Mock Paper 3

UP MCA

Uttar Pradesh MCA Entrance Test (UPMCAT)

Instructions

1. This Mock Paper consists of 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. For a positive integer n, let $f_n(\quad)$ tan $\frac{}{2}$ (1 sec) (1 sec 2) (1 sec 4) …. (1 sec 2^n). Then

(a) f_2 (16) 1 (b) f_3 (16) 11 (c) f_4 (16) 111 (d) f_5 (16) 1111

2. The maximum value of sin (x /6) cos (x 6) in the interval (0, 2) is attained at

(a) 12 (b) 6 (c) 3 (d) 2

3. In a triangle ABC, the angle A is greater than angle B. If the values of the angles A and B satisfy the equation 3 sin x 4 $\sin^3 x$ k 0, 0 k 1, then the measure of angle C is

(a) 3 (b) 2 (c) 2 3 (d) 5 6

4. If x_1, x_2, x_3, x_4 are the roots of equation x^4 x^3 sin 2 x^2 cos 2 x cos sin 0, then $\tan^{\ 1} x_1$ $\tan^{\ 1} x_2$ $\tan^{\ 1} x_3$ $\tan^{\ 1} x_4$ is equal to

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

5. If the radius of the circumcircle of an isosceles triangle PQR is equal to PQ PR, then the angle P is

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

6. The number of triangles ABC that can be formed with a 3, b 8 and sin A 5/3, is

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

7. The elevation of a tower due north of a station A is and at another station B due west of A is . The height of the tower is

(a) $\frac{AB}{\sqrt{(\cot^2 \quad \cot^2 \ )}}$ (b) $\frac{AB}{\sqrt{(\cot^2 \quad \cot^2 \ )}}$ (c) $\frac{AB \cot \quad \cot}{\sqrt{(\cot^2 \quad \cot^2 \ )}}$ (d) $\frac{AB \cot \quad \cot}{\sqrt{(\cot^2 \quad \cot^2 \ )}}$

8. If (0, 1), (1, 1) and (1, 0) be the middle points of the sides of triangle, its incentre is

(a) $(2 \quad \sqrt{2}, 2 \quad \sqrt{2})$ (b) $(2 \quad \sqrt{2}, \quad (2 \quad \sqrt{2}))$

(c) $(2 \quad \sqrt{2}, 2 \quad \sqrt{2})$ (d) $(2 \quad \sqrt{2}, \quad (2 \quad \sqrt{2}))$

9. If the two pairs of lines $x^2 \quad 2mxy \quad y^2 \quad 0$ and $x^2 \quad 2nxy \quad y^2 \quad 0$ are such that one of them represents the bisectors of the angles between the other, then

(a) $mn \quad 1 \quad 0$ (b) $mn \quad 1 \quad 0$ (c) $\frac{1}{m} \quad \frac{1}{n} \quad 0$ (d) $\frac{1}{m} \quad \frac{1}{n} \quad 0$

10. The condition for the two circles $x^2 \quad y^2 \quad 2k_1 x \quad k^2 \quad 0$ and $x^2 \quad y^2 \quad 2k_2 y \quad k^2 \quad 0$ to touch each other externally is

(a) $k_1^2 \quad k_2^2 \quad k^2$ (b) $k_1^2 \quad k_2^2 \quad k^2$

(c) $k^2 \, (k_1^2 \quad k_2^2) \quad k_1^2 k_2^2$ (d) $k^2 \, (k_1^2 \quad k_2^2) \quad k_1^2 k_2^2$

11. The number of common tangents to the circle $x^2 \quad y^2 \quad 4$ and $x^2 \quad y^2 \quad 6x \quad 8y \quad 24$ is

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

12. Let L_1 be a straight line passing through the origin and L_2 be the straight line $x \quad y \quad 1$. If the intercepts made by the circle $x^2 \quad y^2 \quad x \quad 3y \quad 0$ on L_1 and L_2 are equal, then which of the following equations can represent L_1 ?

(a) $x \quad y \quad 0$ (b) $x \quad y \quad 0$ (c) $x \quad 700y \quad 0$ (d) $x \quad 700y \quad 0$

13. The curve described parametrically by $x \quad t^2 \quad t \quad 1, y \quad t^2 \quad t \quad 1$ represents

(a) a pair of straight lines (b) an ellipse

(c) a parabola (d) a hyperbola

14. If $f(x) \quad 3x \quad 5$, then $f^{\quad 1}(x)$

(a) is given by $1/(3x \quad 5)$ (b) is given by $(x \quad 5)/3$

(c) does not exist because f is not one-one (d) does not exist because f is not one-one into

15. The domain of the function $y \quad \frac{1}{\sqrt{\{|x| \quad x\}}}$ is

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

16. $\lim\limits_{n} \left(\frac{n \quad 1}{n \quad 2}\right)^{2n \quad 1}$ is equal to

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

17. If $f(x) \quad e^x$ and $g(x) \quad \ln x$, then $(go\,f)(x)$ is equal to

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

18. If $f(x) \quad \tan^{\quad 1}\sqrt{\frac{[(1 \quad \sin x)]}{[(1 \quad \sin x)]}}, 0 \quad x \quad \quad 2$, then $f \; (\quad 6)$ is

(a) $\quad 1/4$ (b) $\quad 1/2$ (c) $1/4$ (d) $1/2$

19. If $x^m y^n \quad (x \quad y)^{m \quad n}$, then $\frac{dy}{dx}$ is

(a) x/y (b) $1/y$ (c) $1/x$ (d) y/x

20. The slope of the curve $y \quad ae^{\quad x/b}$ at the point where it crosses the y-axis is

(a) a/b (b) $\quad a/b$ (c) b/a (d) $\quad b/a$

21. If $f(x) \quad \dfrac{x^2 \quad 1}{x^2 \quad 1}$ for every real number x, then the minimum value of f

(a) does not exist because f is bounded
(b) is not attained even though f is bounded
(c) is equal to 1
(d) is equal to $\quad 1$

22. The sum of the perimeters of a circle and a square is l. If the sum of the areas is least, then

(a) side of the square is double the radius of the circle.
(b) side of the square is $\frac{1}{2}$ of the radius of the circle.
(c) side of the square is equal to the radius of the circle.
(d) None of the above.

23. Let f be the quadratic function defined on $[a, b]$ by $f(x) \qquad x^2 \qquad x \quad , \qquad 0$, then the real '$c$' guaranted by the Lagranges Mean Value theorem is equal to

(a) $(a \quad b)/2$
(b) $\sqrt{ab}$
(c) $2ab/(a \quad b)$
(d) $(a/b \quad b/a)$

24. If $\quad \dfrac{2x^2 \quad 3}{(x^2 \quad 1)(x^2 \quad 4)} dx \quad A \log \dfrac{x \quad 1}{x \quad 1} \quad B \tan^{1} \dfrac{x}{2}$, then (A, B) is

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

25. The value of $\quad ^{2} \quad [2 \sin x]\, dx$, where [ ] represents the greatest integer function, is

(a) $\quad 5 \quad 3$
(b)
(c) $5 \quad 3$
(d) $\quad 2$

26. The function $\quad {}_{1}^{x} \quad t(e^t \quad 1)(t \quad 1)(t \quad 2)^3 (t \quad 3)^5\, dt$ has a local minimum at x is equal to

(a) 0
(b) 1
(c) 2
(d) 13

27. Let $\mathbf{a} \quad 2\hat{\mathbf{i}} \quad \hat{\mathbf{j}} \quad 2\hat{\mathbf{k}}$ and $\mathbf{b} \quad \hat{\mathbf{i}} \quad \hat{\mathbf{j}}$. If $\mathbf{c}$ is a vector such that $\mathbf{a} \quad \mathbf{c} \quad |\mathbf{c}|, \ |\mathbf{c} \quad \mathbf{a}| \quad 2\sqrt{2}$ and the angle between $(\mathbf{a} \quad \mathbf{b})$ and $\mathbf{c}$ is 30°, then $|(\mathbf{a} \quad \mathbf{b}) \quad \mathbf{c}|$ is equal to

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

28. If vectors $\mathbf{a}$ and $\mathbf{b}$ are non-collinear, then $\dfrac{\mathbf{a}}{|\mathbf{a}|} \quad \dfrac{\mathbf{b}}{|\mathbf{b}|}$ is

(a) a unit vector
(b) in the plane of $\mathbf{a}$ and $\mathbf{b}$, and equally inclined to $\mathbf{a}$ and $\mathbf{b}$
(c) not equally inclined to $\mathbf{a}$ and $\mathbf{b}$
(d) perpendicular to $\mathbf{a}$ and $\mathbf{b}$

29. If $[\mathbf{a}\ \mathbf{b}\ \mathbf{c}] \quad 1$, then the value of $\dfrac{\mathbf{a} \ (\mathbf{b} \quad \mathbf{c})}{(\mathbf{c} \quad \mathbf{a})\ \mathbf{b}} \quad \dfrac{\mathbf{b} \ (\mathbf{c} \quad \mathbf{a})}{(\mathbf{a} \quad \mathbf{b})\ \mathbf{c}} \quad \dfrac{\mathbf{c} \ (\mathbf{a} \quad \mathbf{b})}{(\mathbf{b} \quad \mathbf{c})\ \mathbf{a}}$ is

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

30. The equation $x[(\log_3 x)^2 \quad (9/2)\log_3 x \quad 5] \quad 3\sqrt{3}$ has

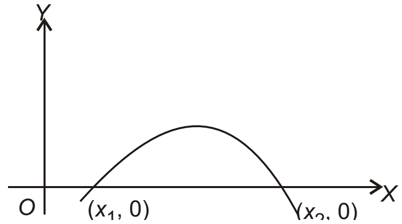
(a) at most one real solution
(b) exactly three real and exactly one irrational solution
(c) at least three real and exactly one irrational solution
(d) at least three real and exactly one rational solution

31. Let and be the roots of the equation $x^2 \quad x \quad 1 \quad 0$. The equation whose roots are $^{19}, \ ^{7}$ is

(a) $x^2 \quad x \quad 1 \quad 0$ (b) $x^2 \quad x \quad 1 \quad 0$

(c) $x^2 \quad x \quad 1 \quad 0$ (d) $x^2 \quad x \quad 1 \quad 0$

32. The adjoining figure shows the graph of $y \quad ax^2 \quad bx \quad c$. Then



(a) $a \quad 0$ and $b \quad 0$ (b) $b^2 \quad 4ac$ (c) $c \quad 0$ (d) $a \quad 0$ and $\quad b \quad 0$

33. The harmonic mean of the roots of the equation $(5 \quad \sqrt{2})\, x^2 \quad (4 \quad \sqrt{5})\, x \quad (8 \quad 2\sqrt{5}) \quad 0$ is

(a) 2 (b) 4 (c) 6 (d) 8

34. If the sum of first n natural numbers is 1/5 times the sum of their squares, then the value of n is

(a) 5 (b) 6 (c) 7 (d) 8

35. If and are different complex numbers with $| \quad | \quad 1$, then $\dfrac{\quad}{1 \quad \bar{\quad}}$ is equal to

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

36. If be a cube root of unity and $(1 \quad)^7 \quad A \quad B$, then A and B are respectively the numbers (A, $B \quad R$)

(a) 0, 1 (b) 1, 1 (c) 1, 0 (d) 1, 1

37. The largest term in the expansion of $(3 \quad 2x)^{50}$ where $x \quad 1/5$ is

(a) 4th and 5th (b) 7th and 8th (c) 6th and 7th (d) 5th and 6th

38. The sum of the series $\dfrac{1}{1 \ 2} \quad \dfrac{1}{2 \ 3} \quad \dfrac{1}{3 \ 4} \quad \dfrac{1}{4 \ 5}$ ...... is

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

39. The straight lines I_1, I_2, I_3 are parallel and lie in the same plane. A total number of m points are taken on I_1; n points on I_2; k points on I_3. The maximum number of triangles formed with vertices at these points are

(a) $^{m \quad n \quad k}C_3$ (b) $^{m \quad n \quad k}C_3 \quad ^{m}C_3 \quad ^{n}C_3 \quad ^{k}C_3$

(c) $^{m}C_3 \quad ^{n}C_3 \quad ^{k}C_3$ (d) None of these

40. There are four machines and it is known that exactly two of them are faulty. They are tested, one by one in a random order till both the faulty machines are identified. Then the probability that only two tests are needed is

(a) 1/3 (b) 1/6 (c) 1/2 (d) 1/4

41. If the integers m and n are chosen at random between 1 and 100, then the probability that a number for the form $7^m \quad 7^n$ is divisible by 5 equals

(a) 1/4 (b) 1/7 (c) 1/8 (d) 1/49

42. Let S denote the rectangle

$$\{(x, y) : 0 \quad x \quad , 0 \quad y \quad 1\}$$

and C the circle $\{(x, y) : x^2 \quad y^2 \quad 1\}$. Point $p \quad S$ also $\quad C$ with probability

(a) 1/8 (b) 1/4 (c) 8 (d) 4

43. If x is a positive integer, then $\begin{vmatrix} x! & (x+1)! & (x+2)! \\ (x+1)! & (x+2)! & (x+3)! \\ (x+2)! & (x+3)! & (x+4)! \end{vmatrix}$ is equal to

(a) $(2x)!\,(x+1)!$ (b) $(2x)!\,(x+3)!$

(c) $(2)\,(x)!\,(x+1)!\,(x+2)!$ (d) $2\,(x+1)!\,(x+2)!\,(x+3)!$

44. If $f(x)$ is a polynomial satisfying

$$f(x) = \frac{1}{2}\begin{vmatrix} f(x) & f(1/x) - f(x) \\ 1 & f(1/x) \end{vmatrix}$$

and $f(2) = 17$ then the value of $f(5)$ is

(a) 624 (b) -124 (c) 626 (d) 126

45. Suppose $A_1, A_2, \ldots\ldots, A_{30}$ are thirty sets each having 5 elements and $B_1, B_2, \ldots\ldots, B_n$ are n sets each with 3 elements. Let $\bigcup_{i=1}^{30} A_i = \bigcup_{i=1}^{n} B_j = S$ and each element of S belongs to exactly 10 of the A_i's and exactly 9 of the B_j's. Then n is equal to

(a) 15 (b) 3 (c) 45 (d) None of these

46. A relation R defined on the set of integers by $R = \{(a, b) : a \text{ divides } b\}$. Then R is

(a) reflexive (b) symmetric (c) transitive (d) equivalence

47. Let $A = \{x : -1 \le x \le 1\} = B$ and S be a subset of $A \times B$ defined by $S = \{(x, y) \in A \times B : x^2 + y^2 = 1\}$. This defines

(a) a one-one function from A to B (b) a many one function from A to B

(c) a onto function from A to B (d) not a function

48. If the locus of the point of intersection of perpendicular tangents to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is a circle with centre at (0, 0), then the radius of the circle would be

(a) $a + b$ (b) ab (c) b/a (d) $\sqrt{a^2 + b^2}$

49. If the circle $x^2 + y^2 = a^2$ intersects the hyperbola $xy = c^2$ in four points $P(x_1, y_1)$, $Q(x_2, y_2)$, $R(x_3, y_3)$, $S(x_4, y_4)$ then

(a) $\sum_{i=1}^{4} x_i = 0$, $\sum_{i=1}^{4} y_i = 0$, $\prod_{i=1}^{4} x_i = c^4$, and $\prod_{i=1}^{4} y_i = c^4$

(b) $\sum_{i=1}^{4} x_i = 0$, $\sum_{i=1}^{4} y_i = 0$

(c) $\prod_{i=1}^{4} x_i = c^4$, $\prod_{i=1}^{4} y_i = c^4$

(d) $\sum_{i=1}^{4} x_i = 0$, $\prod_{i=1}^{4} x_i = c^4$ and $\sum_{i=1}^{4} y_i = 0$, $\prod_{i=1}^{4} y_i = 0$

50. For which of the following values of m, is the area of the region bounded by the curve $y = x - x^2$ and the line $y = mx$ equals 9/2 ?

(a) $-4, 0$ (b) $-2, 2$ (c) $-2, 4$ (d) 4, 5

51. A solution of the differential equation $\frac{dy}{dx}^{2} \quad x\frac{dy}{dx} \quad y \quad 0$ is

(a) $y \quad 2$ (b) $y \quad 2x$ (c) $y \quad 2x \quad 4$ (d) $y \quad 2x^2 \quad 4$

52. A particle moves from rest at a distance c from a fixed point O with an acceleration $\quad x^2$ away from O at a distance x. Then the velocity of the particle at distance $2c$ from O is

(a) $\sqrt{(\quad c)}$ (b) $\sqrt{(\quad c)}$ (c) $\quad c$ (d) None of these

53. AB is vertical diameter of a circle in a vertical plane. Another diameter CD makes an angle of 60° with AB, then the ratio of the time taken by a particle to slide along AB to the time taken by it to slide along CD is

(a) $1:1$ (b) $\sqrt{2}:1$ (c) $1:\sqrt{2}$ (d) $3^{1/4} : 2^{1/2}$

54. A particle is projected with a velocity u from the foot of an inclined plane whose inclination to the horizon is . It strike the plane at right angles if

(a) tan ( ) cot (b) 2 tan ( ) cot

(c) 2 cot ( ) cot (d) None of these

55. If the greatest and the least resultants of two forces are P and Q, respectively, then the resultant of these forces, when acting at right angles, will be

(a) $\sqrt{[(P^2 \quad Q^2)/2]}$ (b) $(P \quad Q)/2$ (c) $(P^2 \quad Q^2)/2$ (d) $\sqrt{[(P^2 \quad Q^2)/2]}$

56. A string ABC has its extremities tied to two fixed points A and B in the same horizontal line. If a weight W is knotted at a given point C, then the tension in the portion CA is (where a, b, c are the sides and is the area of triangle ABC)

(a) $\frac{Wb}{4c}(a^2 \quad b^2 \quad c^2)$ (b) $\frac{Wb}{4c}(b^2 \quad c^2 \quad a^2)$ (c) $\frac{Wb}{4c}(c^2 \quad a^2 \quad b^2)$ (d) $\frac{Wb}{4c}(a^2 \quad b^2 \quad c^2)$

57. Forces 7, 5 and 3 acting on a particle are in equilibrium, the angle between the pair of forces 5 and 3 is

(a) 30° (b) 60° (c) 90° (d) 120°

58. The standard deviation of first n natural numbers is

(a) $\frac{n(n \quad 1)(2n \quad 1)}{6}$ (b) $\frac{(n^2 \quad 1)}{12}$ (c) $\sqrt{\frac{(n^2 \quad 1)}{12}}$ (d) None of these

59. If the mean of the distribution

Variate x	1	2	3	4	5
Frequency f	4	5	k	1	2

is 2.6, then the value of k is

(a) 8 (b) 10 (c) 12 (d) 18

60. If a, b, c, d are positive real numbers such that $a \quad b \quad c \quad d \quad 2$, then $M \quad (a \quad b)(c \quad d)$ satisfies the relation

(a) $0 \quad M \quad 1$ (b) $1 \quad M \quad 2$ (c) $2 \quad M \quad 3$ (d) $3 \quad M \quad 4$

61. If and ( ), are the roots of the equation $x^2 \quad bx \quad c \quad 0$, where $c \quad 0 \quad b$, then

(a) 0 (b) $\quad 0 \quad | \quad |$ (c) $\quad 0$ (d) $\quad 0 \quad | \quad |$

62. Consider an infinite geometric series with first term a and common ratio r. If its sum is 4 and the second term is 3/4, then

(a) $a \quad 7/4, r \quad 3/7$ (b) $a \quad 2, r \quad 3/8$ (c) $a \quad 3/2, r \quad 1/2$ (d) $a \quad 3, r \quad 1/4$

63. The domain of definition of the function $y(x)$ given by the equation $2^x \quad 2^y \quad 2$ is

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

64. If $b \quad a$, then the equation $(x \quad a)(x \quad b) \quad 1 \quad 0$, has

(a) both roots in $[a, b]$ (b) both roots in $(\quad , a)$

(c) both roots in $(b, \quad)$ (d) one root in $(\quad , a)$ and other in $(b, \quad)$

65. The maximum value of $y \quad a \cos x \quad b \sin x$ in

(a) $a^2 \quad b^2$ (b) $\frac{ab}{\sqrt{a^2 \quad b^2}}$ (c) $\sqrt{a^2 \quad b^2}$ (d) $\frac{1}{\sqrt{a^2 \quad b^2}}$

66. The locus of point z satisfying Re $\frac{1}{z} \quad k$, where k is a non-zero real number, is

(a) a straight line (b) a circle (c) an ellipse (d) a hyperbola

67. If $|a| \quad 1$ and $|b| \quad 1$, then the sum of the series $a(a \quad b) \quad a^2(a^2 \quad b^2) \quad a^3(a^3 \quad b^3)$ .... upto is

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

68. If , are the roots of the equation $ax^2 \quad bx \quad c \quad 0$, then the value of the determinant

$$\begin{matrix} 1 & \cos(\quad) & \cos \\ \cos(\quad) & 1 & \cos \\ \cos & \cos & 1 \end{matrix}$$ is

(a) $\sin(\quad)$ (b) $\sin \quad \sin$ (c) $1 \quad \cos(\quad)$ (d) None of these

69. The number of ways in which n distinct objects can be put into the different boxes so that no box remains empty, is

(a) $2^n \quad 1$ (b) $n^2 \quad 1$ (c) $2^n \quad 2$ (d) $n^2 \quad 2$

70. The number $101^{100} \quad 1$ is not divisible by

(a) 100 (b) 1000 (c) 10000 (d) 100000

71. The value of $1 \quad \frac{a^2x^2}{2!} \quad \frac{a^4x^4}{4!} \quad .... \quad ^2 \quad ax \quad \frac{a^3x^3}{3!} \quad \frac{a^5x^5}{5!} \quad .... \quad ^2$ is

(a) e^{ax} (b) $e^{\quad ax}$ (c) 0 (d) 1

72. If $\begin{matrix} 2 & 1 \\ 3 & 2 \end{matrix} \; A \; \begin{matrix} 3 & 2 \\ 5 & 3 \end{matrix} \quad \begin{matrix} 1 & 0 \\ 0 & 1 \end{matrix}$, then the matrix A equals

(a) $\begin{matrix} 1 & 1 \\ 1 & 0 \end{matrix}$ (b) $\begin{matrix} 1 & 1 \\ 0 & 1 \end{matrix}$ (c) $\begin{matrix} 1 & 0 \\ 1 & 1 \end{matrix}$ (d) $\begin{matrix} 0 & 1 \\ 1 & 1 \end{matrix}$

73. If $\begin{matrix} p & q & y & r & z \\ p & x & q & r & z \\ p & x & q & y & r \end{matrix} \quad 0$, then the value of $\frac{p}{x} \quad \frac{q}{y} \quad \frac{r}{z}$ is

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

74. The set of lines $ax \quad by \quad c \quad 0$ where $3a \quad 2b \quad 4c \quad 0$ is concurrent at the point

(a) $\frac{3}{4}, \frac{1}{2}$ (b) $\frac{1}{2}, \frac{3}{4}$ (c) $\frac{3}{4}, \frac{1}{2}$ (d) None of these

75. A circle touches a given straight line and cuts off a constant length $2d$ from another straight line perpendicular to the first straight line. The locus of the centre of the circle is

(a) $y^2 \quad x^2 \quad d^2$ (b) $x^2 \quad y^2 \quad d^2$ (c) $xy \quad d^2$ (d) None of these

76. Let $f(x) \quad \frac{ax \quad b}{cx \quad d}$, then $fof(x) \quad x$ provided that

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

77. The value of $\lim_{x} \quad \frac{}{2} \quad \tan^{1} x^{\quad 1/x}$ is

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

78. If $f(x) \quad [x \sin \quad x]$, then which of the following is not true ?

(a) Continuous at $x \quad 0$ (b) Continuous in $(\quad 1, 0)$

(c) Differentiable at $x \quad 1$ (d) Differentiable in $(\quad 1, 1)$

79. If $y \quad \sec^{1} \frac{x \quad 1}{x \quad 1} \quad \sin^{1} \frac{x \quad 1}{x \quad 1}$, then $\frac{dy}{dx}$ is

(a) 1 (b) $\frac{x \quad 1}{x \quad 1}$ (c) 0 (d) $\frac{x \quad 1}{x \quad 1}$

80. If the line $ax \quad by \quad c \quad 0$ is normal to $xy \quad 1$, then

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

81. The interval in which the function $f(x) \quad x^3$ increases less rapidly, then $y(x) \quad 6x^2 \quad 15x \quad 5$ is

(a) $(\quad, \quad 1)$ (b) $(\quad 5, 1)$ (c) $(\quad 1, 5)$ (d) $(5, \quad)$

82. $\quad 5^{5^{5^x}} \quad 5^{5^x} \quad 5^x \, dx$ is equal to

(a) $\frac{5^{5^x}}{(\log_5)^3} \quad c$ (b) $5^{5^{5^x}} (\log_5)^3 \quad c$ (c) $\frac{5^{5^{5^x}}}{(\log_5)^3} \quad c$ (d) None of these

83. The value of the integral

$$\int_1^3 \tan^{1} \frac{x}{x^2 \quad 1} \quad \tan^{1} \frac{x^2 \quad 1}{x} \, dx \text{ is equal to}$$

(a) (b) 2 (c) 4 (d) None of these

84. The vector **a** lies in the plane of vectors **b** and **c**, which of the following is correct ?

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

85. The distance between the line **r** $2\hat{\mathbf{i}} \quad 2\hat{\mathbf{i}} \quad 3\hat{\mathbf{k}} \quad (\hat{\mathbf{i}} \quad \hat{\mathbf{j}} \quad 4\hat{\mathbf{k}})$ and the plane **r** $(\hat{\mathbf{i}} \quad 5\hat{\mathbf{j}} \quad \hat{\mathbf{k}}) \quad 5$ is

(a) $\frac{10}{3\sqrt{3}}$ (b) $\frac{10}{3}$ (c) $\frac{10}{9}$ (d) None of these

86. If ten objects are distributed at random among ten persons, the probability that at least one of them will not get any thing is

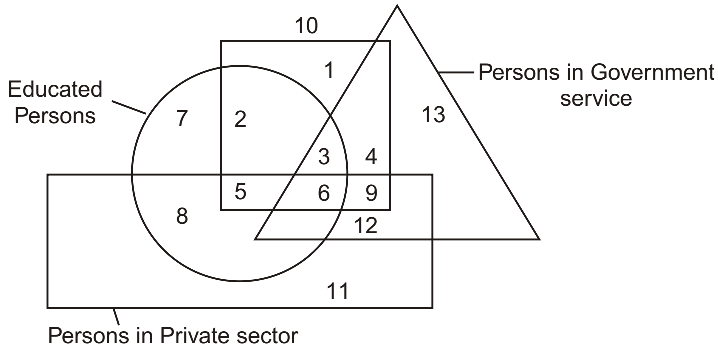
(a) $\frac{10^{10} \quad 10}{10^{10}}$ (b) $\frac{10^{10} \quad 10!}{10^{10}}$ (c) $\frac{10^{10} \quad 1}{10^{10}}$ (d) None of these

87. Like parallel forces act at the vertices A, B and C of a triangle ABC and are proportional to the length BC, AC and AB respectively. The centre of the force is at the

(a) centroid (b) circumcentre (c) incentre (d) None of these

Directions (88-89)

In the Venn diagram given below, the square represents women, the triangle represents persons who are in government. Services, the circle represents educated persons and the rectangle represents persons working in private sectors. Each section of the diagram is numbered. Your task is to study the diagram and answer the question that follow :



88. Number 2 represents

(a) educated women who neither have government jobs nor private job

(b) uneducated women with no jobs

(c) educated men with government jobs

(d) uneducated men with government jobs

(e) None of the above

89. How many pairs of letters are there in the word 'CONTEMPORARY' which have as many letters between them in the word as in the alphabets ?

(a) one (b) two (c) three (d) four

(e) more than four

Directions (90–92)

Find the missing number in the following series.

90. 83, 82, 81........, 69, 60, 33

(a) 73 (b) 80 (c) 75 (d) 77

(e) None of these

91. 77, 78, 77, 81, 73........, 55

(a) 69 (b) 71 (c) 82 (d) 89

(e) None of these

92. 6, 7, 9, 13, 21,.............

(a) 25 (b) 29 (c) 37 (d) 32

(e) None of these

Directions (93–94)

Correct the following equations by interchanging two signs ?

93. 3 9 27 9 3 3

(a) and (b) and (c) × and (d) – and

(e) and

94. 4 2 6 2 12 2

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

(e) and

95. **Statements:** 1. All teachers are doctors.

2. All doctors are engineers.

3. All engineers are typists.

Conclusion: (I) Some typists are teachers.
(II) All doctors are typists.
(III) Some engineers are teachers.
(IV) All doctors are teachers.

(a) only I and II follows (b) only I and III follow
(c) either II or IV follows (d) either I or II and III follow
(e) None of these

96. If stands for 'addition', stands for 'subtraction', stands for 'multiplication' and stands for 'division', then

20 8 8 4 2 ?

(a) 5 (b) 24 (c) 25 (d) 80

97. If means , means , means , and means , then

40 12 3 6 60 ?

(a) 16 (b) 44 (c) 7.95 (d) 479.95
(e) None of these

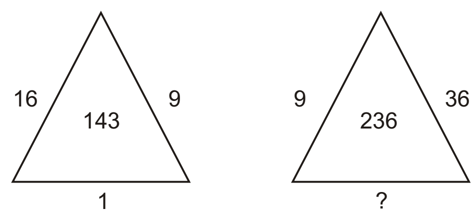
98. How many squares are there in the following figure ?

(a) 14 (b) 16 (c) 22 (d) 12
(e) None of these

Directions (99–100)

Find out the missing number:

99.



(a) 38 (b) 64 (c) 4 (d) 16

100.

6	8	7
9	3	13
10	14	1

(a) 11 (b) 9 (c) 7 (d) 8