Mock Paper 1

UP MCA

Uttar Pradesh MCA Entrance Test (UPMCAT)

Instructions

1. This Mock Paper consists 100 questions of mathematics, statistics & logical Ability.
2. Attempt all the questions/problems.
3. Each question carries 3 marks. (1) will be awarded to wrong answer.
4. Use a soft HB pencil darken the appropriate bubble.

M. Marks: 300 **Time: 2.30 hrs.**

1. The complex numbers $\sin x \quad i\cos 2x$ and $\cos x \quad i\sin 2x$ are conjugate to each other for

(a) $x \quad n$ (b) $x \quad n \quad \frac{1}{2}$ (c) $x \quad 0$ (d) no value of x

2. If z_1, z_2 are two complex numbers such that Im $(z_1 \quad z_2) \quad 0$, Im $(z_1 \quad z_2) \quad 0$, then

(a) $z_1 \quad z_2$ (b) $z_1 \quad z_2$ (c) $z_1 \quad \bar{z}_2$ (d) None of these

3. If $a_1, a_2, a_3 \ldots\ldots, a_n$ are in AP, where $a_i \quad 0$ for all i, then the value of

$$\frac{1}{\sqrt{a_1} \quad \sqrt{a_2}} \quad \frac{1}{\sqrt{a_2} \quad \sqrt{a_3}} \ldots\ldots\ldots\ldots \quad \frac{1}{\sqrt{a_{n \quad 1}} \quad \sqrt{a_n}} \text{ is}$$

(a) $\frac{1}{\sqrt{a_1} \quad \sqrt{a_n}}$ (b) $\frac{1}{\sqrt{a_1} \quad \sqrt{a_n}}$ (c) $\frac{n}{\sqrt{a_1} \quad \sqrt{a_n}}$ (d) $\frac{(n \quad 1)}{\sqrt{a_1} \quad \sqrt{a_n}}$

4. The set of values of p for which the roots of the equation $3x^2 \quad 2x \quad p(p \quad 1) \quad 0$ are of opposite signs, is

(a) $(\quad, 0)$ (b) $(0, 1)$ (c) $(1, \quad)$ (d) $(0, \quad)$

5. If $\log_{10} 2 \quad 0.30103$, $\log_{10} 3 \quad 0.47712$, then the number of digits in $3^{12} \quad 2^8$ is

(a) 7 (b) 8 (c) 9 (d) 10

6. If the quadratic equation $ax^2 \quad 2cx \quad b \quad 0$ and $ax^2 \quad 2bx \quad c \quad 0 \ (b \quad c)$ have a common root, then the value of $a \quad 4b \quad 4c$ is

(a) $\quad 2$ (b) $\quad 1$ (c) 0 (d) 1

7. Let A be a set containing 10 distinct elements, then the total number of distinct functions from A to A is

(a) 10 ! (b) 10^{10} (c) 2^{10} (d) 2^{10} 1

8. If the rth term in the expansion of $\frac{x}{3}$ $\frac{2}{x^2}$ ^{10} contains x^4, then r is equal to

(a) 2 (b) 3 (c) 4 (d) 5

9. If the sum of the coefficients in the expansion of $(x$ $y)^n$ is 4096, then the greatest coefficient in the expansion is

(a) 1594 (b) 792 (c) 924 (d) None of these

10. The number of distinct real roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix}$ 0 in the interval $\frac{}{4}$ x $\frac{}{4}$ is

(a) 0 (b) 2 (c) 1 (d) 3

11. If the value of the determinant $\begin{vmatrix} x & 1 & 1 \\ 1 & y & 1 \\ 1 & 1 & z \end{vmatrix}$ is positive, then

(a) xyz 1 (b) xyz 8 (c) xyz 8 (d) xyz 2

12. If a^2 b^2 c^2 1, then ab bc ca lies in the interval

(a) [1, 2] (b) $0, \frac{1}{2}$ (c) $\frac{1}{2}, 1$ (d) [0, 1]

13. If $\mathbf{a}$ $\hat{\mathbf{i}}$ $\hat{\mathbf{j}}$ $\hat{\mathbf{k}}$, $\mathbf{b}$ $4\hat{\mathbf{i}}$ $3\hat{\mathbf{j}}$ $4\hat{\mathbf{k}}$ and $\mathbf{c}$ $\hat{\mathbf{i}}$ $\hat{\mathbf{j}}$ $\hat{\mathbf{k}}$ are linearly dependent vectors and $|\mathbf{c}|$ $\sqrt{3}$, then

(a) 1, 1 (b) 1, 1 (c) 1, 1 (d) 1, 1

14. Let the vectors $\mathbf{a}$, $\mathbf{b}$, $\mathbf{c}$ and $\mathbf{d}$ be such that $(\mathbf{a}$ $\mathbf{b})$ $(\mathbf{c}$ $\mathbf{d})$ 0. Let P_1 and P_2 be planes determined by the pairs of vectors $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$, $\mathbf{d}$ respectively. Then the angle between P_1 and P_2 is

(a) 0 (b) (c) 3 (d) 2

15. If the vector $\mathbf{a}$ $(2, \log_3 x, a)$ and $\mathbf{b}$ $(3, a\log_3 x, \log_3 x)$ are inclined at an acute angle, then

(a) a 0 (b) a 0 (c) a 0 (d) None of these

16. The line L has intercepts a and b on the coordinate axes. When keeping the origin fixed, the coordinate axes are rotated through of fixed angle, then the same line has intercepts p and q on the rotated axes. Then

(a) a^2 b^2 p^2 q^2 (b) $\frac{1}{a^2}$ $\frac{1}{b^2}$ $\frac{1}{p^2}$ $\frac{1}{q^2}$

(c) a^2 b^2 p^2 q^2 (d) $\frac{1}{a^2}$ $\frac{1}{p^2}$ $\frac{1}{b^2}$ $\frac{1}{q^2}$

17. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in GP with the same common ratio, then the points (x_1, y_1), (x_2, y_2) and (x_3, y_3)

(a) lie on a straight line (b) lie on an ellipse (c) lie on a circle (d) are vertices of a triangle

18. The triangle PQR is inscribed in the circle x^2 y^2 25. If Q and R have coordinates (3, 4) and (– 4, 3) respectively, then QPR is equal to

(a) 2 (b) 3 (c) 4 (d) 6

19. Let PQ and RS be tangents at the extremities of the diameter PR of a circle of radius r. If PS and RQ intersect at a point X on the circumference of the circle, then $2r$ equals

(a) $\sqrt{PQ \quad RS}$ (b) $\frac{PQ \quad RS}{2}$ (c) $\frac{2PQ \quad RS}{PQ \quad RS}$ (d) $\sqrt{\frac{PQ^2 \quad RS^2}{2}}$

20. The equation of the circle which touches both the axes and the straight line $4x \quad 3y \quad 6$ in the first quadrant and lies below it, is

(a) $4x^2 \quad 4y^2 \quad 4x \quad 4y \quad 1 \quad 0$ (b) $x^2 \quad y^2 \quad 6x \quad 6y \quad 9 \quad 0$

(c) $x^2 \quad y \quad 6x \quad y \quad 9 \quad 0$ (d) $4\,(x^2 \quad y^2 \quad x \quad 6y) \quad 1 \quad 0$

21. If the circles $x^2 \quad y^2 \quad 2x \quad 2ky \quad 6 \quad 0$ and $x^2 \quad y^2 \quad 2ky \quad k \quad 0$ intersect orthogonally, then k is

(a) 2 or $\quad 3/2$ (b) $\quad 2$ or $\quad 3/2$ (c) 2 or $3/2$ (d) $\quad 2$ or $3/2$

22. If a variable line drawn through the point of intersection of the straight lines $\frac{x}{} \quad \frac{y}{} \quad 1$ and $\frac{x}{} \quad \frac{y}{} \quad 1$ meets the coordinate axes in A and B, then the locus of the mid point of AB is

(a) $(x \quad y) \quad xy\,(\quad)$ (b) $(x \quad y) \quad 2xy\,(\quad)$

(c) $(\quad)\,(x \quad y) \quad 2 \quad xy$ (d) None of these

23. The equation of the directrix of the parabola $y^2 \quad 4y \quad 4x \quad 2 \quad 0$ is

(a) $x \quad 1$ (b) $x \quad 1$ (c) $x \quad 3/2$ (d) $x \quad 3/2$

24. If any tangent to the ellipse $\frac{x^2}{a^2} \quad \frac{y^2}{b^2} \quad 1$ intercepts lengths h and k on the axes, then

(a) $\frac{h^2}{a^2} \quad \frac{k^2}{b^2} \quad 1$ (b) $\frac{h^2}{a^2} \quad \frac{k^2}{b^2} \quad 2$ (c) $\frac{a^2}{h^2} \quad \frac{b^2}{k^2} \quad 1$ (d) $\frac{a^2}{h^2} \quad \frac{b^2}{k^2} \quad 2$

25. The foci of the hyperbola $9x^2 \quad 16y^2 \quad 18x \quad 32y \quad 151 \quad 0$ are

(a) (2, 3), (5, 7) (b) (4, 1), (–6, 1) (c) (0, 0), (5, 3) (d) None of these

26. The equation $\frac{x^2}{1 \quad k} \quad \frac{y^2}{1 \quad k} \quad 1,\ k \quad 1$ represents

(a) circle (b) an ellipse (c) hyperbola (d) None of these

27. Let $f(\ ) \quad \sin \quad (\sin \quad \sin 3\ )$ then $f(\ )$

(a) 0 only when $\quad 0$ (b) 0 for all real

(c) 0 for all real (d) 0 only when $\quad 0$

28. The number of values of x in the interval $[0, 5\ ]$ satisfying the equation $3 \sin^2 x \quad 7 \sin x \quad 2 \quad 0$ is

(a) 0 (b) 5 (c) 6 (d) 10

29. A man from the top of a 100 m high tower sees a car moving towards the tower at an angle of depression of 30°. After some time, the angle of depression becomes 60°. The distance (in metre) travelled by the car during this time is

(a) $100\sqrt{3}$ (b) $200\sqrt{3}/3$ (c) $100\sqrt{3}/3$ (d) $200\sqrt{3}$

30. The number of solutions of $\sin^{\ 1} x \quad \sin^{\ 1} 2x \quad 3$ is

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

31. If $\frac{\cos A}{a}$ $\frac{\cos B}{b}$ $\frac{\cos C}{c}$ and the side a 2, then area of triangle is

(a) 1 (b) 2 (c) $\sqrt{3}/2$ (d)$\sqrt{3}$

32. In a triangle ABC, let C 2. If r is the inradius and R is the circumradius of the triangle, then 2 (r R) is equal to

(a) a b (b) b c (c) c a (d) a b c

33. If sin sin ^{1} $\frac{1}{5}$ cos ^{1} x 1 then x equals to

(a) 1 (b) 0 (c) 4/5 (d) 1/5

34. f and g are two differentiable functions which satisfy the condition g (a) 2, g (a) b and fog I identity function, then f (b) is equal to

(a) $\frac{2}{3}$ (b) $\frac{1}{2}$ (c) 2 (d) None of these

35. Let f (x) $\frac{x}{x \quad 1}$, x 1 . Then, for what value of is f {f (x)} x?

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

36. The domain of definition of f (x) $\frac{\log_{2}(x \quad 3)}{x^{2} \quad 3x \quad 2}$ is

(a) $\frac{R}{\{1, \quad 2\}}$ (b) (2,) (c) $\frac{R}{\{1, \quad 2, \quad 3\}}$ (d) $\frac{(3,)}{\{1, \quad 2\}}$

37. Let f (x) $\begin{cases} \frac{1}{|x|} & \text{for } |x| \quad 1 \\ ax^{2} \quad b & \text{for } |x| \quad 1 \end{cases}$

If f (x) is continuous and differentiable at any point, then

(a) a $\frac{1}{2}$, b $\frac{3}{2}$ (b) a $\frac{1}{2}$, b $\frac{3}{2}$ (c) a 1, b 1 (d) None of these

38. If the normal to the curve y f (x) at the point (3, 4) makes an angle $\frac{3}{4}$ with the positive x axis, then f (3) is equal to

(a) –1 (b) $\frac{3}{4}$ (c) $\frac{4}{3}$ (d) 1

39. Let f (x) (1 b^{2}) x^{2} 2bx 1 and let m (b) be the minimum value of f(x) . As b varies, the range of m(b) is:

(a) [0, 1] (b) $0, \frac{1}{2}$ (c) $\frac{1}{2}, 1$ (d)] 0, 1]

40. The value of the integral $\int_{0}^{1} \frac{dx}{x^{2} \quad 2x \cos \quad 1}$ is equal to

(a) sin (b) sin (c) ^{2} sin (d) $\frac{}{2 \sin}$

41. $|x|\,dx$ is equal to

(a) $x^{4}/4$ (b) $x^{4}/4$ (c) $|x|^{4}/4$ (d) None of these

42. Let f be a function whose domain is $[-5, 7]$. Let $g(x) = |2x - 5|$ then, domain of $(fog)x$ is

(a) $[-5, 1]$ (b) $[-4, 0]$ (c) $[-6, 1]$ (d) None of these

43. $\int_{-a}^{a} f(x)\,dx$ is equal to

(a) $\int_{0}^{a} [f(x) - f(-x)]\,dx$ (b) $\int_{0}^{a} [f(x) + f(-x)]\,dx$

(c) $2\int_{0}^{a} f(x)\,dx$ (d) 0

44. $\int_{0}^{} \sin^5 \frac{x}{2}\,dx$ equals

(a) $\frac{16}{15}$ (b) $\frac{32}{15}$ (c) $\frac{8}{15}$ (d) $\frac{5}{6}$

45. Let $f : (0, \ ) \to R$ and $F(x) = \int_{0}^{x} f(t)\,dt$. If $F(x^2) = x^2(1 + x)$, then $f(4)$ equals

(a) $\frac{5}{4}$ (b) 7 (c) 4 (d) 2

46. $\lim_{n} \left[\frac{1}{1 + n^3} + \frac{4}{8 + n^3} + \ldots\ldots\ldots\ldots + \frac{r^2}{r^3 + n^3} + \ldots\ldots\ldots + \frac{1}{2n}\right]$ is equal to

(a) $\frac{1}{2}\log 2$ (b) $\frac{1}{3}\log 2$ (c) $\log\frac{1}{2}$ (d) None of these

47. The volume of the solid obtained by revolving about y axis the area enclosed between the ellipse $x^2 + 9y^2 = 9$ and the straight line $x + 3y = 3$, in the first quadrant is

(a) 3 (b) 4 (c) 6 (d) 9

48. $\int_{R} \sqrt{4x^2 - y^2}\,dy\,dx$ where R is the triangle bounded by the line $y = 0$, $y = x$, $x = 1$ will be equal to

(a) $\frac{\sqrt{3}}{2} - \frac{}{6}$ (b) $\frac{1}{2} - \frac{2}{\sqrt{3}} - \frac{}{2}$ (c) $\frac{1}{3} - \frac{\sqrt{3}}{2} - \frac{}{3}$ (d) None of these

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

(a) $y = 2$ (b) $y = 2x$ (c) $y = 2x - 4$ (d) $2x^2 - 4$

50. $\lim_{x} \left(\cos\frac{y}{x}\right)^x$ is equal to

(a) 0 (b) 1 (c) 3 (d) None of these

51. Let $E = \{1, 2, 3, 4\}$ and $F = \{1, 2\}$. Then the number of onto functions from E to F are

(a) 14 (b) 14 (c) 6 (d) 4

52. The sum of the series is $\frac{2}{1!} - \frac{6}{2!} - \frac{12}{3!} - \frac{20}{4!} - \ldots\ldots$

(a) $5e$ (b) $7e$ (c) $9e$ (d) $11e - 6$

53. The probability that a man will live 10 more years is 1/4 and the probability that his wife will live 10 more years is 1/3. Then the probability that neither will be alive in 10 years, is

(a) 5/12 (b) 1/2 (c) 7/12 (d) 11/12

54. Let E and F be two independent events. The probability that both E and F happens is 1/2. Then

(a) $P(E)$ 1/3, $P(F)$ 1/4 (b) $P(E)$ 1/2, $P(F)$ 1/6

(c) $P(E)$ 1/6, $P(E)$ 1/2 (d) $P(E)$ 1/6, $P(E)$ 1/4

55. Thirteen cards are drawn simultaneously from a pack of 51 cards. If aces count one; face cards 10 and others according to denomination, the expectation of the score on the 13 cards is

(a) 45/13 (b) 37/13 (c) 85/13 (d) 48/17

56. Two particles A and B are dropped from the heights of 5 m and 20 m respectively. Then the ratio of time taken by A to that taken by B, to reach the ground is

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

57. A particle is projected with the speed of $10\sqrt{5}$ m/s at an angle of 60° from the horizontal. The velocity of the projectile when it reaches the height of 10 m is

(g 9 8 m/s^2)

(a) $4\sqrt{19}$ m/s (b) $\sqrt{179}$ m/s (c) 15 m/s (d) $5\sqrt{15}$ m/s

58. A sphere impinges directly on an equal sphere at rest. If the coefficient of restitution is e, their velocities after the impact are as

(a) 1 : e (b) e : 1 (c) 1 e : 1 e (d) 1 e : 1 e

59. Two like parallel forces P and $5P$ act on rigid body at a distance x apart. If the forces are interchanged then positions, the point of application of the resultant will be depend through h distance of

(a) $\frac{x}{6}$ (b) $\frac{2x}{3}$ (c) $\frac{x}{3}$ (d) $\frac{3x}{4}$

60. A blacksmith carries a hammer on his shoulder and holds it at the other end of its light handle in his hand. If he changes the point of support of the handle at the shoulder and if x is the distance between his hand and the point of support, then the pressure on his shoulder is proportional to

(a) x (b) x^2 (c) $1/x$ (d) $1/x^2$

61. A square hole is punched out of a circular lamina of diameter a. The diagonal of the square is equal to the radius of the circle and one of the corners is at the centre of the circle. The distance of the CG of the remainder from the centre of the circle is

(a) $\frac{a}{8 \quad 4}$ (b) $\frac{a}{8 \quad 4}$ (c) $\frac{a}{5 \quad 4}$ (d) $\frac{a}{5 \quad 4}$

62. If a variate X is expressed as a linear function of two variates U and V in the form $X \quad aU \quad bV$, then mean $\overline{X}$ of X is

(a) $a\overline{U} \quad b\overline{V}$ (b) $\overline{U} \quad \overline{V}$ (c) $b\overline{U} \quad a\overline{V}$ (d) None of these

63. The mean deviation from the mean of the AP a, $a \quad d$, $a \quad 2d$, ..., $a \quad 2nd$ is

(a) $n(n \quad 1)\,d$ (b) $\frac{n(n \quad 1)\,d}{(2n \quad 1)}$ (c) $\frac{n(n \quad 1)\,d}{2n}$ (d) $\frac{n(n \quad 1)\,d}{(2n \quad 1)}$

64. The acceleration of a particle, moving in a straight line, at time t is $(2t \quad 1)$ m/s^2. If 4 m/s is the initial velocity of the particle, then its velocity of the particle after 2 s is

(a) 4 m/s more (b) 8 m/s (c) 10 m/s more (d) None of these

65. A coin and a die are thrown simultaneously. The probability that at head apears on coin and '3' on the die is

(a) $\frac{1}{2}$ (b) $\frac{1}{8}$ (c) $\frac{1}{12}$ (d) 1

66. Which of the following is not an equivalence relation on Z ?

(a) $a \; R \; b$ a b is an even integer (b) $a \; R \; b$ a b is an even integer

(c) $a \; R \; b$ a b (d) $a \; R \; b$ a b

67. Let $f : R$ R be a function defined by $f(x)$ $\dfrac{e^{|x|} \quad e^{x}}{e^{x} \quad e^{x}}$, then

(a) f is a bijection (b) f is an injection only

(c) f is a surjection only (d) f is neither an injection nor a surjection

68. The closest distance of the origin from a curve given as $a\bar{z}$ $\bar{a}z$ $A\bar{A}$ 0 is

(a) 1 unit (b) $\dfrac{\text{Re}\,(A)}{|A|}$ (c) $\dfrac{\text{Im}\,(A)}{|A|}$ (d) None of these

69. If 1, $\log_9 (3^{1-x}$ 2) and $\log_3 (4 \; 3^{x}$ 1) are in AP, then x is equal to

(a) $\log_4 3$ (b) $\log_3 4$ (c) 1 $\log_3 4$ (d) $\log_3 0.25$

70. If , are roots of the equation $2x^2$ $6x$ b 0 (b 0), then — — is less than

(a) 2 (b) 2 (c) 18 (d) None of these

71. If n is even and $^{n}C_0$ $^{n}C_1$ $^{n}C_2$ ..... $^{n}C_r$ $^{n}C_{r-1}$ $^{n}C_{r-2}$ ... $^{n}C_n$, then r is equal to

(a) $\dfrac{n}{2}$ (b) $\dfrac{n \quad 1}{2}$ (c) $\dfrac{n \quad 2}{2}$ (d) $\dfrac{n \quad 2}{2}$

72. If n is an even natural number, then $\sum_{r=0}^{n} \dfrac{(-1)^r}{^{n}C_r}$ equals

(a) 0 (b) $\dfrac{1}{n}$ (c) $\dfrac{(-1)^{n/2}}{^{n}C_{n/2}}$ (d) None of these

73. The sum of the series $\dfrac{1^2 \quad 2^2}{1!}$ $\dfrac{2^2 \quad 3^2}{2!}$ $\dfrac{3^2 \quad 4^2}{3!}$ ..... is

(a) 27e (b) 24e (c) 28e (d) None of these

74. If A, B are symmetric matrices of the same order, then AB BA is

(a) symmetric matrix (b) skew-symmetric matrix

(c) null matrix (d) unit matrix

75. Consider the system of equations $a_1 x$ $b_1 y$ $c_1 z$ 0, $a_2 x$ $b_2 y$ $c_2 z$ 0, $a_3 x$ $b_3 y$ $c_3 z$ 0,

if $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ 0, then the system has

(a) more than two solutions (b) one trivial and one non-trivial solutions

(c) no solutions (d) only trivial solution (0, 0, 0)

76. If the quadrilateral formed by the lines ax by c 0, $a x$ $b y$ c 0, ax by c 0 $a x$ $b y$ c 0 have perpendicular diagonals, then

(a) b^2 c^2 b^{2} c^{2} (b) c^2 a^2 c^{2} a^{2}

(c) a^2 b^2 a^{2} b^{2} (d) None of these

77. The equation $8x^2 \quad 8xy \quad 2y^2 \quad 26x \quad 13y \quad 15 \quad 0$ represents a pair of straight line. The distance between them is

(a) $\frac{7}{\sqrt{5}}$ (b) $\frac{7}{2\sqrt{5}}$ (c) $\sqrt{\frac{7}{5}}$ (d) None of these

78. If two circles $a(x^2 \quad y^2) \quad bx \quad cy \quad 0$ and $A(x^2 \quad y^2) \quad Bx \quad Cy \quad 0$ touch each other then

(a) $aC \quad cA$ (b) $bC \quad cB$ (c) $aB \quad bA$ (d) $aA \quad bB \quad cC$

79. The length of the chord of the parabola $x^2 \quad 4ay$ passing through the vertex and having slope $\tan \quad$ is

(a) $4a \operatorname{cosec} \quad \cot$ (b) $4a \tan \quad \sec$
(c) $4a \cos \quad \cot$ (d) $4a \sin \quad \tan$

80. If $x \quad 9$ is the chord of contact of the hyperbola $x^2 \quad y^2 \quad 9$, then the equation of the corresponding pair of tangents is

(a) $9x^2 \quad 8y^2 \quad 18x \quad 9 \quad 0$ (b) $9x^2 \quad 8y^2 \quad 18x \quad 9 \quad 0$
(c) $9x^2 \quad 8y^2 \quad 18x \quad 9 \quad 0$ (d) $9x^2 \quad 8y^2 \quad 18x \quad 9 \quad 0$

81. The functions $f : R \quad R$ defined by $f(x) \quad (x \quad 1)(x \quad 2)(x \quad 3)$ is

(a) one-one but not onto (b) onto but not one-one
(c) both one and onto (d) neither one-one nor onto

82. Let $f(x) \quad \begin{cases} x^2 & , \quad x \quad z \\ \frac{k(x^2 \quad 4)}{2 \quad x} & , \quad x \quad z \end{cases}$, then $\lim_{x} \quad f(x)$

(a) exists only when $k \quad 1$ (b) exists for every real k
(c) exists for every real k except $k \quad 1$ (d) does not exist

83. If $y \quad x \quad e^x$, then $\frac{d^2x}{dy^2}$ is

(a) e^x (b) $\frac{e^x}{(1 \quad e^x)^3}$ (c) $\frac{e^x}{(1 \quad e^x)^2}$ (d) $\frac{1}{(1 \quad e^{x)^2}}$

84. The curves $ax^2 \quad by^2 \quad 1$ and $Ax^2 \quad By^2 \quad 1$ intersect orthogonally, then

(a) $\frac{1}{a} \quad \frac{1}{A} \quad \frac{1}{b} \quad \frac{1}{B}$ (b) $\frac{1}{a} \quad \frac{1}{A} \quad \frac{1}{b} \quad \frac{1}{B}$ (c) $\frac{1}{a} \quad \frac{1}{b} \quad \frac{1}{B} \quad \frac{1}{A}$ (d) None of these

85. On the interval [0, 1] the function $x^{25}(1 \quad x)^{75}$ takes its maximum value at the point

(a) 0 (b) 1/4 (c) 1/2 (d) 1/3

86. $\frac{(\cos x \quad x \sin x)}{x(x \quad \cos x)} dx$ is equal to

(a) $\log(x(x \quad \cos x)) \quad c$ (b) $\log \frac{x}{x \quad \cos x} \quad c$

(c) $\log \frac{x \quad \cos x}{x}$ (d) None of these

87. If $\int_1^4 f(x)\,dx \quad 4$ and $\int_2^4 (3 \quad f(x))\,dx \quad 7$, then the value of $\int_2^1 f(x)\,dx$ is

(a) 2 (b) 3 (c) 5 (d) None of these

88. The degree of the differential equation satisfying the relation $\sqrt{1 \quad x^2} \quad \sqrt{1 \quad y^2} \qquad x\sqrt{1 \quad y^2} \quad y\sqrt{1 \quad x^2}$ is

(a) 1 (b) 2 (c) 3 (d) None of these

89. The numbers 1, 2, 3, ..., n are arranged in a random order. The probability that the digits 1, 2, 3, ..., k ($n \quad k$) appear as neighbour is

(a) $\frac{(n \quad k)!}{n!}$ (b) $\frac{n \quad k \quad 1}{{}^{n}C_{k}}$ (c) $\frac{n \quad k}{{}^{n}C_{k}}$ (d) $\frac{k!}{n!}$

90. The equation $a \sin x \quad b \cos x \quad c$, where $|c| \quad \sqrt{a^2 \quad b^2}$ has

(a) a unique solution (b) infinite number of solutions

(c) no solution (d) None of these

91. If the last four letters of the word 'CONCENTRATION' are written in reverse order followed by next two in reverse order and next three in the reverse order, counting from the end, which letter would be eight in the new arrangement ?

(a) *N* (b) *T* (C) *E* (d) None of these

92. Six friends *A*, *B*, *C*, *D*, *E* and *F* are sitting in a closed circle facing the centre. *A* is facing *D*. *C* is between *A* and *B*. *F* is between *E* and *A*. Who is to the immediate left of *B* ?

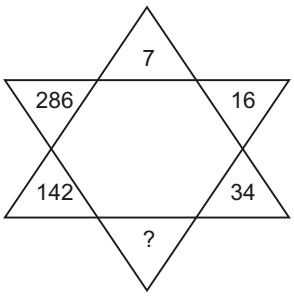
(a) *E* (b) *D* (c) *C* (d) *A*

93. Find the missing number

7	10	11
?	28	3
13	1	14

(a) 9 (b) 8 (c) 15 (d) 6

94. Find the missing number in the following figures ?



(a) 38 (b) 66 (c) 68 (d) 70
(e) 72

95. Ashish is heavier than Govind. Mohit is lighter than Jack. Pawan is heavier than Jack but lighter than Govind. Who among them is the heaviest ?

(a) Jack (b) Govind (c) Ashish (d) Pawan
(e) Mohit

96. **Statements:** 1. All crooks are simple.
2. Some simple are intelligent.

3. All intelligent are fools.

Conclusions: I. Some fools are crooks.

II. No fool is a crook.

III. Some simple are fools.

IV. All intelligent are simple.

(a) None of these (b) either I or II follows

(c) III and IV follow (d) either I or II and III follow.

(e) only I and II, and either III or IV follows.

Directions (97-98):

Arrange the given words in the alphabetical order the tick and one that come last.

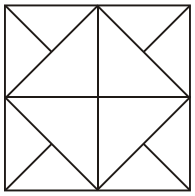
97. (a) regard (b) refer (c) report (d) remind

(e) render

98. (a) demand (b) destroy (c) deterred (d) damage

(e) direct

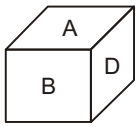
99. How many triangle are there in the following figure ?



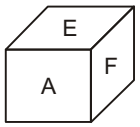
(a) 16 (b) 20 (c) 12 (d) 22

(e) None of these

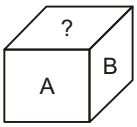
100. Which letter will come on the blank surface ?



(i)



(ii)



(iii)

(a) C (b) A (c) D (d) E