MATHEMATICS

CODE :- 12

Time Allowed: Two Hours

Marks: 100

Name:	Roll No.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

Read instructions given below before opening this booklet:

1. Use only **BLUE Ball Point** Pen.

2. In case of any defect - Misprint, Missing Question/s Get the booklet changed. No complaint shall be entertained after the examination.

3. Before you mark the answer, read the instruction on the OMR Sheet (Answer Sheet) also before attempting the questions and fill the particulars in the ANSWER SHEET carefully and correctly.

4. There are FOUR options to each question. Darken only one to which you think is the right answer. There will be no Negative Marking.

5. Answer Sheets will be collected after the completion of examination and no candidate shall be allowed to leave the examination hall earlier.

6. The candidates are to ensure that the Answer Sheet is handed over to the room invigilator only.

7. Rough work, if any, can be done on space provided at the end of the Question Booklet itself. No extra sheet will be provided in any circumstances.

8. Write the BOOKLET SERIES in the space provided in the answer sheet, by darkening the corresponding circles.

9. Any representation regarding questions and answers, candidate may give in writing to the Centre Supervisor just after the examination is over. Later on it will not be entertained.

SEAL

1. The centre of gravity of the surface of a hollow cone lies on the axis and divides it in the ratio :

(A) 3 : 4 (B) 2 : 3 (C) 1 : 2 (D) None of the above

2. $\lim_{x \to 0} \dfrac{(1+x)^{1/x} - e + \frac{1}{2}ex}{x^2}$ *is equal to* :

(A) $\dfrac{e}{24}$ (B) $\dfrac{11e}{24}$ (C) $-\dfrac{11e}{24}$ (D) None of the above

3. The value of a so that $f(x) = \begin{cases} \dfrac{\sin^2 ax}{x^2}, & x \neq 0 \\ 1, & x = 0 \end{cases}$ is continuous at x=0, is

(A) 1 (B) -1 (C) ± 1 (D) None of the above

4. A set is defined as :

(A) a non empty collection of objects (B) a collection of well defined objects

(C) a well defined collection of objects (D) None of the above

5. The integer n for which $\lim_{x \to 0} \dfrac{(\cos x - 1)(\cos x - e^x)}{x^n}$ is a finite non-zero number is :

(A) 3 (B) 1 (C) 2 (D) None of the above

6. If the sum of n terms of the series 2,5,8,11,.................... is 60100, then n is :

(A) 100 (B) 200 (C) 150 (D) None of the above

7. If a,4,b are in A.P. and a,2,b are in G.P., then a,1,b are in :

(A) A.P. (B) G.P. (C) H.P. (D) None of the above

8. If a,b,c are in A.P. as well as in G.P., then

(A) a=b=c (B) $a \neq b = c$ (C) $a = b \neq c$ (D) None of the above

9. If x= $1+y+y^2+y^3+$................ ad. inf.. then y is :

(A) $\dfrac{x}{x-1}$ (B) $\dfrac{x}{1-x}$ (C) $\dfrac{x-1}{x}$ (D) None of the above

10. The n*th* term of the series 4+6+9+13+18+.............., is

(A) n+1 (B) $(n^2+n+6)/2$, (C) $n(n+1)/2$ (D) None of the above

11. If the matrix AB is zero, then

(A) A=O or B=O (B) A=O and B=O

(C) it is not necessary that either A=O or B=O; (D) None of the above

12. If A and B are two matrices such that AB = B and BA=A then $A^2 + B^2$ *is equal to* :

(A) 2AB (B) 2BA (C) A+B (D) None of the above

13. If the system of equations

ax+y=1, x+2y=3 and 2x+3y=5 are consistent, then a is given by :

(A) 1 (B) O (C) 2 (D) None of the above

14. One root of the equation :

$$\begin{vmatrix} 3x-8 & 3 & 3 \\ 3 & 3x-8 & 3 \\ 3 & 3 & 3x-8 \end{vmatrix} = 0, \quad is \;;$$

(A) $\frac{8}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) None of the above

15. Let A= {1,2,3,4,5}, B= {2,3,6,7}, then the number of elements in $(A\times B)\cap(B\times A)$ is:

(A) 4 (B) 6 (C) 18 (D) None of the above

16. Out of 880 boys in a school, 224 played cricket, 240 played hockey and 336 played basket ball. Of the total, 64 played both basket ball and hockey, 80 played cricket and basket ball and 40 played cricket and hockey; 24 played all the three games. The numbers of boys who did not play any game, is :

(A) 128 (B) 216 (C) 240 (D) None of the above

17. Let R be the relation on the set of natural numbers N given by xRy iff x is a factor of y (ie x | y). Then R is :

(A) reflexive and symmetric (B) transitive and symmetric

(C) reflexive, transitive but not symmetric (D) None of the above

18. If the function $f:[1,\infty)\rightarrow[1,\infty)$ is defined by f(x)= $2^{x(x-1)}$, *then* f^{-1}*is* :

(A) $\left(\frac{1}{2}\right)^{x(x-1)}$ (B) $\frac{1}{2}\left[1+\sqrt{(1+4\log_2 x)}\right]$

(C) $\frac{1}{2}\left[1-\sqrt{(1+4\log_2 x)}\right]$ (D) None of the above

19. The greatest height to which a man can throw a stone is h. The greatest distance to which he can throw it, will be :

(A) h (B) h/2 (C) 2h (D) None of the above

20. A body is moving in a straight line with uniform acceleration. It covers distances of 10m and 12m in third and fourth second respectively, then the initial velocity in m/sec is :

(A) 5 (B) 4 (C) 3 (D) None of the above

21. From the top of a tower of height 100m, a ball is projected with a velocity of 10m/sec. It takes 5 second to reach the ground. If $g=10m/sec^2$, then angle of projection is :

(A) 60^0 (B) 45^0 (C) 30^0 (D) None of the above

22. If the angle α between two forces of equal magnitude is reduced to $\alpha - \frac{\pi}{3}$, then the magnitude of their resultant becomes $\sqrt{3}$ times of the earlier one. The angle α is :

(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{2}$ (D) None of the above

23 A force $\sqrt{5}$ units acts along the line.

$\frac{x-3}{2} = \frac{y-4}{(-1)}$. The moment of the force about the point (4,1) along z axis is :

(A) 5

(B) $\sqrt{5}$

(C) $-\sqrt{5}$

(D) None of the above

24 Weights 2,3,4 and 5 lbs are suspended from uniform lever 6ft long at distances of 1,2,3 and 4 ft respectively from one end. If the weight of lever is 11 lbs, then the distance of the point at which it will balance from this end is :

(A) $\frac{63}{25}ft$ (B) $\frac{73}{25}ft$ (C) $\frac{83}{25}ft$ (D) None of the above

25. Two cars A and B are moving uniformly on two straight roads at right angles to one another at 40 and 20 km/h respectively. A passes the intersection of roads when B has still to move 50 km to reach it. The shortest distance between the two cars is :

(A) $20\sqrt{5}\ kms.$ (B) 20 kms. (C) 25 kms. (D) None of the above

26. Let R be a relation on a set A such that $R^{-1} = R$. Then R is :

(A) reflexive (B) symmetric (C) transitive (D) None of the above

27. The range of the function $f(x) = {}^{6-x}P_{x-2}$ is :

(A) {1,3} (B) {1,2,3} (C) {2,3,4} (D) None of the above

28. Given f(x) = $\log\left(\dfrac{1+x}{1-x}\right)$ and $g(x) = \left(\dfrac{3x+x^3}{1+3x^2}\right)$, $then\ (fog)x\ equals$:

(A) -f(x) (B) $(f(x))^3$ (C) 3f(x) (D) None of the above

29. If z=x +i y and $Z^{1/3} = p+iq, then \left(\dfrac{x}{p}+\dfrac{y}{q}\right)/(p^2+q^2)$ is equal to :

(A) 2 (B) 1 (C) -2 (D) None of the above

30. If w is an imaginary cube root of unity, then $(1+w-w^2)^7$ equals :

(A) -128w (B) $-128w^2$ (C) 128w (D) None of the above

31. The points representing $(\sqrt{5}+i\sqrt{3})^{1/3}$ lie on a :

(A) straight line (B) circle with centre at (0,0) and radius $\sqrt{2}$

(C) circle with centre at (0, 0) and radius $2\sqrt{2}$ (D) None of the above

32. The expression $\tan\left[i\log\left(\dfrac{x-iy}{x+iy}\right)\right]$ reduces to :

(A) $\dfrac{2xy}{x^2-y^2}$ (B) $\dfrac{xy}{x^2-y^2}$ (C) $\dfrac{2xy}{x^2+y^2}$ (D) None of the above

33. If x is real, the maximal value of $(3x^2+9x+17)/(3x^2+9x+7) is$:

(A) 1 (B) 17/7 (C) 41 (D) None of the above

34. The real roots of the equation $7^{\log_7(x^2-4x+5)}$=x-1 are :

(A), 4 and 5 (B) 2 and 3 (C) 1 and 2 (D) None of the above

35. If a^2, b^2, C^2 are in A.P., then $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in :

(A) A.P. (B) G.P. (C) H.P. (D) None of the above

36. Number of common tangents to the circles $x^2+y^2+4x+6y+9=0$ and $x^2+y^2-8x-10y+5=0$ is :

(A) 1 (B) 2 (C) 3 (D) None of the above

37. The locus of the points of intersection of the perpendicular tangents to the parabola $x^2=4ay$, *is* :

(A) y=a (B) x=a (C) y=-a (D) None of the above

38. If the normals at two points P and Q of a parabola $y^2=4ax$ intersect at a third point R on the curve, then the product of the ordinates of P and Q is :

(A) $8a^2$ (B) $4a^2$ (C) $-4a^2$ (D) None of the above

39. If the vertex and focus of hyperbola are (2,3), (6,3) respectively and eccentricity is 2, then equation of the hyperbola is :

(A) $\frac{(x+2)^2}{9}-\frac{(y-3)^2}{27}=1$ (B) $\frac{(x+1)^2}{16}-\frac{(y-3)^2}{48}=1$

(C) $\frac{(x+2)^2}{16}-\frac{(y-3)^2}{48}=1$ (D) None of the above

40. If a,b,c are in A.P., then the value of

$$\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3. & x+4 & x+c \end{vmatrix}$$ is :

(A) 0 (B) 3 (C) -3 (D) None of the above

41. The equation x+2y+3z=1, x-y+4z=0, 2x+y+7z=1 have:

(A) only one solution (B) no solution

(C) infinitely many solutions (D) None of the above

42. $\lim_{n\to\infty}\left[\frac{1}{n^2}\sec^2\frac{1}{n^2}+\frac{2}{n^2}\sec^2\frac{4}{n^2}+\frac{3}{n^2}\sec^2\frac{9}{n^2}+\ldots\ldots\ldots\ldots\ldots+\frac{n}{n^2}\sec^2 1\right]=$:

(A) $\frac{1}{2}\tan 1$ (B) $\tan 1$ (C) $\frac{1}{2}\sec 1$ (D) None of the above

43. If f(x) $=\left[\frac{e^{(1/x)}-1}{e^{(1/x)}+1}\right], x\neq 0$ and f(0)=0; then f is :

(A) continuous at x=0

(B) discontinuous at x=0

(C) discontinuous at x=0 but can not be made continuous at x=0

(D) None of the above

44. If f(x) $\begin{vmatrix} x^3 & \cos x & e^{x^2} \\ \sin x & x^2 & \sec x \\ \tan x^3 & 1 & 2 \end{vmatrix}$, *then the value of* $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} f(x)\,dx$ *is* :

(A) 1 (B) 4 (C) 0 (D) None of the above

45. $\int \frac{\cos x}{\cos(x-a)}dx$ *is equal to* :

(A) x cos a + sin a log | cos (x-a) | + c (B) x cos a - sin a log | cos (x-a) | + c

(C) sin a- sin a log | cos (x-a) | + c (D) None of the above

46. $\int \cos(\log x)\,dx$ is equal to:

(A) $\frac{x}{2}[\cos(\log x)-\sin(\log x)]+c$ (B) $\frac{x}{2}[\cos(\log x)+\sin(\log x)]+c$

(C) $x[\cos(\log x)+\sin(\log x)]+c$ (D) None of the above

47. If f(x)= f($a-x$), the $\int_0^a x\,f(x)$ dx is equal to :

(A) $a\int_0^a f(x)\,dx$ (B) $a^2\int_0^a f(x)\,dx$ (C) $\frac{a}{2}\int_0^a f(x)\,dx$ (D) None of the above

48. $\int_0^{\pi}\frac{dx}{1-2a\cos x+a^2}$ $a<1$ *is equal to* :

(A) $\frac{\pi\ a\log 2}{4}$ (B) $\frac{4\pi}{2-a^2}$ (C) $\frac{\pi}{1-a^2}$ (D) None of the above

49. The area enclosed by the curve $y=x^5$, x axis and the ordinates x=1, and x= -1 is :

(A) 0 (B) $\frac{1}{3}$ (C) $\frac{1}{6}$ (D) None of the above

50 The smaller area enclosed by the circle $x^2+y^2=a^2$ and the line x+y=a, is :

(A) $\frac{a^2}{4}(\pi-2)$ (B) $\frac{a^2}{4}(\pi+2)$ (C) $\frac{a^2}{2}(\pi+2)$ (D) None of the above

51. Solution of equation $\frac{dy}{dx}+\frac{1}{x}\tan y=\frac{1}{x^2}\tan y\sin y$ is :

(A) $2x+\sin y(1+cx^2)=0$ (B) $2x=\sin y(1+2cx^2)$

(C) $2x=\cos y(1+cx^2)$ (D) None of the above

52 The solution of $\frac{dy}{dx}=\sin(x+y)+\cos(x+y)$ is :

(A) $x+c=\log\left(1+\tan\frac{x+y}{2}\right)$ (B) $y+c=\log\left(1+\tan\frac{x+y}{2}\right)$

(C) $y+c=\log\left(1-\tan\frac{x+y}{2}\right)$ (D) None of the above

53. Mean deviation of numbers 3,4,5,6,7 from the mean is :

(A) 5 (B) 25 (C) 1.2 (D) None of the above

54. In an experiment with 15 observations the following results were available

$\sum x=170,\quad \sum x^2=2830$. One observation that was 20 was found to be wrong and was replaced by the correct value of 30. The correct variance is :

(A) 78 (B) 188 (C) 8.33 (D) None of the above

55. A car completes the first half of its journey with a velocity v_1 and the rest half with velocity v_2. Then the average velocity of the car for the whole journey is :

(A) $\sqrt{v_1 v_2}$ (B) $\frac{2v_1 v_2}{v_1+v_2}$ (C) $\frac{v_1+v_2}{2}$ (D) None of the above

56. The mean of the numbers 1,2,3..........., n with frequencies x,2x,3x........, nx is :

(A) (2n+1)/3 (B) (2n+1)/6 (C) n/2 (D) None of the above

57. If P (A $\cup$ B) = 2/3; P (A $\cap B) = \frac{1}{6}$, $P(A) = \frac{1}{3}$, *then* :

(A) A and B are disjoint events (B) A and B are independent events.

(C) A and B are dependent events (D) None of the above

58. If A, B, C can hit a target 4 times in 5 shots, 3 times in 4 shots and 2 times in 3 shots respectively, then the probability that exactly two of them will hit the target is:

(A) $\frac{13}{30}$ (B) $\frac{17}{30}$ (C) $\frac{5}{6}$ (D) None of the above

59. There are m persons sitting in a row. Two of them are selected at random. The probability that the two selected persons are not together is :

(A) $1-\frac{2}{m}$ (B) $\frac{2}{m}$ (C) $\frac{m(n\ [illegible])}{(m+1)(m+2)}$ (D) None of the above

60. The frequencies of numbers 0,1,2,....n, are $q^n, {}^nC_1\, q^{n-1}p,\ {}^nC_2\, q^{n-2}p^2, \ldots\ldots, p^n$ respectively, where p+q=1, then the mean is :

(A) np (B) nq (C) npq (D) None of the above

61. Let $|\bar{a}| = 1, |\bar{b}| = 2, |\bar{c}| = 3$ and $\bar{a} \perp (\bar{b}+\bar{c}), \bar{b} \perp (\bar{c}+\bar{a}),$ *and* $\bar{c} \perp (\bar{a}+\bar{b}),$ *then* $|\bar{a}+\bar{b}+\bar{c})|$ is:

(A) $\sqrt{13}$ (B) 6 (C) $\sqrt{14}$ (D) None of the above

62. $(\bar{a}.\hat{i})^2 + (\bar{a}.\hat{j})^2 + (\bar{a}.\hat{k})^2$ *is equal to* :

(A) a^2 (B) $3\bar{a}$ (C) $|\bar{a}\ .(\hat{i}+\hat{j}+\hat{k})|^2$ (D) None of the above

63. $[\bar{a}+\bar{b}, \bar{b}+\bar{c}, \bar{c}+\bar{a}]$ *is equal to* :

(A) $[\bar{a},\bar{b},\bar{c}]$ (B) $2\,[\bar{a},\bar{b},\bar{c}]$ (C) $3\,[\bar{a},\bar{b},\bar{c}]$ (D) None of the above

64. If $\bar{a},\bar{b},\bar{c}$ are non coplanar vectors and $\bar{p} = \frac{\bar{b}\times\bar{c}}{[b,c,a]}$, $\bar{q} = \frac{\bar{c}\times\bar{a}}{[\bar{c},\bar{a},\bar{b}]}$, $r = \frac{a\times b}{[\bar{a},\bar{b},\bar{c}]}$, *then*

$(\bar{a}+\bar{b}).\bar{p} + (\bar{b}+\bar{c}).\bar{q} + (\bar{c}+\bar{a}).\bar{r}$ *is equal to* :

(A) 1 (B) 2 (C) 3 (D) None of the above

65. Constant forces $\overline{P}=\hat{i}-2\hat{j}+3\hat{k}, \overline{Q}=-\hat{i}+3\hat{j}-\hat{k}, and\ \overline{R}=2\hat{i}-4\hat{j}+3\hat{k}$ act on a particle at A(4, -3, -2). If the particle is displaced from A to B (6,1,-3), then work done by the forces will be :

(A) 13 (B) 15 (C) $\sqrt{13}$ (D) None of the above

66. The order and degree of differential equation: $\left[\frac{d^2y}{dx^2}+x\frac{dy}{dx}\right]^{\frac{1}{4}}=\left[\frac{d^2y}{dx^2}\right]^{1/3}+yx$ are respectively :

(A) 2, 3 (B) 2, 9 (C) 2, 3/4 (D) None of the above

67. The Points on the curve $y=\frac{2}{3}x^3+\frac{1}{2}x^2$ *at which the tangents make equal angles with* coordinate axes, are :

(A) $\left(-\frac{1}{2},\frac{5}{25}\right)\left(-1,\frac{-1}{6}\right)$ (B) $\left(\frac{1}{2},\frac{5}{24}\right)\left(1,\frac{-1}{6}\right)$

(C) $\left(\frac{1}{2},\frac{5}{24}\right)\left(-1,\frac{-1}{6}\right)$ (D) None of the above

68. The equation sin x+ x cos x=0 has at least one real roof in the interval :

$(0,\pi)$ (B) $(-\pi/2,\pi/2)$ (C) $(0,\pi/4)$ (D) None of the above

69. The volume of a sphere is increasing at the rate of 1200 c.c./sec. The rate of increase of its surface when the radius is 10cm is :

(A) 120 sq.cm./sec. (B) 240 sq.cm./sec. (C) 200sq.cm./sec. (D) None of the above

70. The points on the curve $y=x^3-2x^2-x$ at which the tangent line is parallel to the line y= 3x-2, are :

(A) (2, - 2), $\left(\frac{2}{3},\frac{14}{27}\right)$ (B) (2,–2),$\left(\frac{-2}{3},\frac{14}{27}\right)$

(C) $(-2,2),\left(\frac{-2}{3},-\frac{14}{27}\right)$ (D) None of the above

71 The length of tangent to the curve x = $a(\theta+\sin\theta), y=a(1-\cos\theta)$ *at* θ *point is* :

(A) $2a\sin\left(\frac{\theta}{2}\right)$ (B $a\sin\left(\frac{\theta}{2}\right)$ (C) $2a\sin\theta$ (D) None of the above

72 The maximum value of $x^{1/x} is$:

(A), $(1/e)^e$ (B) $e^{1/e}$ (C) e (D) None of the above

73. The point (0,3) is nearest to the curve $x^2 = 2y$ at the point :

(A) (2,2) (B) (-2,2) (C) (2,-2) (D) None of the above

74. 20 is divided into two parts so that product of cube of one quantity and square of the other quantity is maximum. The parts are :

(A) 6,14 (B) 16,4 (C) 12,8 (D) None of the above

75. The function f(x) = $x^3 + 6x^2 + (9+2K)x + 1$ is increasing function if :

(A) $K > \frac{3}{2}$ (B) $K \geq \frac{3}{2}$ (C) $K < \frac{3}{2}$ (D) None of the above

76. A particle of mass m is thrown in the vaccum with initial velocity u and angle of projection α. Its position at time t will be given by :

(A) $x = (u\cos\alpha)t,\ y = (u\sin\alpha)t - gt$ (B) $(B)\ x = u\cos\alpha - gt,\ y = (u\sin\alpha)t - gt^2$

(C) $x = (u\cos\alpha)t,\ y = (u\sin\alpha)t - \frac{1}{2}gt^2$ (D) None of the above.

77. Let T_H be the time taken by a projectile upto the highest point and T the time of flight. Then :

(A) $T = T_H$ (B) $2T=3T_H$

(C) $T_H = (u\ \sin\ \alpha)/g,\ T = (2u\sin\ \alpha)/g$ (D) None of the above

78 A Projectile is thrown from the origin with such as velocity u that it passes through P (a,a) for the two angles of projection α *and* β $(\alpha \neq \beta)$. Then

(A) $\alpha + \beta = \frac{3\pi}{4}$ (B) $\alpha + \beta = \frac{\pi}{2}$ (C) $\alpha + \beta = \tan^{-1} 2$, (D) None of the above

79. Which one of the following is true ?

(A) $\overline{F} = yz\hat{i} + zx\hat{j} + xy\hat{k}$ *is a conservative force.*

(B) $\overline{F} = x\hat{i} + y\hat{j} + z\hat{k}$ *is not a conservative force.*

(C) $\overline{F} = z^2\hat{i} + x^2\hat{j} + y^2\hat{k}$ *is a conservative force.*

(D). None of the above

80. W is the work done by the force $x^2\hat{i} + y\hat{j}$ along a closed path consisting of the line segments from (0,0) to (1,1) to (1,0) to (0,0), then :

(A) W=0 (B) W=1/3 (C) W=1 (D) None of the above

81. If $x^2 + y^2 + 4x + 8y - 1 = 0$ $and\ x^2 + y^2 + \lambda x + 3y - 4 = 0$ cut orthogonally then the value of λ is :

(A) 11 (B) 11/2 (C) $-\frac{11}{2}$ (D) None of the above

82. If $\sum_{k=0}^{100} i^k = x + iy$, then values of x and y are :

(A) x=1,y=0 (B) x=1, y=1 (C) x=0, y=1 (D) None of the above

83. If $i(1+i)(1+2i)............(1+ni) = a + ib, then$ $1.2.5.10...........(1+n^2)$ *is equal to* :

(A) $a^2 - b^2$ (B) $a^2 + b^2$ (C) $b^2 - a^2$ (D) None of the above

84. The argument of the complex number $\frac{13-5i}{4-9i}$ *is*

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{5}$ (D) None of the above

85. If α, β are imaginary cube roots of unity, then value of $\alpha^4 + \beta^{28} + \frac{1}{\alpha\beta}$ is :

(A) 1 (B) -1 (C) 0 (D) None of the above

86. The equation of line which passes through the point (3,4) and the sum of its intercepts on axes is 14, is :

(A) 4x+3y=24, x+y=7 (B) 4x-3y=24, x+y=7

(C) 4x+3y=24, x-y=7 (D) None of the above

87. If a ray travelling along the line x= 1 gets reflected from the line x+y=1, then the equation of the line along which the reflected ray travels is :

(A) x-y=1 (B) y=0 (C) x=0 (D) None of the above

88. The numbers of integral points (i.e. points having bolk coordinates in the form of integers) exactly in the interior of triangle with vertices (0,0), (0,21) and (21,0) is :

(A) 233 (B) 133 (C) 190 (D) None of the above

89 A circle touches y- axis at a distance + 4 units from origin and cuts an intercept of length 6 units on x-axis. If the centre of circle lies in Ist quadrant then, its equation is:

(A) $x^2+y^2-10x-8y+16=0$ (B) $x^2+y^2+10x+8y-16=0$

(C) $x^2+y^2-10x-8y-16=0$ (D) None of the above

90. If the lines 3x-4y+4=0 and 6x-8y=7 are tangents to a circle, then the radius of the circle is:

(A) 3 (B) 3/2 (C) ¾ (D) None of the above

91. The equation of a circle whose centre is (3,-1) and which cuts off a chord of length 6 units on the line 2x-5y+18=0, is :

(A) $x^2+y^2-6x+2y-28=0$ (B) $x^2+y^2+6x-2y-28=0$

(C) $x^2+y^2-6x+2y+28=0$ (D) None of the above

92 The vertices of a right angled triangle are (2,-2), (-2,1) and (5,2). The equation of its circum circle is :

(A) (x-2)(x+2) + (y+2)(y-1)=0 (B) (x+2)(x-5) + (y-1)(y-2)=0

(C) (x-2) (x-5)+(y+2)(y-2)=0 (D) None of the above

93. If the distance between foci of an ellipse is 10 and latus rectum is 15, then eccentricity is:

(A) ¼ (B) 1/3 (C) ½ (D) None of the above

94. The centre of hyperbola $9x^2-16y^2-18x+32y-151=0$, is :

(A) (1,1) (B) (-1,1) (C) (1,-1) (D) None of the above

95 The equation of hyperbola whose asymptotes are the straight lines 3x-4y+7=0 and 4x+3y+1=0 and which passes through origin is :

(A) $12x^2-7xy-12y^2+31x-17y=0,$ (B) $12x^2-7xy-12y^2+31x+17y=0,$

(C) $12x^2+7xy+12y^2-31x-17y=0,$ (D) None of the above

96. $\lim_{x\to 3}\frac{x-3}{|x-3|}=$

(A does not exist. (B) 1 (C) -1 (D) None of the above

97. If f(2)=4, and $f'(2)=1$, then $\lim_{x\to 2}\frac{x\,f(2)-2f(x)}{x-2}$ is given by :

(A) -4 (B) -2 (C) 2 (D) None of the above

98. The value of the derivative of $|x-1|+|x-3|$ *at* x= 2, is :

(A) -2 (B) 0 (C) 2 (D) None of the above

99. The derivative of $f(x) = \log_{x^2} 3$ w.r.t. x is :

(A) $\frac{2\log 3}{x(\log x)^2}$ (B) $\frac{\log 3}{x(\log x)^2}$, (C) $\frac{\log 3}{2x(\log x)^2}$ (D) None of the above

100. If $x^m y^n = (x+y)^{m+n}$, *then* $\frac{dy}{dx}$ *is* :

(A) $\frac{y}{x}$ (B) $\frac{x}{y}$ (C) $\frac{1}{x}$ (D) None of the above