1}{170}e^{2x}(7 \cos x - 11 \sin x)$

2) $-\frac{1}{170}e^{2x}(7 \cos x - 11 \sin x)$

3) $-\frac{1}{170}e^{2x}(7 \cos x + 11 \sin x)$

4) $-\frac{1}{170}e^{2x}(7 \sin x - 11 \cos x)$

Ques # :97

The solution of differential equation $\frac{dx}{z(x+y)} = \frac{dy}{z(x-y)} = \frac{dz}{x^2+y^2}$ is:

1) $x^2 - y^2 + z^2 = c_1$, $2xy - z^2 = c_2$

2) $2xy + z^2 = c_1$, $x^2 - y^2 - z^2 = c_2$

3) $x^2 + y^2 - z^2 = c_1$, $2xy - z^2 = c_2$

4) $2xy - z^2 = c_1$, $x^2 - y^2 - z^2 = c_2$

Ques # :98

The complimentary function of differential equation $\frac{d^2y}{dx^2} + (1 - \cot x)\frac{dy}{dx} - y\cot x = sin^2 x$, is:

1) $c_1 e^x + c_2 (\sin x - \cos x)$

2) $c_1 e^{-x} + \frac{1}{2} c_2 (\sin x + \cos x)$

3) $c_1 e^{-x} + c_2 (\cos x - \sin x)$

4) $c_1 e^x + \frac{1}{2} c_2 (\sin x - \cos x)$

Ques # :99

The resultant of two forces P and Q is R. If Q is doubled, R is doubled; while, if Q is reversed, R is again doubled, then the ratio in P, Q and R is equal to

1) $\sqrt{2} : \sqrt{3} : \sqrt{2}$

2) $\sqrt{3} : \sqrt{2} : \sqrt{2}$

3) $\sqrt{2} : \sqrt{3} : \sqrt{3}$

4) $\sqrt{2} : \sqrt{2} : \sqrt{3}$

Ques # :100

Three like parallel forces P , Q , R act at the angular points of a triangle ABC. If their resultant passes through the centroid, then

1) $\frac{P}{a} = \frac{Q}{b} = \frac{R}{c}$

2) $\frac{P}{\tan A} = \frac{Q}{\tan B} = \frac{R}{\tan C}$

3) $P = Q = R$

4) $P.a = Q.b = R.c$

Ques # :101

A particle moves with uniform velocity 4 m/sec from a point O. After 2 seconds a second particle starts from the same point O and in the same direction with velocity 5 m/sec and 3 m/sec^2 acceleration. When and where does the second particle meet the first ?

1) after 4 seconds since first particle starts motion and at 16 meter from O.
2) after 2 seconds since first particle starts motion and at 16 meter from O.
3) after 4 seconds since second particle starts motion and at 8 meter from O.
4) None of these

Ques # :102

A body of 10 kg falls down from a 10 meter height and comes to rest after entering 1 meter into the sand. The average resisting force of sand on the body is -

1) 90 kg wt
2) 100 kg wt
3) 110 kg wt
4) 120 kg wt

Ques # :103

A particle is projected with velocity 39.2 m/sec at the angle of projection 30° from the horizon. The particle will move in perpendicular direction with its direction of projection after a time interval of :

1) 6 seconds
2) 8 seconds
3) 4 seconds
4) 16 seconds

Ques # :104

The optimum solution of the linear programming problem $Max\ z = 2x_1 + x_2$ subject to $-x_1 + x_2 \leq 1, -5x_1 + x_2 \leq 2, x_1 \geq 0, x_2 \geq 0$ is :

1) $x_1 = 0\ ,\ x_2 = 2$
2) $x_1 = 0\ ,\ x_2 = 1$
3) No feasible solution exists

4) Unbounded solution

Ques # :105

The set of all feasible solutions of a linear programming problem is :

1) not necessarily a convex set
2) always a convex set
3) nothing can be said
4) None of these

Ques # :106

Let a linear programming problem is as-

Maximise $z = x_1 + 5x_2 + 0.x_3 + 0.x_4$

subject to $3x_1 + 4x_2 + x_3 + 0x_4 = 6$

$x_1 + 3x_2 + 0x_3 - x_4 = 2$

$x_1, x_2, x_3, x_4 \geq 0$

The basic feasible solution after first iteration of simplex method is:

1) $x_1 = 0 \ , \ x_2 = \frac{2}{3} \ , \ x_3 = \frac{10}{3} \ , \ x_4 = 0$
2) $x_1 = 0 \ , \ x_2 = 0 \ , \ x_3 = 6 \ , \ x_4 = 2$
3) $x_1 = 0 \ , \ x_2 = \frac{3}{2} \ , \ x_3 = 0 \ , \ x_4 = \frac{5}{2}$
4) $x_1 = 0 \ , \ x_2 = \frac{2}{3} \ , \ x_3 = 0 \ , \ x_4 = \frac{5}{2}$

Ques # :107

The method to solve assignment problem is known as :

1) Eulerian method
2) Lagrangian method
3) Hungerian method
4) Hamiltonian method

Ques # :108

The method to find basic feasible solution of a transportation problem which gives minimum transportation cost, in comparision to others , is :

1) North-west corner rule
2) Vogel's approximation method

3) Least cost entry method
4) All the above methods

Ques # :109

If $f(x_1), f(x_2)$ and $f(x_3)$ are values of $f(x)$ near a maximum or minimum point at $\bar{x}$, then with the help of divided difference formula, the value of $\bar{x}$ is given by :

1) $\bar{x} = (x_1 + x_2) - \frac{f(x_1, x_2)}{2f(x_1, x_2, x_3)}$

2) $\bar{x} = \frac{1}{2}(x_1 + x_2) - \frac{f(x_1, x_2)}{f(x_1, x_2, x_3)}$

3) $\bar{x} = \frac{1}{2}(x_1 + x_2) - \frac{f(x_1, x_2)}{2f(x_1, x_2, x_3)}$

4) $\bar{x} = \frac{1}{2}(x_1 + x_2) + \frac{f(x_1, x_2)}{2f(x_1, x_2, x_3)}$

Ques # :110

The error is least in calculating the value of integral using the rule :

1) Trapezoidal rule
2) Simpson one-third rule
3) Weddle rule
4) Simpson three-eighth rule

Ques # :111

The solutiion of difference equation

$u_{x+2} - 7\,u_{x+1} + 10\,u_x = 12.4^x$ is :

1) $u_x = c_1 5^x + c_2 2^x + 12.4^x$

2) $u_x = c_1 5^x + c_2 2^x + 6.4^x$

3) $u_x = c_1 e^{5x} + c_2 e^{2x} - 6.4^x$

4) $u_x = c_1 2^x + c_2 5^x - 6.4^x$

Ques # :112

The difference equation corresponding to the function $y_n = A2^n + B3^n$ is :

1) $y_{n+2} + 5y_{n+1} + 6y_n = 0$

2) $y_{n+2} - 5y_{n+1} + 6y_n = 0$

3) $y_{n+2} - 5y_{n+1} - 6y_n = 0$

4) $y_{n+2} + 5y_{n+1} - 6y_n = 0$

Ques # :113

The rate of convergence of Regula-falsi method to solve algebraic and transcedental equations, is equal to :

1) 1.618
2) 0.618
3) 2.618
4) 2.0

Ques # :114

If $z = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$ then the value of $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y}$ is:

1) $\sin 2z$
2) $2\sin 2z$
3) 2
4) $2\tan z$

Ques # :115

For the function $x^3 + y^3 - 3axy$, which of the following is true :

1) It has maximum value at (a, a) if $a > 0$.
2) It has stationary value at $(0,0)$.
3) It has no stationary value at $(0,0)$.
4) It has minimum value at (a, a) if $a > 0$.

Ques # :116

Number of asymptotes of the curve $\frac{a^2}{x^2} + \frac{b^2}{y^2} = 1$ is:

1) 2
2) 0
3) 1
4) 4

Ques # :117

The value of integral $\iiint_V x\,y\,z\,dx\,dy\,dz$ where V is the volume of whole conicoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}\leq 1$, is :

1) $\frac{a^2b^2c^2}{48}$
2) $\frac{a^2b^2c^2}{6}$
3) $\frac{a^2b^2c^2}{24}$
4) 0

Ques # :118

The value of integral $\int_0^\infty \frac{x^{m-1}+x^{n-1}}{(1+x)^{m+n}}dx$ is:

1) $\frac{\lceil(m)\lceil(n)}{\lceil(m+n)}$
2) $\frac{2\lceil(m)\lceil(n)}{\lceil(m+n)}$
3) $\frac{\lceil(m)\lceil(n)}{2\lceil(m+n)}$
4) $\frac{\lceil(m+n)}{\lceil(m)\lceil(n)}$

Ques # :119

The infinite series $\sum\sqrt{\left(\frac{3^n-1}{5^n-1}\right)}$ is :

1) Neither convergent nor divergent

2) Divergent
3) Convergent
4) Oscillatory

Ques # :120

The set Q of rational numbers is:
1) a complete ordered field
2) not complete but ordered field
3) complete but not an ordered field
4) None of these

Ques # :121

The sequence $\{x_n\}$, where

$$x_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \ldots\ldots\ldots + \frac{1}{n+n}, \quad \forall n \in N$$

1) is not convergent
2) is not monotonic
3) is unbounded
4) is bounded

Ques # :122

The series of functions $\sum_{n=1}^{\infty} \frac{\sin nx}{n^{p-2}}$ is uniformally convergent on R if

1) $p > 3$
2) $p \geq 3$
3) $p < 3$
4) $p = 3$

Ques # :123

Which of the following statements is true :
1) Every discontinuous function is R-integrable.
2) Every bounded function is R-integrable.
3) Every monotonic function is R-integrable.

4) Every monotonic function is not R-integrable.

Ques # :124

The supremum and Infimum of the set $S = \left\{\frac{(-1)^n}{n} + 1 \, ; n \in N\right\}$ are respectively :

1) 3/2 , 0
2) 0 , 3/2
3) 1 , 3/2
4) 3/2 , 1

Ques # :125

The values of constant l, m, n, for which the directional derivative of

$\varphi = lxy^2 + myz + nz^2x^3$ at the point $(1, 2, -1)$ has maximum

magnitude 64 along z-axis, is equal to :

1) $l = -6, m = 24, n = 8$
2) $l = 6, m = 24, n = -8$
3) $l = 6, m = -24, n = -8$
4) $l = 8, m = 24, n = -6$

Ques # :126

If $\hat{r}$ is the unit vector along the vector $\vec{r}$ and $r = |\vec{r}|$, then divergence of $\hat{r}$ is equal to :

1) $\frac{3}{r}$
2) $\frac{2}{r^2}$
3) $\frac{2}{r}$
4) 0

Ques # :127

The value of the surface integral $\int_s (ax\hat{i} + by\hat{j} + cz\hat{k}).\hat{n}\, ds$

where S is the surface of sphere $x^2 + y^2 + z^2 = 9$, is equal to:

1) $\frac{4}{3}\pi(a+b+c)$

2) $\frac{1}{3}\pi(a+b+c)$

3) $36\pi(a+b+c)$

4) $4\pi(a+b+c)$

Ques # :128

If both the roots of the equation $x^2 - mx + 121 = 0$ are greater

than 10, then minimum value of m is -

1) 21

2) 22

3) 23

4) 11

Ques # :129

If a, x, y, z, b are in A.P., then $x + y + z = 15$ and if a, x, y, z, b

are in H.P., then $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{5}{3}$. Values of a and b are equal to

1) 8 , 2

2) 11 , 3

3) 9 , 1

4) 7 , 3

Ques # :130

Let $f(x)$ be a quadratic function. If $f(1) = f(-1)$ and a, b, c are in G.P., then $f'(a), f'(b), f'(c)$ are in –

1) A.P.

2) G.P.

3) H.P.

4) None of these

Ques # :131

According to pure mathematicians out of following which is not the characteristics of mathematics -

1) Mathematics is objective facts.
2) It is a study of reason and logic.
3) It is a system of rigour, purity and beauty.
4) Biased from societal influences.

Ques # :132

Out of following which is not the best characteristics of functional mathematics ?

1) ability to apply skills
2) use mathematics in different contexts
3) draw conclusions but no need to justify them
4) interpret results and discuss their validity

Ques # :133

There are two groups given below. Group A is related with some key concepts of mathematics to prepare curriculum and Group B related with their corresponding meaning but not given in correct order.

Group A	Group B
I. Competence	(a). Appreciating how and why we engage in mathematics and the historical rules of the subject.
II. Creativity	(b). Combining approaches and working in unfamiliar ways.
III. Application and Implications of mathematics.	(c). Understanding mathematical modelling.
IV. Critical understanding	(d). Being able to work appropriately and accurately.

Match the correct order for key concepts of Group A with Group B.

1) I II III IV
   d b c a
2) I II III IV
   d b a c
3) I II III IV
   b d c a
4) I II III IV
   c a b d

Ques # :134

Out of the following which is not the starter activity of a mathematics lesson ?

1) A revision of previously learn work on the lesson topic.
2) A statement or the presentation of some data, as a focus for discussion.
3) Keep the whole class busy working actively on problems, exercises or activities related to the theme of the lesson.
4) A mathematical puzzle.

Ques # :135

Out of the following which is the best characteristics related to plenaries work of your lesson plan ?

1) It allowing pupils to think that the lesson is over when you are presenting the plenary.
2) It is used to monitor or evaluate learning in order to inform future teaching and learning.
3) Plenary to be squeezed out through lack of time.
4) No need to pay attention that students are able to write down something about the lesson.

Ques # :136

Out of the following which is not the objectives of mathematics teaching at secondary stage?

1) Power of understanding and making use of the mathematical language (symbolism)
2) Develops a power of sensing, analysing and solving problems involving simple calculation.
3) Develops quantitative thinking (precision in thinking)
4) Develops the power of organising, interpreting and expressing statistical and graphical data.

Ques # :137

Out of the following which is the best method of teaching to teach a topic "Laying out school gardens and finding the cost of seeds" at secondary stage ?

1) Inductive method
2) Deductive method
3) Laboratory method
4) Project method

Ques # :138

Out of the following which teaching aid is best suited to teach the topic " The angles in the same segment of a circle are equal " ?

1) Filmstrips
2) Models
3) Charts
4) Rotractor

Ques # :139

Out of the following which is not the best characteristics of lesson plan in mathematics ?

1) Should be based upon felt needs of the students.
2) Should provide opportunities for activity.
3) Should be proceed rigidly.
4) Should take care of unexpected developments during the lesson.

Ques # :140

To develop speedy and accurate arithmetical calculation skills, out of following which strategy is best suited ?

1) Written work
2) Drill work
3) Assignments
4) Program learning

Ques # :141

An effort or technique from which we not only tried to take Mathematics in real life situation but also take place in all discipline is known as -

1) Correlation in teaching of Mathematics
2) Induction in teaching of Mathematics
3) Deduction in teaching of Mathematics
4) Recreation in teaching of Mathematics

Ques # :142

The statement given by Leibnitz "Music is a modern hidden exercise in Arithmetic of a mind unconscious of dealing with numbers" reflect which values of life ?

1) Moral values
2) Aesthetic value
3) Social value
4) Intellectual value

Ques # :143

Who stated the statement "Mathematics is the subject which provides an opportunity for training the mind, to close thinking, stirring up a sleeping and un-instructed spirit".

1) Hubsch
2) Schultze
3) Plato
4) Dutton

Ques # :144

"Mathematics should be taught on compulsory basis to all pupils as a part of general education during the first ten years of schooling" this recomendation was given by which commission/report?

1) Mudaliar Commission
2) Kothari Commission
3) Ram Murthi Commission
4) N.C.F. 2005

Ques # :145

Out of the following which is not the specific objective related to skill objectives of Mathematics?

1) To develops surveying, measuring and weighing.
2) Able to use log tables, slide rules etc effectively.
3) Able to draw geometrical figures neetly, accurately and speedly.
4) Arrange available data and draw conclusion from them.

Ques # :146

If an evaluation method assesses the student performance in terms of a specified performance standard then this method of evaluation is known as -

1) Criterion Referenced Evaluation
2) Non-Referenced Evaluation
3) Formative Evaluation
4) Summative Evaluation

Ques # :147

A test which is prepared to measure the degree of mastery of skills, fundamental concepts, process and

general knowledge of the subject, attained by the student is known as

1) Diagnostic test
2) Achievement test
3) Remedial test
4) Performance test

Ques # :148

Out of the following which is not the characteristics of gifted students in Mathematics?

1) Picks up things rapidly and easily.
2) Quick in grasping relationships, making generalisations and drawing conclusion.
3) Good power of imagination, thinking and reasoning.
4) Liking to work at concrete levels.

Ques # :149

Out of the following which is the correct order of steps of Inductive Method in Mathematics teaching?

1) Example ---> Verification ---> Observation ---> Generalization
2) Observation ---> Example ---> Verification ---> Generalization
3) Example ---> Observation ---> Generalization ---> Verification
4) Example ---> Observation ---> Verification ---> Generalization

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Ques # :150

Who was the propounder of unit Approach?

1) Johann Friedrich Herbart
2) H.C. Morrison
3) Benjamin Bloom
4) Ziller


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