MASTER CADRE MATHS AUGUST 2022 QUESTION PAPER

1. A class has 10 boys and 5 girls. Three students are selected at random one after another. The probability that, the first two are boys and the third is a girl is_____.

(a) $\frac{15}{91}$ (b) $\frac{12}{91}$ (c) $\frac{14}{91}$ (d) $\frac{17}{91}$

2. If the amplitude of $z-2-3i$ is $\frac{\pi}{4}$, then locus of $z=x+iy$ is_____ . Where i is iota.

(a) $x+y-1=0$ (b) $x-y-1=0$ (c) $x+y+1=0$ (d) $x-y+1=0$

3. $\sin^8\theta-4\sin^6\theta+6\sin^4\theta-4\sin^2\theta+1$ is equal to_____.

(a) $\cos^8\theta$ (b) $\sin 8\theta$ (c) $\cos 8\theta$ (d) $\sin^4\theta\cos^4\theta$

4. The integral value of $\int_0^{\frac{\pi}{2}}\int_0^{a\sin\theta}\int_0^{r} r\,dr\,d\theta\,dz$ is_____.

(a) 0.5 (b) 0.25 (c) 1 (d) 0

5. If $y=\tan^{-1}\left[\frac{\sin x+\cos x}{\sin x-\cos x}\right]$, then $\frac{dy}{dx}$ is equal to_____.

(a) $\frac{1}{2}$ (b) $\frac{\pi}{4}$ (c) 0 (d) 1

6. From point A, Ram moves 100m in north- east direction, he again turns and movies 100m in south-east direction. He again turns and covers 100m south- west and finally covers 100m in north- west direction. In which direction is he now with respect to A

(a) West (b) South- west (c) At point A (d) East

7. $\int_0^a f(x)\,dx+\int_0^a f(2a-x)\,dx=$ _____.

(a) $2\int_0^a f(x)\,dx$ (b) $\int_0^{2a} f(x)\,dx$ (c) $\int_{-a}^a f(x)\,dx$ (d) $\int_0^a f(a+x)\,dx$

8. The projection of vector $7\hat{i}+\hat{j}-4\hat{k}$ on $2\hat{i}+6\hat{j}+3\hat{k}$ is_____.

(a) $\frac{1}{7}$ (b) 5 (c) $\frac{3}{7}$ (d) $\frac{8}{7}$

9. In the expansion of $(1+x)50$, the sum of the coefficients of odd power of x is_____.

(a) 248 (b) 249 (c) 250 (d) 251

10. Consider the Group $G=\{1,5,7,11,13,17\}$ under multiplication modulo 18. What is the value of 17^{-1} ?

(a) 11 (b) 12 (c) 15 (d) 17

11. If $T:R^2\to R^3$ is a linear transformation $T(1,0)=(2,3,1)$ and $T(1,1)=(3,0,2)$, then which one of the following is correct ?

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(a) $T(x,y)=(3x-3y,2x+y,x+y)\forall(x,y)\in R^2$
(b) $T(x,y)=(2x+y,3x-3y,x+y)\forall(x,y)\in R^2$
(c) $T(x,y)=(2x-y,3x+3y,x-y)\forall(x,y)\in R^2$
(d) $T(x,y)=(x-y,2x-y,3x-3y)\forall(x,y)\in R^2$

12. P.E of $(D+2)(D-1)^3 y=e^x$ is_____.

(a) $\frac{1}{8}e^x$ (b) $\frac{1}{18}x^2e^x$ (c) $\frac{1}{18}e^x x^3$ (d) none of these

13. A function $f(X)=\frac{x^2-1}{x-1}$ is_____.

(a) Discontinuous at x=1
(b) Discontinuous at x=2
(c) Continuous at x=1
(d) Continuous at x=2

14. If $f(x)=\begin{cases}x^2+3x+a & for\ x\le 1\\ bx+2 & for\ x>1\end{cases}$ is everywhere differentiable, then the values of a is_____ and b is_____.

(a) $3,5$ (b) $1,5$ (c) $3,1$ (d) $1,1$

15. The system of equations
$\alpha x+y+z=\alpha-1$
$x+\alpha y+z=\alpha-1$
$x+y+\alpha z=\alpha-1$ has no solution if α is_____.

(a) Not equal to -2
(b) 1
(c) -2
(d) 0

16. In an examination of nine papers, a candidate has to pass in more papers than the number of papers in which he fails in order to be successful, the number of ways in which he can be unsuccessful is_____.

(a) 112 (b) 256 (c) 284 (d) 656

17. The area of a triangle with vertices $(-3,0),(3,0)$ and $(0,k)$ is 9 sq. units. The value of K will be _____.

(a) 9 (b) 3 (c) -9 (d) 6

18. The first term of G.P is 1. The sum of the 3rd and 5th terms is 90. Then the common ratio is _____.

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

19. Suppose box A contains 4 green and 5 black coins and box B contains 6 green and 3 black coins. A coin is chosen at random from the box. A and placed in box B. finally, a coin is chosen at random from among those now in B. What is the probability a black coin was transferred from box A to box B given that the coin chosen from box B is green?

(a) $14/29$ (b) $15/29$ (c) $7/10$ (d) $1/2$

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20. The algebraic sum of the moments of all the forces about any point in the plane of forces is equal to_____.

(a) 0 (b) 1 (c) -1 (d) Infinity

21. If $y = \log_e \sqrt{\frac{1+\sin x}{1-\sin x}}$ then value of derivative $\frac{dy}{dx}$ is_____.

(a) $\cos x$ (b) $\sec x$ (c) $\tan x$ (d) $\cot x$

22. For all the complex numbers, Z_1, Z_2 satisfying $|Z_1| = 12$ and $|Z_2 - 3 - 4i| = 5$, the minimum value of $|Z_1 - Z_2|$ is_____.

(a) 2 (b) 5 (c) 7 (d) 9

23. If α, β are two values of θ satisfying the equation $\sec^2\theta + p\tan\theta + q = 1$ then_____.

(a) $\tan(\alpha+\beta) = \frac{p}{q-1}$ (b) $\tan(\alpha-\beta) = \frac{p}{q-1}$

(c) $\tan(\alpha+\beta) = \frac{q}{p-1}$ (d) $\tan(\alpha-\beta) = \frac{q}{p-1}$

24. Each student in Liberal art at some college has a mathematics requirement A and science requirement B. It is found that out of total 140. Students 60 completed A, 40 students completed B and 20 students completed both A and B. The number of students who have completed neither A nor B are

(a) 40 (b) 50 (c) 60 (d) 70

25. What will be the 99th term from the end of AP 500, 489, 478, 467……-1139?

(a) 1078 (b) 1123 (c) 12 (d) 61

26. Which of the following is equal to $\sqrt[3]{-1}$?

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

27. The average height of the paraboloid $z = x^2 + y^2$ over the square $0 \le x \le 2, 0 \le y \le 2$ is_____.

(a) $\frac{1}{2}$ (b) $\frac{8}{3}$ (c) $\frac{10}{3}$ (d) $\frac{1}{5}$

28. The solution set of the equation $[2x] = [x] + 3,\ 0 \le x \le 4$ where $[x]$ = the greatest integer less than or _____.

(a) $[3]$ (b) $\left\{3, \frac{5}{2}\right\}$ (c) $\left[\frac{5}{2}, \frac{7}{2}\right)$ (d) $[2,3]$

29. If we place some coins over the paper strip and pull it with a jerk, then coins don't fall off because of _____.

(a) Friction (b) Inertia (c) Resistance (d) Force

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30. $\tan^{-1}\frac{1}{7}+2\tan^{-1}\frac{1}{3}=$

(a) $\frac{3\pi}{4}$ (b) $\frac{\pi}{4}$ (c) $\frac{3\pi}{2}$ (d) None of the above

31. The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar if_____.

(a) $k=3\ or\ -3$ (b) $k=0\ or\ -1$ (c) $k=1 or -1$ (d) $k=0 or -3$

32. $\int_0^{3\pi/4}\sqrt{1-\sin 2x}\,dx=$_____.

(a) $2\sqrt{2}-1$ (b) -1 (c) 1 (d) $1-2\sqrt{2}$

33. A Ring $(R,+,.)$ under binary operation addition is always_____.

(a) Group (b) Monoid (c) Sub Group (d) Normal Subgroup

34. The mean deviation from the mean for the data 6,7,10,12,13,4,8 and 20 is_____.

(a) 3.75 (b) 3 (c) 3.05 (d) 5

35. Solution of equation $7\cos^2\theta+3\sin^2\theta=4$ is_____.

(a) $n\pi, n\in Z$ (b) $n\pi\pm\frac{\pi}{3}, n\in Z$

(c) $n\pi\pm\frac{\pi}{6}, n\in Z$ (d) $n\pi\pm\frac{\pi}{2}, n\in Z$

36. If A is a Hermitian matrix, then iA is_____.

(a) Hermitian (b) Symmetric
(c) Skew-Hermitian (d) Skew- symmetric

37. If K is an integer, then $\lim_{k\to 0^+}(x-[x])$ is equal to _____.

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

38. If $x=-5+2\sqrt{-4}$, then the value of $x^4+9x^3+35x^2-x+4$ is_____.

(a) -120 (b) -130 (c) -140 (d) -160

39. The value of the triple integral $\iiint xyz\ dxdydz$ over the volume enclosed by three coordinates planes and the plane $x+y+z=1$ is_____.

(a) $\frac{5}{720}$ (b) $\frac{11}{720}$ (c) $\frac{3}{720}$ (d) $\frac{7}{720}$

40. If the sum of the roots of the quadratic equation $ax^2+bx+c=0$ is equal to the sum of the squares of their reciprocals, then $\frac{a}{c},\frac{b}{a},\frac{c}{b}$ are in_____.

(a) A.P (b) G.P (c) H.P (d) A.G.P.

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41. The number of integral terms in the express of $\left(3^{\frac{1}{2}}+2^{\frac{1}{2}}\right)^{500}$ is_____.

(a) 128 (b) 129 (c) 251 (d) 512

42. The number of tangents to the curve $y=e^{|x|}$ at the point $(0,1)$ is_____.

(a) 2 (b) 4 (c) 1 (d) 0

43. Digits $1,2,3,4,5$ are written in random order without repetition to form a five digits number. How many of these are divisible by 4?

(a) 12 (b) 24 (c) 48 (d) 96

44. Three horses A, B and C are running a race. A and B have the same probability of winning and each is twice as likely to win as C. If there is no tie in winning position, the probability that B or C wins is_____.

(a) 0.5 (b) 0.6 (c) 0.7 (d) 0.8

45. The integrating factor for the differential equation $2y\,dx+xdy=0$ is_____.

(a) x (b) y (c) x y (d) y^2

46. Let $-1\le f(x)\le 1$ for $x\in[0,1)$ and $-2\le f(x)\le 2$ for $x\in[1,3]$ then the greatest of $\int_0^3 f(x)dx$ is_____.

(a) 3 (b) 5 (c) 6 (d) 4

47. If mode and mean are given by 5 and 6, respectively then the median is_____.

(a) $17/3$ (b) $13/3$ (c) $23/3$ (d) 33

48. The particular integral of $\frac{d^2y}{d^2x}+a^2y=e^{iax}$ is_____.

(a) $\frac{e^{iax}}{2ai}$ (b) $\frac{x}{2a}e^{ax}$ (c) $\frac{x}{2ai}e^{iax}$ (d) $\frac{e^{ax}}{2a}$

49. The number of generators of a cyclic group of order 219 is_____.

(a) 144 (b) 124 (c) 56 (d) 218

50. What is the probability of getting the sum as a prime number if two dice are thrown?

(a) $5/24$ (b) $5/12$ (c) $5/30$ (d) $1/4$

51. For any $n\in N$, where N is set of natural numbers, let $D_n=\left(0,\frac{1}{n}\right)$ and the open interval from 0 to $\frac{1}{n}$. Then the value of $D_3\cup D_7$ is_____.

(a) D_7 (b) D_2 (c) D_1 (d) D_3

52. Condition of convergence of Newton- Raphson method for the equation $f(x)=0$ is_____.

(a) $|f(x).f''(x)|=0$ (b) $|f(x).f''(x)|=[f'(x)]^2$

(c) $|f(x).f''(x)|<[f'(x)]^2$ (d) $|f(x).f''(x)|>[f'(x)]^2$

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53. In how many different ways the first twelve natural numbers can be divided in three equal groups such that the numbers in each group are in AP?
(a) 3 (b) 4 (c) 2 (d) 1

54. If the function $f(x)$ given by $\begin{cases} 3ax+b & if \ x>1 \\ 11 & if \ x=1 \\ 5ax-2b & if \ x<1 \end{cases}$ is continuous at x=1, then values of a is_____ and b is_____.
(a) $1,2$ (b) $1,3$ (c) $3,2$ (d) $2,2$

55. $\sim(pVq)\Lambda(p\Lambda q)$ is a_____.
(a) Tautology (b) Contradiction (c) Contingency (d) None of these.

56. The function $f(x)=e|x|$ is_____.
(a) Continuous everywhere but not differentiable at x=0
(b) Continuous and differentiable everywhere
(c) Not continuous at x=0
(d) Neither continuous nor differentiable at x=0

57. The solution of initial value problem $y''+4y'+13y=0, y(0)=1, y'(0)=1$ is_____.
(a) $y=(e^{-2x}\sin 3x)/3$ (b) $y=(e^{-3x}\sin 3x)/3$
(c) $y=(e^{-2x}\sin 3x)/4$ (d) $y=(e^{-5x}\sin 3x)/3$

58. Ordinary differential equation involves_____.
(a) Only one independent variable (b) Only two independent variable
(c) Two or more independent variable (d) No independent variable

59. Assuming that everyone in a group of 36 persons drink tea or coffee or both. A total of 16 drink tea while 9 drink tea but riot coffee. How many persons in this group drink coffee but not tea
(a) 4 (b) 11 (c) 13 (d) 20

60. The solution of $|2/(x-4)|>1$ where $x\neq 4$ is_____.
(a) $(2,6)$ (b) $(2,4)\cup(4,6)$ (c) $(2,4)\cup(4,\infty)$ (d) $(-\infty,4)\cup(4,6)$

61. For transformation $T:R5\to R5$ given by $T(a,b,c,d,e)=(b-d,d+e,b,2d+e,b+e)$, the nullity is equal to _____.
(a) 0 (b) 1 (c) 2 (d) 3

62. The value of the determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$, where ω is one of the cube roots of unity is_____.
(a) 1 (b) 2
(c) 0 (d) 3

63. The equation $kx^2+4xy+5y^2=0$ represent two lines inclined at an angle π if k is_____.
(a) $\frac{5}{4}$ (b) $\frac{4}{5}$ (c) $-\frac{5}{4}$ (d) $-\frac{4}{5}$

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64. The square root of $13-8\sqrt{3}\,i$ is equal to_____.
(a) $2+\sqrt{3}\,i$ (b) $4-\sqrt{3}\,i$ (c) $8+\sqrt{3}\,i$ (d) $7+\sqrt{3}\,i$

65. The order of identity element in a group is always_____.
(a) 0 (b) 1 (c) 2 (d) 3

66. The Harmonic series $\frac{1}{1^{\rho}}+\frac{1}{2^{\rho}}+\frac{1}{3^{\rho}}+\frac{1}{4^{\rho}}+\ldots\ldots$ is_____.
(a) Convergent for $\rho>1$ and divergent for $\rho\le 1$
(b) Convergent for $\rho<1$ and divergent for $\rho\ge 1$
(c) Convergent for $\rho\le 1$ and divergent for $\rho>1$
(d) Convergent for $\rho\ge 1$ and divergent for $\rho<1$

67. Which of the following is not a subspace of R^3?
(a) $\{(a,b,c)\,|\,a,b,c\in \textit{Rational number}\}$ (b) $\{(0,0,0)\}$
(c) $\{(a,a+b,-a+2b)\,|\,a,b\in R\}$ (d) $\{(a,a-b,b)\,|\,a,b\in R\}$

68. If a body in equilibrium condition is acted by three force at three points, then the line of action of these forces should be_____.
(a) Always concurrent (b) Always parallel
(c) Concurrent or parallel (d) None of the above

69. The value of α for which the vector $\vec{r}$ is at right angle to each of the vectors $\vec{a}=\alpha\hat{i}+\hat{j}+3\hat{k}$, $\vec{b}=2\hat{i}+\hat{j}-\alpha\hat{k}$, $\vec{c}=-2\hat{i}+\alpha\hat{j}+3\hat{k}$ is_____.
(a) 0 (b) 1 (c) 2 (d) 4

70. The roots of the equation $(x-a)(x-b)+(x-b)(x-c)+(x-c)(x-a)=0$ are_____.
(a) Real (b) Imaginary
(c) Rational (d) None of the above

71. Suppose a population A has 100 observations 101,102,……..200 and another Population B has 100 observations , 151,152,…….250. If V_A and V_B represent the variances of the two population, then V_A/V_B is_____.
(a) $2/3$ (b) $9/4$ (c) 1 (d) $4/9$

72. The equation of tangent to the curve $y=be^{-x/a}$ at the point where it crosses the y-axis is_____.
(a) $ax+by=1$ (b) $ax-by=1$ (c) $\frac{x}{a}+\frac{y}{b}=1$ (d) $\frac{x}{a}-\frac{y}{b}=1$

73. The angle between the lines $x-2y=5$ and $y-2x=5$ is_____.
(a) $\tan^{-1}(1/4)$ (b) $\tan^{-1}(3/5)$ (c) $\tan^{-1}(5/4)$ (d) $\tan^{-1}(2/3)$

74. A feasible solution of a linear programming problem which is also a basic solution to a problem is called_____.
(a) Unbounded solution (b) Infeasible Solution
(c) Basic feasible solution (d) Non Basic Solution

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75. If $A=\{1,2,3,4,5\}$, then the number of proper subsets of A is_____.
(a) 31 (b) 32 (c) 38 (d) 48

76. The straight lines $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and $\frac{x-4}{5}=\frac{y-1}{2}=z$ intersect at the point_____.
(a) $(1,1,1)$ (b) $(-1,-1,-1)$ (c) $(1,0,1)$ (d) $(-2,-3,-4)$

77. Have a look at the series: $15,30,22,44,36,72,.....$ What number should come next?
(a) 64 (b) 76 (c) 126 (d) 144

78. A cooperative bank has two branches employing 50 and 70 workers respectively. The average salaries paid by two respective branches are Rs.360 and Rs.390 per month. The mean of the salaries of all the employees is_____.
(a) 370 (b) 370.5 (c) 377 (d) 377.5

79. The general solution of first order equation $\frac{dy}{dx}=\cos x$ is given by_____.
(a) $y=\cos x$ (b) $\sin x$ (c) $y=\cos x+c$ (d) $y=\sin x+c$

80. The angle between the planes $4x-4y+7z=5$ and $2x+y+2z=7$ is_____.
(a) $\sin^{-1}(2/3)$ (b) $\cos^{-1}(3/2)$ (c) $\sin^{-1}(3/2)$ (d) $\cos^{-1}(2/3)$

81. For $f(x,y)=\begin{cases}\frac{2xy}{x^2+y^2}, & if\ \ f(x,y)\neq(0,0)\\ 0, & if\ \ f(x,y)=(0,0)\end{cases}$ then _____.
(a) f_x and f_y exist at $(0,0)$ and f is continuous at $(0,0)$
(b) f_x and f_y exist at $(0,0)$ and f is discontinuous at $(0,0)$
(c) f_x and f_y do not exist at $(0,0)$ and f is continuous at $(0,0)$
(d) f_x and f_y do not exist at $(0,0)$ and f is discontinuous at $(0,0)$

82. There point A, B and C are collinear if the area of triangle ABC is_____.
(a) >0 (b) <0 (c) 0 (d) None of the above

83. If order of group G is p^2, where p is prime then_____.
(a) G is abelian (b) G is not abelian
(c) G is ring (d) None of these

84. The order of convergence of bisection method is_____.
(a) 1 (b) 2 (c) 3 (d) 4

85. The infinite variable series $\frac{x}{1+x}+\frac{x^2}{1+x^2}+\frac{x^3}{1+x^3}+.....$ is_____.
(a) Convergent for $x>1$ and divergent for $x\leq 1$
(b) Convergent for $x<1$ and divergent for $x\geq 1$
(c) Convergent for $x\leq 1$ and divergent for $x>1$
(d) Oscillatory

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86. $p \vee q$ is logically equivalent to_____.
(a) $p \to \sim q$ (b) $\sim p \to q$ (c) $\sim p \to \sim q$ (d) $p \to q$

87. For finding cube of a number N, the iterative formula using Newton-Raphson method is_____.
(a) $x_{n+1} = \frac{1}{3}\left(2x_n + \frac{N}{x_n^2}\right)$ (b) $x_{n+1} = \frac{1}{2}\left(2x_n + \frac{N}{x_n^2}\right)$
(c) $x_{n+1} = \frac{1}{3}\left(2 + \frac{N}{x_n^2}\right)$ (d) $x_{n+1} = \frac{2}{3}\left(2x_n + \frac{N}{x_n^2}\right)$

88. Given $\begin{bmatrix} 1 & -1 & 1 \\ 1 & 2 & -1 \\ 2 & 1 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$. Which of the following options is correct about this equation?
(a) The given equation has only trivial solution
(b) The given equation has no trivial solution
(c) $x = y = z = 0$
(d) $x = y = 0, z \neq 0$

89. If $< a_n >$ converges to a, for all n, $a \geq 0$, then $< \sqrt{a_n} >$ is_____.
(a) Converge to $\sqrt{a}$ (b) Diverge to $\sqrt{a}$
(c) Converge to a (d) Diverge to a

90. $\int_0^1 x(1-x)^n dx$ Equal to_____.
(a) $\frac{1}{n} - \frac{1}{n+1}$ (b) $\frac{1}{(n+1)(n+2)}$
(c) $\frac{1}{n(n+1)}$ (d) $\frac{n}{(n+1)(n+2)}$

91. $\underset{x \to 0}{Lt}\left[\frac{x+5}{x-1}\right]^x =$ _____.
(a) e^6 (b) e^5 (c) e (d) 1

92. The square root of the complex number $5+12i$ is_____.
(a) $\pm(3+2i)$ (b) $\pm(3-2i)$
(c) $\pm(3+4i)$ (d) $\pm(3-4i)$

93. A bakery sells cookies in three boxes. The three boxes contain 50, 80 and 120 number of cookies. The baker wants to sells all the cookies in any of the three boxes. The least number of cookies that he can bake, in a day, so that he is able to sell all his cookies in any of the three boxes is_____.
(a) 1100 (b) 1200 (c) 1300 (d) 1400

94. If the focus of the parabola $x^2 - ky + 3 = 0$ is $(0,2)$ then a value of k is_____.
(a) 14 (b) 6 (c) 3 (d) 7

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95. What is the focus of the parabola $y^2 = -8(x-3)$?
(a) $(1,0)$ (b) $(0,0)$ (c) $(1,1)$ (d) $(0,1)$

96. A problem in mathematics is given to three students A, B and C. If the probability of A solving the problem is $1/2$ and B not solving it is $1/4$ .The whole probability of the problem being solved is $63/64$ then what is the probability of C of solving it?
(a) $1/2$ (b) $7/8$ (c) $1/64$ (d) $1/8$

97. If $f(x) = \left(\frac{x^2+5x+3}{x^2+x+2}\right)^x$, then $\lim_{x\to\infty} f(x)$ is_____.
(a) e (b) e^4 (c) e^2 (d) e^3

98. A matrix is singular *iff* it has_____.
(a) One Eigen value (b) Two Eigen value
(c) Zero Eigen value (d) None of these

99. The maximum value of the object function $Z = 5x+10y$ subject to the constraints $x+2y \le 120, x+y \ge 60, x-2y \ge 0, x \ge 0, y \ge 0$ is_____.
(a) 200 (b) 600 (c) 800 (d) 900

100. The distance between the parallel planes $x+y-z+4=0$ and $x+y-z+5=0$ is_____.
(a) $1/\sqrt{3}$ (b) $1/\sqrt{5}$ (c) $2/\sqrt{3}$ (d) $2/\sqrt{5}$

101. The value of $\lim_{x\to 0}\frac{e^x - e^{\sin x}}{x-\sin x}$ is_____.
(a) 1 (b) 2 (c) 3 (d) 4

102. The inequality $|z-4| < |z-2|$ represents the region given by_____.
(a) $\mathrm{Re}(z) > 0$ (b) $\mathrm{Re}(z) < 0$ (c) $\mathrm{Re}(z) > 2$ (d) $\mathrm{Re}(z) < 2$

103. A jet of an enemy is flying along the curve $y = x^2 + 2$. A soldier is placed at a point $(3,2)$. The nearest distance between the soldier and the jet is_____.
(a) 3 (b) $\sqrt{5}$ (c) $\sqrt{3}$ (d) $\sqrt{2}$

104. If $y = \tan^{-1}\left\{\sqrt{\frac{1+\cos x}{1-\cos x}}\right\}$ then value of derivative $\frac{dy}{dx}$ is_____.
(a) 0 (b) $-\frac{1}{3}$
(c) $-\frac{1}{4}$ (d) $-\frac{1}{2}$

105. Which of the following is the SI unit of force?
(a) $Kg\ m$ (b) $Kg\ m^2$ (c) $Kg\ m^2/s$ (d) $Kg\ m/s^2$

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106. $\sum_{r=1}^{n} r^2 \frac{\binom{n}{r}}{\binom{n}{r-1}} =$ _____.

(a) $\frac{(n+1)(n+2)}{12}$ (b) $\frac{n^2(n+2)}{6}$ (c) $\frac{n(n+2)}{2}$ (d) $\frac{n(n+1)(n+2)}{6}$

107. Taking infinite series of log x up to fourth term causes which type of error?
(a) Absolute error (b) Relative error (c) Round-off error (d) Truncation error

108. The value of $(101)^4$ using binomial theorem is_____.
(a) 104060401 (b) 104060404 (c) 100000400 (d) 104560400

109. Area bounded by the curve $y = x^2$ and $y = 2 - x^2$ is_____.
(a) $8/3$ (b) $3/8$ (c) $3/2$ (d) $1/8$

110. What is the identity element in group $G = \{2,4,6,8\}$ under multiplication modulo 10?
(a) 5 (b) 9 (c) 6 (d) 12

111. If $u = \sin^{-1}\frac{x^2+y^2}{x+y}$ then value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is _____
(a) cot u (b) sin u (c) tan u (d) sec u

112. The number of arbitrary constants in a general solution of first order equation contains_____.
(a) 1 (b) 2 (c) 3 (d) 4

113. Let Z_{10} denote the ring of integers modulo 10 then number of ideals in Z_{10} is_____.
(a) 2 (b) 3 (c) 4 (d) 5

114. The locus of the point of intersection of tangents to the circle $x = a\cos\theta, y = a\sin\theta$ at the points whose parametric angle differ by $\frac{\pi}{2}$ is_____.
(a) Straight line (b) Circle (c) Ellipse (d) Hyperbola

115. Which of the following relation is true?
(a) $E^{-1} = 1 + \nabla$ (b) $E^{-1} = \nabla$ (c) $E^{-1} = 1 - \nabla$ (d) None of these

116. Find the cube root of $8i$ lying in the first quadrant of the complex plane. Where i is iota?
(a) $i - \sqrt{3}$ (b) $2i + \sqrt{3}$ (c) $i + 2\sqrt{3}$ (d) $i + \sqrt{3}$

117. Find the equation of the plane passing through the points $P(1,1,1), Q(3,-1,2)$ and $R(-3,5,-4)$.
(a) $x + 2y = 0$ (b) $x - y - 2 = 0$ (c) $-x + 2y - 2 = 0$ (d) $x + y - 2 = 0$

118. The average marks of boys in a class is 26 and that of girls is 21. The average marks of boys and girls combined is 25. The percentage of boys in class is _____.
(a) 60 (b) 70 (c) 80 (d) 90

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119. The value of $\lim_{x\to 1}[x]\cos\left(\frac{\pi(1-x)}{2}\right)e^{1}/(1-x)$ denotes the greatest integer function is _____.

(a) 0
(b) 1
(c) ∞
(d) $-\infty$

120. Let the algebraic structure $(N,\times)$ has multiplication as binary operation, where N is the set of natural numbers. Which of the statement is true for $(N,\times)$?

(a) Monoid and semi group
(b) Semi group and group
(c) Group and abelian group
(d) Group but not abelian group

121. If $Z=\sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$, then_____.

(a) $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=\tan z$
(b) $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=\sin z$
(c) $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=\cos z$
(d) None of these

122. Solution of the equation $\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix}=0$

(a) $x=4$
(b) $x=2$
(c) $x=1$
(d) $x=5$

123. The solution of differential equation $(1+x^2)\frac{dy}{dx}+2xy-4x^2=0$, subjected to initial condition $y(0)=0$ is given by_____.

(a) $y=\frac{4x^3}{3(1+x^2)}$
(b) $y=\frac{4x^3}{(1+x^2)}$
(c) $y=\frac{x^3}{3(1+x^2)}$
(d) $y=\frac{4}{3(1+x^2)}$

124. $\lim_{n\to-\infty}\frac{n^3-n}{\sqrt{1+n^6}}$ is equal to _____.

(a) -1
(b) 1
(c) 0
(d) 3

125. The value of the integral $\int\frac{dx}{(x+2)(x-3)}$ is _____.

(a) $\frac{1}{5}\log_e\frac{x-3}{x+2}+C$
(b) $\frac{1}{54}\log_e\frac{x-3}{x+2}+C$
(c) $\frac{1}{52}\log_e\frac{x-3}{x+2}+C$
(d) $\frac{1}{4}\log_e\frac{x-3}{x+2}+C$

126. What is the optimal solution of following Linear Programming problem?

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$Max\, Z = 3x_1 + 2x_2$

Subject to $-2x_1 + x_2 \le 1$

$x_1 \le 2$

$x_1 + x_2 \le 3$

$x_1, x_2 \ge 0$

(a) $x_1 = 1$ and $x_2 = 1$ (b) $x_1 = 2$ and $x_2 = 1$

(c) $x_1 = 1$ and $x_2 = 2$ (d) $x_1 = 0$ and $x_2 = 1$

127. The Eigen values corresponding the matrix A= $A = \begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$ are_____.

(a) $2,3 \,and\, 3$ (b) $1,1 \,and\, 1$ (c) $1,2 \,and\, 3$ (d) $2,2 \,and\, 3$

128. If $c + \frac{i}{c} = a + ib$ where a, b, c are real, then the value of $a^2 + b^2$ is _____.

(a) 1 (b) -1 (c) c^2 (d) $-c^2$

129. If A is non singular matrix of order 3 then $\left|adj\left(A^3\right)\right|$ equals_____.

(a) $|A|^8$ (b) $|A|^6$ (c) $|A|^9$ (d) $|A|^{12}$

130. Which of the following is not a solution of $xy' + y = 0$?

(a) $xy = \sqrt{3}$ (b) $xy = -2$ (c) $x = \sqrt{3}y$ (d) $xy = \frac{\pi}{2}$

131. The angle between the planes $x + y + 2z = 9$ and $2x - y + z = 15$ is_____.

(a) $\pi/3$ (b) $\pi/2$ (c) $\pi/6$ (d) $\pi/9$

132. If $z^2 + z + 1 = 0$, where z is a complex number then the value of

$\left(z + \frac{1}{z}\right)^2 + \left(z^2 + \frac{1}{z^2}\right)^2 + \left(z^3 + \frac{1}{z^3}\right)^2 + \ldots\ldots\ldots + \left(z^6 + \frac{1}{z^6}\right)^2$ is_____.

(a) 12 (b) 18 (c) 54 (d) 6

133. The value of 'c' in Rolle's theorem for the function $f(x) = x(x-3)e^{3x}$ on $[0,3]$ is_____.

(a) 0.369 (b) 2.703 (c) 0 (d) 3

134. A missile fired from the ground level rise x meters vertically upward in t seconds where $x = 100t - \frac{25}{2}t^2$. The maximum height reached is _____meters.

(a) 100 (b) 150 (c) 200 (d) 250

135. If the circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2bx + c = 0$ touch each other then_____.

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(a) $a^{-2}+b^{-2}=c^{-1}$ (b) $a^{-2}+b^{-2}=c^{-2}$

(c) $a+b=2c$ (d) $\frac{1}{a}+\frac{1}{b}=\frac{2}{c}$

136. The equation of smallest degree with real coefficients having 1+i as one the roots is_____. where i is an iota.

(a) $x^2+x+1=0$ (b) $x^2-2x+2=0$

(c) $x^2+2x+2=0$ (d) $x^2-2x-2=0$

137. The value of legendre polynomial $P_2(x)$ is_____.

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

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

138. If $u+v=e^x\cos y$ and $u-v=e^x\sin y$ then value $J\left(\frac{u,v}{x,y}\right)$ is_____.

(a) e^{2x} (b) $\frac{e^{2x}}{2}$ (c) $-\frac{e^{2x}}{2}$ (d) 0

139. If $f(x)=|x|+|\cos x|$ then_____.

(a) $f'\left(\frac{\pi}{2}\right)=2$ (b) $f'\left(\frac{\pi}{2}\right)=0$

(c) $f'\left(\frac{\pi}{2}\right)=1$ (d) $f'\left(\frac{\pi}{2}\right)$ does not exist

140. If a circle passes through $(2,0)$ and $(0,4)$ and center at x-axis the find the radius of the circle.

(a) 5units (b) 15units (c) 25units (d) 35units

141. If the angles of a triangle are in the ratio 4:1:1, then the ratio of the largest side to the perimeter is_____.

(a) $\sqrt{3}:(2+\sqrt{3})$ (b) $1:5$ (c) $1:(2+\sqrt{3})$ (d) $1:3$

142. Rank of Matrix $A=\begin{bmatrix}1 & 2 & -1 & 4\\ 2 & 4 & 3 & 5\\ -1 & -2 & 6 & -7\end{bmatrix}$ is_____.

(a) 1 (b) 2

(c) 3 (d) 4

143. The order of the element $(\bar{2},\bar{2})$ in $Z_4 X Z_6$ is_____.

(a) 2 (b) 4 (c) 6 (d) 12

144. Order of convergence of Newton's method is_____.

(a) 1 (b) 3 (c) 2 (d) 1.5

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145. The longest side of a triangle is 2 times the shortest side and third side is 4cm shorter than the longest side. If the perimeter of triangle is at least 61cm, find the minimum length of shortest side.
(a) 7 (b) 9 (c) 11 (d) 13

146. The value of $\lim_{x\to 0}\frac{\tan x - x}{x^2 \tan x}$ is_____.
(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) 5

147. A feasible solution to a linear programming problem should_____.
(a) Satisfy the problem constraint
(b) Optimize the objective function
(c) Satisfy the problem constraints and non- negativity restrictions
(d) Satisfy the non- negativity restrictions

148. Conjugacy Classes of S_3 are_____.
(a) 1 (b) 2 (c) 3 (d) 6

149. The area of the parallelogram determined by the vectors $\hat{i}+2\hat{j}+3\hat{k}$ and $3\hat{i}-2\hat{j}+\hat{k}$ is_____.
(a) $8\sqrt{2}$ (b) $8\sqrt{5}$ (c) 87 (d) $8\sqrt{3}$

150. For interpolation of data with unequal intervals, which of the formula can be used?
(a) Newton Forward interpolation formula
(b) Newton backward interpolation
(c)Newton divided difference formula
(d) Gauss Interpolation formula

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ANSWERS

1. (a)	2. (d)	3. (a)	4. *	5. (d)	6. (c)
7. (b)	8. (d)	9. (b)	10. (d)	11. (b)	12. (c)
13. (a) or (d)	14. (a)	15. (c)	16. (b)	17. (b)	18. (c)
19. (b)	20. (a)	21. (b)	22. (c)	23. (a)	24. (c)
25. *	26. (a)	27. (b)	28. (c)	29. (b)	30. (b)
31. (d)	32. (a)	33. (a)	34. (a)	35. (b)	36. (c)
37. (c)	38. (d)	39.	40. (c)	41. (c)	42. (c)
43. (b)	44. (b)	45. (a)	46. (b)	47. (a)	48. (c)
49. (a)	50. (b)	51. (d)	52. (c)	53. (b)	54. (c)
55. (b)	56. (a)	57. *	58. (a)	59. (d)	60. (b)
61. (c)	62. (c)	63. (a)	64. (b)	65. (b)	66. (a)
67. (a)	68. (a)	69. (a)	70. (a)	71. (c)	72. (c)
73. *	74. (c)	75. (a)	76. (b)	77. (a)	78. (d)
79. (d)	80. (d)	81. (b)	82. (c)	83. (a)	84. (a)
85.	86. (b)	87. (a)	88. (a)	89. (a)	90. (b)
91. (d)	92. (a)	93. (b)	94. (b)	95. (a)	96. (b)
97. (b)	98. (c)	99. (b)	100. (a)	101. (a)	102. *
103. (b)	104. (d)	105. (d)	106. (d)	107. (d)	108. (a)
109. (a)	110. (c)	111. (c)	112. (a)	113. (c)	114. (b)
115. (c)	116. (d)	117. (d)	118. (c)	119.	120. (a)
121. (a)	122. (a)	123. (a)	124. (b)	125. (a)	126. (b)
127. (d)	128. *	129. (b)	130. (c)	131. (a)	132. (d)
133. (b)	134. (c)	135. *	136. (b)	137. (b)	138. (c)
139. (d)	140. (a)	141. (a)	142. (b)	143. (c)	144. (c)
145. (d)	146. (b)	147. (c)	148. (c)	149. (d)	150. (c)

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