DEPARTMENT OF EDUCATION
CENTRAL TIBETAN ADMINISTRATION, DHARAMSHALA
ENTRANCE EXAMINATION-2012.

MATHEMATICS

Time : 2 hours **Max. Marks 100.**

INSTRUCTIONS:

There are hundred questions in this paper. All the questions are of Multiple Choice type and carry equal marks. Each question is followed by four responses marked **(a)**, **(b)**, **(c)** and **(d)**. Select the one, which is the best in each case and record it clearly against the question number on the answer sheets provided with the paper.

More than one response indicated against an item or overwriting in the answer sheet would deem as incorrect response and no mark will be granted on that.

Question paper along with the answer sheet of the paper should be returned to the invigilator after the completion of the paper or when the time is over whichever is earlier.

Roll No.__________________________

Marks obtained by the candidate:

____

Signature of Examiner

MATHEMATICS-2012

Q.1. If ω is a cube root of unity, then the value of determine

$$\begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix}$$ is:

(a) 0 (b) 3^3

(c) 3 (d) 1

Q.2. If $z = \begin{vmatrix} 2 & 5-i & 7+i \\ 5+i & 2 & 3-i \\ 7-i & 3+i & 7 \end{vmatrix}$, then:

(a) arg (z) is 0 or π (b) arg (z) is $\frac{\pi}{2}$ or $-\frac{\pi}{2}$

(c) 0 < arg (z) < $\frac{\pi}{2}$ (d) none of these

Q.3. If α, β, γ are the roots of $x^3 + ax^2 + b = 0$, then the value of

$$\begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix}$$ is:

(a) $-a^3$ (b) $a^3 - 3b$

(c) a^3 (d) $a^2 - 3b$

Q.4. $\begin{vmatrix} a+b & c & b+c \\ a-b & c & 3b+c \\ b+c & c & a+b \end{vmatrix}$ is equal to:

(a) $a+b+c$ (b) 0

(c) $a+2b+c$ (d) none of these

Q.5. If $A = \begin{bmatrix} 1 & \frac{1}{2} \\ 0 & 1 \end{bmatrix}$, then A^{64} is:

(a) $\begin{bmatrix} 1 & 32 \\ 32 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 \\ 32 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 32 \\ 0 & 1 \end{bmatrix}$

(d) none of these

Q.6. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then adj (adj A) is equal to:

(a) adj A

(b) A

(c) A'

(d) – A

Q.7. Matrix theory was introduced by:

(a) Cauchy Riemann

(b) Caley Hamilton

(c) Cauchy Schwarz

(d) Einstien

Q.8. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, then value of α for which $A^2 = B$, is

(a) 1

(b) – 1

(c) 4

(d) no real value

Q.9. The most general solution of θ, which satisfy both the equations $\tan\theta = -\frac{1}{\sqrt{3}}$ and $\cos\theta = \frac{\sqrt{3}}{2}$ is:

(a) $n\pi + \frac{\pi}{6}$

(b) $n\pi - \frac{\pi}{6}$

(c) $2n\pi \pm \frac{\pi}{6}$

(d) $2n\pi - \frac{\pi}{6}$

Q.10. The equation $1 + \sin^2 ax = \cos x$ has a unique solution, then

(a) rational

(b) irrational

(c) interger

(d) none of these

Q.11. $\tan^{-1}(x)$ is:

(a) an even function
(b) an odd function
(c) a periodic function
(d) symmetric about the line $y = -x$

Q.12. The normal to the curve $y = x^3 + 1$ at (0, 1) is:

(a) y = 1
(b) x = 1
(c) y = 0
(d) x = 0

Q.13. The interval in which $9x^2 - 12x - 30$ increases more rapidly then $2x^3$ is:

(a) (1, 2)
(b) $(-\infty, 1)$
(c) $(2, \infty)$
(d) none of these

Q.14. The least value of the function $f(x) = x^4 - x^2 - 2x + 2$ is:

(a) 0
(b) 2
(c) 1
(d) none of these

Q.15. The function $f(x) = \sin x - x$ is:

(a) always increasing
(b) always decreasing
(c) non-decreasing
(d) non-increasing

Q.16. Let $f(x) = \int e^x (x-1)(x-2)dx$. Then f decreases in the interval:

(a) $(-\infty, -2)$
(b) $(-2, -1)$
(c) (1, 2)
(d) $((2, +\infty)$

Q.17. If $y = |x|$, then $\frac{dy}{dx}$ is equal to:

(a) $\frac{|x|}{x}$
(b) 1
(c) – 1
(d) none of these

Q.18. $\frac{d}{dx}\left(x^x\right)$ is equal to:

(a) $y(1 + \log x)$
(b) $y \bullet \log x$
(c) $x^x(1 - \log x)$
(d) none of these

Q.19. $y^2 + \frac{d}{dx}y$ is equal to $\left(where, y = \frac{1-e^{-2x}}{1+e^{-2x}}\right)$:

(a) – 1
(b) 1
(c) 2
(d) none of these

Q.20. If $y = e^{x + e^{x + \ldots\ldots\infty}}$, then $\frac{dy}{dx}$ is equal to:

(a) $\frac{y}{y+1}$
(b) $\frac{y}{1-y}$
(c) $\frac{y}{y-1}$
(d) none of these

Q.21. $\int \frac{\sin 2x}{\sin^2 x + 2\cos^2 x} dx$ is equal to:

(a) $\log(1+\cos^2 x)+c$
(b) $-\log(1+\sin^2 x)+c$
(c) $\log(1+\tan^2 x)+c$
(d) $-\log(1+\cos^2 x)+c$

Q.22. $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$ is equal to:

(a) $-\cot(xe^x)+c$
(b) $\tan(xe^x)+c$
(c) $\tan e^x + c$
(d) none of these

Q.23. $\int x^2 e^{x^3} \cos(e^{x^3}) dx$ is equal to:

(a) $\sin(e^{x^3})+c$
(b) $\{3\sin(e^{x^3})\}+c$
(c) $\frac{1}{3}\sin(e^{x^3})+c$
(d) $e^x \sin(e^{x^3})+c$

Q.24. If $f'(x) = f(x)$ and $f(0) = 1$, then $\int \frac{dx}{f(x)+f(-x)}$ is equal to:

(a) $\log(e^{2x}+1)+c$
(b) $\log(e^{2x}+e^{-x})+c$
(c) $\tan^{-1}(e^{2x})+c$
(d) none of these

Q.25. The value of $\int \frac{d(\sin x)}{\sqrt{1-\sin^2 x}}$ is equal to:

(a) $x+c$

(b) $3x+c$

(c) x^2+c

(d) none of these

Q.26. $\int_0^{2\pi} \sin^2 x \, dx$ is equal to:

(a) 2π

(b) π^2

(c) π

(d) none of these

Q.27. If $f(x)$ is an odd function and has a period T, then $\Phi(x) = \int_0^x f(t)dt$ is

(a) a periodic function with period *T/2*

(b) a periodic function with period *T*

(c) not a periodic function

(d) a periodic function with period *T/4*

Q.28. The value of $\int_0^{\pi/2} \frac{\sin x - \cos x}{\sin x + \cos x} dx$ is equal to

(a) 0

(b) 1

(c) 2

(d) none of these

Q.29. $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x} dx$ is equal to:

(a) $\frac{\pi^2}{8}$

(b) $\frac{\pi^2}{4}$

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

(d) π^2

Q.30. $\int_{-\pi/2}^{\pi/2} \sin^3 x(\sin 2x + \cos x)dx$ is equal to:

(a) 1/2

(b) 4/5

(c) 2

(d) 1

Q.31. Area bounded by the curve $y = x$ and $y = x^3$ in the first quadrant is:

(a) 1 sq. units
(b) $\frac{1}{2}$ sq. units
(c) $\frac{1}{4}$ sq. units
(d) 2 sq. units

Q.32. The area bounded by $y = \sin^{-1} x$, $x = \frac{1}{\sqrt{2}}$ and $x - axis$ is:

(a) $\left(\frac{1}{\sqrt{2}} + 1\right)$ sq. units
(b) $\left(1 - \frac{1}{\sqrt{2}}\right)$ sq. units
(c) $\frac{\pi}{4\sqrt{2}}$ sq. units
(d) $\left(\frac{\pi}{4\sqrt{2}} + \frac{1}{\sqrt{2}} - 1\right)$ sq. units

Q.33. Area enclosed within the curve $|x| + |y| = 1$ is:

(a) 1 sq. units
(b) 2 sq. units
(c) 4 sq. units
(d) none of these

Q.34. The area bounded by the curve $y = \sec^2 x$, $y = 0$ and $|x| = \frac{\pi}{3}$ is:

(a) $\sqrt{3}$ sq. units
(b) $\sqrt{2}$ sq. units
(c) $2\sqrt{3}$ sq. units
(d) $2\sqrt{2}$ sq. units

Q.35. The area bounded by the curves $|x| + |y| \geq 1$ and $x^2 + y^2 \leq 1$ is:

(a) 2 sq. units
(b) π sq. units
(c) $(\pi - 2)$ sq. units
(d) $(\pi + 2)$ sq. units

Q.36. The area of quadrilateral formed by $y = 1 - x$, $y = 2 - x$ (when $0 \leq x \leq 1$) and the co-ordinate axes is:

(a) 1 sq. units
(b) 2 sq. units
(c) 3 sq. units
(d) none of these

Q.37. The general solution of differential equation $\frac{dy}{dx} = e^{x+y} + e^{x-y}$, is:

(a) $\log e^y = e^x + c$
(b) $\tan^{-1}(e^y) = e^x + c$
(c) $e^y = \tan^{-1} e^x + c$
(d) none of these

Q.38. A solution of the differential equation $\left(\frac{dy}{dx}\right)^2 - x\left(\frac{dy}{dx}\right) + y = 0$ is:

(a) $y = 2$

(b) $y = 2x + x^2$

(c) $y = \frac{x^2}{4} + c$

(d) $y = 2x^2 - 4$

Q.39. The general solution of the differential equation $\frac{dy}{dx} + y = x^3$ is:

(a) $ye^x = e^x(x^3 + 3x^2 - 6x - 6) + c$

(b) $ye^x = e^x(x^3 - 3x^2 - 6x + 6) + c$

(c) $y = (x^3 - 3x^2 + 6x - 6) + ce^{-x}$

(d) none of the above

Q.40. The solution of the differential equation $\frac{dy}{dx} = 1 + y + x^2 y + x^2$ through the point (0, 0) is:

(a) $(y+1)e^{-\left(x + \frac{x^3}{3}\right)} = c$

(b) $(y-1)e^{-x-\frac{x^3}{3}} = c$

(c) $y = e^{x - \frac{x^3}{3}} + c$

(d) none of the above

Q.41. If the points A, B and C with position vectors $2\hat{i} + 2\hat{j}$, $\lambda\hat{i} + 8\hat{j}$ and $8\hat{i} + 32\hat{j}$ are collinear then λ is equal to:

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

(b) $\frac{16}{5}$

(c) 4

(d) none of these

Q.42. If $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$, then the angle between the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ is:

(a) 30^0 (b) 60^0

(c) 90^0 (d) 0^0

Q.43. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors, such that $\vec{a} + \vec{b} + \vec{c} = 0$ and $m = \vec{a} \bullet \vec{b} + \vec{b} \bullet \vec{c} + \vec{c} \bullet \vec{a}$ then:

(a) $m < 0$ (b) $m > 0$

(c) $m = 0$ (d) none of these

Q.44. If the vector $\vec{a}, \vec{b} = \vec{i} + 2\vec{j} + 3\vec{k}$ and $\vec{c} = 2\vec{i} - \vec{j}$ from a right handed system then $\vec{a}$ is equal to:

(a) $\dfrac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$

(b) $\dfrac{1}{\sqrt{70}}(3\hat{i} + 6\hat{j} - 5\hat{k})$

(c) $\dfrac{\hat{i} + \hat{j} - \hat{k}}{\sqrt{3}}$

(d) $\dfrac{-\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$

Q.45. Equation of plane parallel to plane $2x + 4y + 2z = 5$ and passing through the point (1,2,3) is:

(a) $2x + 4y + 2z = 1$ (b) $x + 2y + z = 8$

(c) $x + 2y + z = 4$ (d) none of these

Q.46. If l_1, m_1, n_1 and l_2, m_2, n_2 are direction cosines of the two lines inclined to each other at an angle θ, then the direction cosines of internal bisector of the angle between these lines are:

(a) $\dfrac{l_1+l_2}{2\sin\frac{\theta}{2}}, \dfrac{m_1+m_2}{2\sin\frac{\theta}{2}}, \dfrac{n_1+n_2}{2\sin\frac{\theta}{2}}$

(b) $\dfrac{l_1+l_2}{2\cos\frac{\theta}{2}}, \dfrac{m_1+m_2}{2\cos\frac{\theta}{2}}, \dfrac{n_1+n_2}{2\cos\frac{\theta}{2}}$

(c) $\dfrac{l_1-l_2}{2\sin\frac{\theta}{2}}, \dfrac{m_1-m_2}{2\sin\frac{\theta}{2}}, \dfrac{n_1-n_2}{2\sin\frac{\theta}{2}}$

(d) $\dfrac{l_1-l_2}{2\cos\frac{\theta}{2}}, \dfrac{m_1-m_2}{2\cos\frac{\theta}{2}}, \dfrac{n_1-n_2}{2\cos\frac{\theta}{2}}$

Q.47. The lines $\dfrac{x-2}{1}=\dfrac{y-3}{2}=\dfrac{z-4}{3}$ and $\dfrac{x-1}{-5}=\dfrac{y-2}{1}=\dfrac{z-1}{1}$ are:

(a) parallel

(b) at right angle

(c) intersecting

(d) none of these

Q.48. A point $P(x, y, z)$ lies on the line joining points $A(1,2,3)$ and $B(2,10,1)$. If x co-ordinate of the point P is – 1, then:

(a) $y=-14, z=7$

(b) $y=7, z=-14$

(c) $y=-1, z=-1$

(d) none of these

Q.49. Foot of perpendicular of point (2, 2, 2) in the plane $x+y+z=9$ is:

(a) (1, 1, 1)

(b) (3, 3, 3)

(c) (9, 0, 0)

(d) (2, 6, 1)

Q.50. Mode of 1, 3, 5, 7, 9,......., 99 is:

(a) 51

(b) 49

(c) 50

(d) none of these

Q.51. A group of 10 items has arithmetic mean 6. If the arithmetic mean of four items is 7.5, then mean of the remaining items is:

(a) 6.5 (b) 5.5

(c) 4.5 (d) 5.0

Q.52. If a variable takes the discrete values $\alpha+4$, $\alpha-\frac{7}{2}$, $\alpha-\frac{5}{2}$, $\alpha-3$, $\alpha-2$, $\alpha+\frac{1}{2}$, $\alpha-\frac{1}{2}$, $\alpha+5(\alpha>0)$, then the median is:

(a) $\alpha-\frac{1}{2}$ (b) $\alpha-\frac{5}{4}$

(c) $\alpha-2$ (d) $\alpha+\frac{5}{4}$

Q.53. $\lim_{x\to 0}\left(\frac{2^x+3^x}{2}\right)^{2/x}$ is equal to:

(a) 6 (b) log 6

(c) log 3 (d) none of these

Q.54. The value of $\lim_{x\to 0}(1+x^2+\sin x)^{3/\tan x}$ is equal to:

(a) e (b) 1

(c) 0 (d) e^3

Q.55. At the point $x=1$, the function $f(x)=\begin{cases} x^3-1, x>1 \\ x-1\ , x\le 1 \end{cases}$ is:

(a) continuous and differentiable (b) continuous and not not differentiable

(c) discontinuous and differentiable (d) discontinuous and not differentiable

Q.56. The function $\frac{e^{\tan x}-1}{e^{\tan x}+1}$ is discontinuous:

(a) at $n\pi, n\in I$ (b) at $(2n+1)\frac{\pi}{2}, n\in I$

(c) no where (d) none of these

Q.57. $2.4^{2n+1} + 3^{3n+1}$ is divisible by for all $n \in N$ then n is:

(a) 2
(b) 9
(c) 3
(d) 11

Q.58. If $P(n): 3^n < n!$, $n \in N$, then $P(n)$ is true:

(a) for $n \geq 6$
(b) for $n \geq 7$
(c) for $n \geq 3$
(d) for all n

Q.59. The number of arrangements of the letters of the word 'EXAMINATION' is:

(a) 11!
(b) $\frac{11!}{6!}$
(c) $\frac{11!}{(2!)^3}$
(d) none of these

Q.60. The number of ways of selecting 10 players out of 22, when 4 of them being excluded and 6 always included is:

(a) ${}^{22}C_{10}$
(b) ${}^{12}C_2$
(c) 495
(d) none of these

Q.61. How many 4 digit number can be made from the digits 0, 1, 2, 3, 4, 5, 6? (Repetition is not allowed)

(a) 360
(b) 840
(c) 720
(d) none of these

Q.62. If ${}^nC_4$, ${}^nC_5$, ${}^nC_6$ are in A.P., then the value of n is:

(a) 14 or 7
(b) 11
(c) 17
(d) 8

Q.63. The probability of having atleast one tail in 4 throws with a coin is:

(a) $\frac{15}{16}$
(b) $\frac{1}{16}$
(c) $\frac{1}{4}$
(d) 1

Q.64. Given two mutually exclusive events A and B such that $P(A)=0.45$ and $P(B)=0.35$, $P(A \cap B)$ is equal to:

(a) $\frac{63}{400}$ (b) 0.8

(c) $\frac{63}{200}$ (d) 0

Q.65. A letter is taken out at random from 'ASSISTANT' and another is taken out from 'STATISTICS'. The probability that they are the same letters is:

(a) $\frac{1}{45}$ (b) $\frac{13}{90}$

(c) $\frac{19}{90}$ (d) none of these

Q.66. The ratio in which line $3x+4y=2$ divides the distance between $3x+4y=7$ and $6x+8y+19=0$ is:

(a) 10 : 23 (b) 23 : 10

(c) 13 : 10 (d) 10 : 13

Q.67. If orthocenter and circumcentre of triangle are respectively (1, 1) and (3, 2), then the co-ordinates of its centroid are:

(a) $\left(\frac{7}{3},\frac{5}{3}\right)$ (b) $\left(\frac{5}{3},\frac{7}{3}\right)$

(c) (7, 5) (d) none of these

Q.68. The triangle with vertices $A(2, 7)$, $B(4, y)$ and $C(-2, 6)$ is right angled if:

(a) $y=-1$ (b) $y=0$

(c) $y=1$ (d) none of these

Q.69. If the straight lines $y+2=0$, $x-a-b=0$ and $y-bx=0$ are concurrent, then:

(a) $a+b=1$

(b) $b(a+b)=1$

(c) $a+b=2$

(d) $b(a+b)=2$

Q.70 The number of common tangent to the circles $x^2+y^2+4x=0$ and $x^2+y^2-6x=0$ is:

(a) 1
(b) 2
(c) 3
(d) 4

Q.71. The radius of the circle passing through the points (1, 2), (5, 2) and (5, - 2) is:

(a) $2\sqrt{5}$
(b) $3\sqrt{2}$
(c) $5\sqrt{2}$
(d) $2\sqrt{2}$

Q.72. The focus of the parabola $y^2-4x-2y+9=0$ is:

(a) (1, 0)
(b) (3, 1)
(c) (2, 1)
(d) none of these

Q.73. The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$, and having its centre at (0, 3) is:

(a) 4
(b) 3
(c) $\sqrt{12}$
(d) 7 / 2

Q.74. The distance between the directrices of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is:

(a) $\frac{9}{\sqrt{5}}$
(b) $\frac{24}{\sqrt{5}}$
(c) $\frac{18}{\sqrt{5}}$
(d) none of these

Q.75. The equation $2x^2+3y^2-8x-18y+35=k$ represents:

(a) no locus if $k>0$
(b) an ellipse if $k<0$
(c) a point if $k=0$
(d) a hyperbola if $k>0$

Q.76. If $A=\{5,6,7\}$ and $B=\{1,2,3,4\}$, then number of elements in set $A\times B\times B$ is equal to:

(a) 36
(b) 48
(c) 16
(d) none of these

Q.77. Which of the following is a null set?

(a) $\{x : |x| < 1, x \in N\}$

(b) $\{x : |x| = 5, x \in N\}$

(c) $\{x : x^2 = 1, x \in Z\}$

(d) $\{x : x^2 + 2x + 1 = 0, x \in R\}$

Q.78. Smallest value of Y such that $Y \cup \{1,2\} = \{1,2,3,5,9\}$ is equal to:

(a) {3, 5, 9}

(b) {1, 2, 3, 5, 9}

(c) {1, 2}

(d) none of these

Q.79. If R is a relation from a set A to set B, then

(a) $R \subseteq A \times B$

(b) $R \subseteq A \cup B$

(c) $R \subseteq B \times A$

(d) $R = A \times B$

Q.80. Let $A = \{2,3,4,5\}$ and let $R = \{(2,2),(3,3),(4,4),(5,5)\}$ be a relation in A. The R is:

(a) reflexive

(b) symmetric

(c) transitive

(d) none of these

Q.81. If R is an equivalence relation on a set A, then R^{-1} is:

(a) reflexive and symmetric only

(b) reflexive and transitive only

(c) transitive and symmetric only

(d) reflexive, symmetric and transitive

Q.82. Let the functions f, g, h are defined from the set of real numbers R to R such that $f(x) = x^2 - 1$, $g(x) = \sqrt{(x^2 + 1)}$, $h(x) = \begin{cases} 0 & if \quad x < 0 \\ x & if \quad x \geq 0 \end{cases}$, then $ho(fog)(x)$ is defined by:

(a) x

(b) x^2

(c) 0

(d) none of these

Q.83. If $\left(\frac{1+i\sqrt{3}}{2}\right)^m = \left(\frac{1-i\sqrt{3}}{2}\right)^n$ (when m and n are even integers), then:

(a) $m = 2n$

(b) $m = n$

(c) $m = 3n$

(d) none of these

Q.84. If $(1+i)^{-20} = a+ib$, then the value of a and b is:

(a) $a = 2^{-10}, b = -2^{-10}$

(b) $b = -2^{-10}, b = 0$

(c) $a = 2^{-10}, b = 0$

(d) none of these

Q.85. $(z-1)(\bar{z}-1)$ can be written as:

(a) $z\bar{z}+1$

(b) $|z|^2+1$

(c) $|z-1|^2$

(d) $|z|^2+2$

Q.86. The number of real roots of $(x-1)^4+(x+1)^4=16$ is:

(a) 1

(b) 2

(c) 0

(d) none of these

Q.87. If the roots of $x^2-ax+2=0$ differ by unity, then:

(a) $a=3$

(b) $a=1$

(c) $a=6$

(d) $a=-6$

Q.88. If the roots of $a(b-c)x^2+b(c-a)x+c(a-b)=0$ are equal, then a,b,c are in:

(a) A.P.

(b) G.P.

(c) H.P.

(d) none of these

Q.89. If $x^3+3x^2-9x+c=(x-\alpha)(x-\beta)^2$, then c is equal to:

(a) 5

(b) – 5

(c) 0

(d) none of these

Q.90. The set of values of x satisfying the inequalities $(x-1)(x-2)<0$ and $(3x-7)(2x-3)>0$ is:

(a) (1, 2)

(b) $\left(2,\frac{7}{3}\right)$

(c) $\left(1,\frac{7}{3}\right)$

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

Q.91. Which of the following is correct?

(a) $x+\frac{1}{x}\geq 2$ (x is positive real number)

(b) $x+\frac{1}{x}>0$ (x is a positive real number)

(c) $x+\frac{1}{x}\geq 1$ (x is a positive real number)

(d) $x+\frac{1}{x}\leq -2$ (x is a positive real number)

Q.92. $(x^2+1)(x-1)(x-2)<0$, then:

(a) $x<1$ or $x>2$

(b) $x\in(1,2)$

(c) $-1<x<2$

(d) none of these

Q.93. If $\left({}^{15}C_r+{}^{15}C_{r-1}\right)\left({}^{15}C_{15-r}+{}^{15}C_{16-r}\right)=\left({}^{16}C_{13}\right)^2$, then the value of r is:

(a) $r=3$

(b) $r=2$

(c) $r=4$

(d) none of these

Q.94. The coefficient of x^{12} in the expansion of $\sum_{r=0}^{50}{}^{50}C_r(x-1)^{50-r}\bullet 2^r$ is:

(a) ${}^{50}C_{12}$

(b) 1

(c) 0

(d) none of these

Q.95. The 7th term from the end in the expansion of $\left(x-\frac{2}{x^2}\right)^{10}$ is equal to:

(a) ${}^{10}C_4 2^4\left(\frac{1}{x^2}\right)$

(b) ${}^{10}C_4 2^4$

(c) $-{}^{10}C_3 2^3 x$

(d) none of these

Q.96. The term independent of x in the expansion of $\left(\frac{x^2}{2}-\frac{2}{x}\right)^9$ is equal to:

(a) ${}^9C_6(2^3)$

(b) ${}^9C_5(2)^4$

(c) ${}^9C_7(2)^5$

(d) none of these

Q.97. If sum of n terms of a sequence is $5n^3+2n^2+n+5$, then:

(a) sequence is an A.P.

(b) sequence is a G.P.

(c) sequence is a H.P.

(d) none of these

Q.98. If the sum of first n natural numbers is 1 / 5 times the sum of their squares, then the values of n is:

(a) 5

(b) 6

(c) 7

(d) 8

Q.99. If the roots of the equation $x^3-12x^2+39x-28=0$ are in A.P., then their common difference will be:

(a) ± 1

(b) ± 2

(c) ± 3

(d) ± 4

Q.100. The nth term of a sequence whose sum of n terms is $5n^2+2n$, is:

(a) $10n+3$

(b) $10n-5$

(c) $10n-3$

(d) none of these

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ENTRANCE EXAMINATION-2012.

ANSWER SHEET FOR	Name	
MATHEMATICS	**Roll No.**	

Q.No.	Ans.	Q.No.	Ans.	Q.No.	Ans.	Q.No.	Ans.	Q.No.	Ans.
1		2		3		4		5	
6		7		8		9		10	
11		12		13		14		15	
16		17		18		19		20	
21		22		23		24		25	
26		27		28		29		30	
31		32		33		34		35	
36		37		38		39		40	
41		42		43		44		45	
46		47		48		49		50	
51		52		53		54		55	
56		57		58		59		60	
61		62		63		64		65	
66		67		68		69		70	
71		72		73		74		75	
76		77		78		79		80	
81		82		83		84		85	
86		87		88		89		90	
91		92		93		94		95	
96		97		98		99		100	