megaleap
Comprehensive MCA Entrance Coaching

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M. C. A. ENTRANCE **Test Code: MTD - II** **Total Questions: 100** **Max. Time: 135 Minutes**

SUBTEST–I (Quantitative and Mathematical Ability)
(Questions: 50, Time: 75 Minutes)

1. $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$ lies between

(a) 1 and 2 (b) 2 and 3 (c) 2 and 2.5 (d) none

2. If α, β, γ are the roots of the equation $x^3+px^2+qx+r=0$, then the equation with leading coefficient unity, having roots $\alpha-\frac{1}{\beta\gamma},\beta-\frac{1}{\gamma\alpha},\gamma-\frac{1}{\alpha\beta}$ will have second degree term coefficient

(a) $pr(r+1)$ (b) $-p-\frac{p}{r}$ (c) $p+\frac{p}{r}$ (d) none

3. If α, β, γ, … are the roots of f(x) = 0 then the equation whose roots are α–2*h*, β–2*h*, γ–2*h*, … would be

(a) $f(x+2h)=0$ (b) $f(x-2h)=0$

(c) $f(2h-x)=0$ (d) $f(x-h)=0$

4. $\int_0^1 x^6\sqrt{1-x^2}\,dx$ is

(a) $\frac{5\pi}{256}$ (b) $\frac{3\pi}{32}$ (c) $\frac{5\pi}{32}$ (d) none

5. If $y=x$ is a solution of $x^2y''+xy'-y=0$, then the second linearly independent solution of the above equation is

(a) $1/x$ (b) x^2 (c) x^{-2} (d) none

6. $\lim_{n\to\infty}\left(\frac{1}{n^2}+\frac{2}{n^2}+\ldots+\frac{1}{n}\right)$ is

(a) 0 (b) 1/2 (c) 1 (d) ∞

7. If under certain conditions $f(a+h)=f(a)+hf'(a+\theta h),\ (0<\theta<1)$ provided $f''(a)$ is continuous and non zero, then as $h\to 0$, $\theta\to$

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

8. $x^2+y^2-7x-5y+25=0$ represents

(a) real circle (b) imaginary circle
(c) a pair of lines (d) a parabola

9. There are _____ asymptotes of $y^2(1+x)=x^2(1-x)$

(a) no (b) 1 (c) 2 (d) none

10. If $\log_x a,\ \log_y a,\ \log_z a$ are in H. P., then $x,\ y,\ z$

(a) are necessarily in G. P.
(b) may be in G. P. but not necessarily
(c) can never be in G. P. (d) none of these

11. The basic feasible solution of a L P. P. are

(a) interior points of the constraint set
(b) boundary points of the constraint set
(c) extreme points of the constraint set
(d) none of these

12. Let $\Sigma a_n,\ \Sigma b_n,\ \Sigma c_n$ be three positive term series such that $\lim\frac{a_n}{b_n}=0$ and $\lim\frac{a_n}{c_n}=\infty$, if $\sum a_n$ converges, then

(a) $\sum b_n$ bn must diverge (b) $\sum c_n$ must diverge
(c) $\sum b_n$ must converge (d) $\sum c_n$ must converge

13. Which one of the following is an example of non–-commutative ring?

(a) Residue class ring mod 6 (b) 2 × 2 matrices over a field
(c) The ring of polynomials over Z_6
(d) The ring of Gaussian integers

14. In the series $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\ldots$ the rearrangement of terms alters the sum of the series because it is

(a) A conditionally convergent series
(b) Absolutely convergent series
(c) Absolutely convergent but not conditionally convergent
(d) Divergent series

15. Which of the following limits do not exist?

(a) $\lim_{x\to 0}\frac{1}{1-e^{1/x}}$ (b) $\lim_{x\to a}\frac{1}{1-e^{x-a}}$

(c) $\lim_{x\to 0}e^{1/x}$ (d) All of the above

16. Given $a_i^2+b_i^2+c_i^2=1$ (i=1, 2, 3) and $a_ia_j+b_ib_j+c_ic_j=0$ (i ≠ j, i, j=1,2,3), then the value of $\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}^2$ is

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

17. The domain of the function $f(x)=\sin^{-1}\left(\log_3\frac{x^2}{3}\right)$

(a) [–3,–1] (b) [1, 3]

(c) $[-3,-1]\cup[1,3]$ (d) none of these

18. $\int \frac{10x^9+10^x\log 10}{10^x+x^{10}}dx$ is

(a) $\frac{1}{2}\log(10^x+x^{10})$ (b) $\log(10^x-x^{10})$

(c) $\log(10^x+x^{10})$ (d) $2\log(10^x+x^{10})^{-1}$

19. A circle of radius unity is inscribed in an isosceles triangle. The least perimeter of such a triangle is

(a) $3\sqrt{3}$ (b) 9 (c) $6\sqrt{3}$ (d) none

20. Consider the following statements:
1. Ever cyclic group is abelian
2. Every abelian group is cyclic
3. There is atleast one abelian group of every finite order n > 0
4. Every group of order < 4 is cyclic.
Of these statements
(a) 2 alone is correct (b) 1, 3 and 4 are correct
(c) 1 and 4 are correct (d) 1 and 3 are correct

21. The matrix $A=\begin{pmatrix}1 & 2\\ 3 & 1\end{pmatrix}$ satisfies the matrix equation $A^2-2A=KI$, where *K* is

(a) 2 (b) 5 (c) 3 (d) 1

22. If X and Yare two random variables having joint density function: $f(x,y)=\frac{1}{8}(6-x-y);\ 0<x<2, 2<y<4=0$ o therwise then P(X < 1 ∩ y < 3) is

(a) 5/24 (b) 5/8 (c) 3/8 (d) none of these

23. The L.P.P. maximize $2x_1+x_2$ such that $x_1-x_2\le 0,\ 2x_1-x_2\le 40,\ x_i\ge 0$ for all *j* has

(a) no feasible solution (b) unbounded solution
(c) unique optimal solution
(d) infinite number of optimal solutions

24. If $y=\frac{2}{1-x^2}$, then which one of the following does not hold?

(a) $x=\pm 1$ are vertical asymptotes (b) $y=0$ is horizontal asymptote
(c) $y=2$ is horizontal asymptote (d) none of these

25. The series $\left(1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}+\ldots\right)\left(1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\ldots\right)$ is

(a) convergent (b) divergent (c) Oscillating (d) none

26. The equation $f(x)=a_0x^n+a_1x^{n-1}+\ldots+a_n=0$ has atleast one root in the interval (0, 1) if

(a) $\frac{a_0}{n+1}+\frac{a_1}{n}+\ldots+a_n=0$

(b) $\frac{a_0}{n}+\frac{a_1}{n-1}+\ldots+a_{n-1}=0$

(c) $na_0+(n-1)a_1+\ldots+a_{n-1}=0$

(d) $(n+1)a_0+na_1+\ldots+a_n=0$

27. Odd man out is
(a) (Z + .) (b) (Q + .) (c) (R + .) (d) (C + .)

28. Which of the following is not a countable set?
(a) Z (b) Q (c) R (d) none

29. For testing the goodness of fit, the following distribution is used
(a) t – dist. (b) F – dist (c) x^2 – dist (d) none

30. Simple random sampling means
(a) equal probability for each item to be drawn
(b) 50% equal and 50% unequal chances
(c) drawn purposefully (d) drawn after satisfaction

31. If X is a random variable, which follows normal distribution with mean 0 and unit variance, then the distribution of x^2 follows
(a) t – distribution (b) F–distribution
(c) x^2 – distribution (d) none of these

32. The chi–squared statistic is used for testing
(a) the difference between two sample means
(b) the significance of the correlation coefficient
(c) homogeneity of variances (d) the hypothesis $\sigma^2=\sigma_0^2$

33. The locus of a point which moves such that the sum of the squares of its distances from the six faces of a cube is constant is
(a) a plane (b) a cone (c) a sphere (d) none

34. The orthogonal trajectories of the given family of curves $y=cx^k$ are given by
(a) x^2+y^2 = constant (b) x^2+ky^2 = constant

(c) $kx^2 + y^2$ = constant (d) $x^2 - ky^2$ = constant

35. To remove product term i.e. xy term from $ax^2 + 2hxy + by^2 = 0$, the axes should be rotated through

(a) $\tan^{-1} 2\dfrac{(h^2 - ab)^{1/2}}{a+b}$ (b) $\tan^{-1}\dfrac{2ab}{a+b}$

(c) $\dfrac{1}{2}\tan^{-1}\dfrac{2h}{a-b}$ (d) none of these

36. If $0 < \alpha < \theta < \beta < \pi/2$. Then $\dfrac{\sin\alpha - \sin\beta}{\cos\beta - \cos\alpha}$ is

(a) $\tan\theta$ (b) $\cot\theta$ (c) $\cos\theta$ (d) none

37. Derived set of S = {1, 3, 7, 11} is

(a) ϕ (b) {1} (c) {3} (d) none

38. The line $y = 2x + k$ is normal to parabola $y^2 = 4x$ if k is

(a) 12 (b) –12 (c) 14 (d) none

39. Consider the following function, of which one or more functions may be injectious, from Z into Z

1. $x \to x^2$ 2. $x \to 2x$ 3. $x \to 2+x$

Select the functions which are 1–1 using the codes given below: Codes:

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

40. Two roots of the cubic $z^3 + 3Hz + G = 0$ will be imaginary if

(a) $G^2 + 4H^3 > 0$ (b) $G^2 + 4H^3 = 0$

(c) $G^2 + 4H^3 < 0$ (d) G= 0 and H=0

41. If u = f(r), where $r = \sqrt{x^2 + y^2}$, then $\dfrac{\delta^2 u}{\delta x^2} + \dfrac{\delta^2 u}{\delta y^2}$ is equal to

(a) $f'(r) + \dfrac{1}{r} f''(r)$ (b) $f''(r) + rf'(r)$

(c) $f''(r) + \dfrac{1}{r} f'(r)$ (d) none of these

42. The entire length of the given curve $x^{2/3} + y^{2/3} = a^{2/3}$ is given by

(a) $8a$ (b) $6a$ (c) $\sqrt{8ay}$ (d) $4\sqrt{3a}$

43. What is the degree of the differential equation?

$3y = x\dfrac{dy}{dx} + \sin\left(\dfrac{dy}{dx}\right)$?

(a) 1 (b) 2 (c) 3 (d) cannot be determined

44. If $f(x) = x\left(\sqrt{x} - \sqrt{x+1}\right)$, then

(a) $f(x)$ is continuous but not differentiable at $x = 0$

(b) $f(x)$ is differentiable at $x = 0$

(c) $f(x)$ is not differentiable at $x = 0$

(d) none of these

45. The matrix A + B can be defined when

(a) A has 2 columns and B has 1 column

(b) A has 2 rows and B has 3 rows

(c) Both A and B are square matrices of the same order

(d) none of these

46. A box contains "a" white and "b" black balls. "c" balls are drawn. The expected value of the number of white balls drawn iff

(a) $\dfrac{ab}{a+c}$ (b) $\dfrac{ac}{a+b}$ (c) $\dfrac{bc}{a+b}$ (d) none

47. The value of x and y if $A = \begin{pmatrix} x & 2/3 & 2/3 \\ 2/3 & 1/3 & y \\ 2/3 & -2/3 & 1/3 \end{pmatrix}$ is orthogonal is

(a) $x = 1/3, y = 2/3$ (b) $x = 1/3, y = -2/3$

(c) $x = -1/3, y = -2/3$ (d) none of these

48. In order to solve cubic equation $a_0x^3 + 3a_1x^2 + 3a_2x + a_3 = 0$ by cardon's method, it is necessary to remove the

(a) constant term (b) second term

(c) third term (d) none of these

49. The scalar A.{(B + C) × (A + B + C)} equals

(a) 0 (b) [A B C] + [B C A]

(c) [A B C] (d) none of these

50. If P(x) and Q(y) are arbitrary functions of x and y respectively, then the differential equation P(x)dx + Q(y)dy = 0

(a) May or may not be exact (b) Is never exact

(c) Is always exact

(d) Is exact only when P(x) = x and Q(y) = y

SUBTEST–II (Deductive & Logical Ability)
(Questions: 50, Time: 60 Minutes)

51. A, B, C, D are girls. The set of boy friends of A, B, C, D are respectively {E, F}, {G, H], {F}, {F, G]. The girls want to marry only among, their boy friends. Then

(a) There is a unique pairing of boys with girls for marriage.

(b) C can marry only F in any pairing

(c) Such marriages for all the girls simultaneously is not possible.

(d) none of these

52. Sumit has five sons A, B, C, D and E (not necessarily in the order of their ages). Two of them being twins are of identical age, but are neither the youngest nor the oldest of the sons. D is younger than three of his brothers. E is older than C but younger than B. The twins are:

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

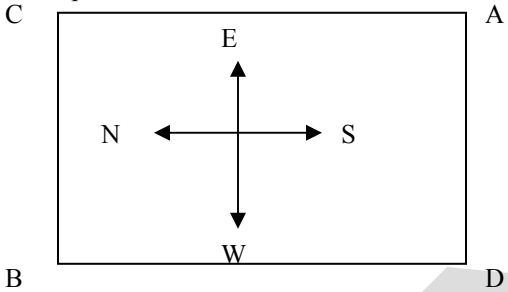
53. The sum of the value of X and Y would be

O	×	□	□	21
O	□	O	O	15
×	×	×	O	5
×	O	×	□	Y
6	13	13	X	

(a) 37 (b) 35 (c) 19 (d) 27

54. The numbers x and y are positive reals. If $x^m \geq y^m$ for every integer m then
(a) $x = y$ (b) $x > y$
(c) m should be positive (d) none of these

Directions (Q. 55 – 59): are based on the following diagram that shows four persons stationed at the square's four corners of a plot. Find the correct answer from among the alternative given under each question.



55. A starts crossing the field diagonally. After half the distance he turns right; walks some distance and turns left. Which direction is A facing now?
(a) North–east (b) North–west
(c) South–east (d) South–west

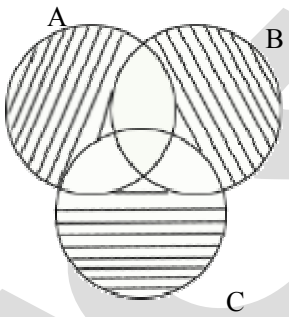
56. From the original position given in the diagram A and B move one arm length clockwise and then cross over to the corner diagonally opposite. C and D move one arm length anti. Clockwise and cross over to the comer diagonally opposite. The original configuration ADBC has now changed to
(a) CBDA (b) BDAC (c) DACB (d) ACBD

57. From the original position given in the diagram, B and D move one and a half length of sides clockwise and anti clock–wise respectively. Which one of the following statements is true?
(a) B and D are both at the Mid points between A and C.
(b) D is at the mid point between A and C, and B at the corner originally occupied by A.
(c) B and D are both at the mid–point between A and D.
(d) B is at the mid–point between A and original position of D; and D, at the mid–point between original position of B and C.

58. From the position in the diagram, A and C move diagonally to opposite corners and then one side each clockwise and anti clockwise respectively. D and B move two sides clockwise and anti–clockwise respectively. Where is A now?
(a) At the north–west corner (b) At the north–east comer
(c) At the south–east comer (d) At the south–west comer

59. After the movements given in the above question, who is at the north–west corner?
(a) A (b) B (c) C (d) none of these

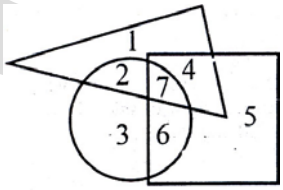
60. The Boolean expression for the shaded region in the given figure is



(a) $\overline{A} + \overline{B} + \overline{C}$ (b) $\overline{A}.\overline{B}.\overline{C}$ (c) A+B+C (d) none

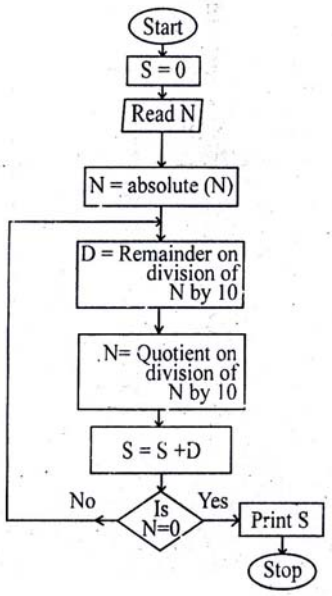
61. The value of 2^{10} in hexadecimal system is
(a) FF3 (b) 3FF (c) 400 (d) none

62. It tall is equivalent to circle, armymen to triangle and strong to square, indicate which number will represent strong army men?



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

63. Read the following



If the value of N is read as –125639 then the value of S written is
(a) 12563 (b) 9 (c) 26 (d) none

64. A.B.C and D are positive integer. If $C^2 - \{A+D)^2 = 231$
$D^2 - (A + B)^2 = 28$, $A^2 = 5 + C$ then C is

(a) 4 (b) 11 (c) 20 (d) none

Directions (Q. 65 – 66): Consider the following truth table

x	Y	x.y	x+y	x⊕y	x⊗y
0	0	0	0	0	1
0	1	0	1	1	0
1	0	0	1	1	0
1	1	1	1	0	1

Let Band D respectively denote the borrow and the difference bits when y is subtracted from x.

65. B as a function of x and y is given by
(a) $x'.y$ (b) $x'+y$ (c) $x + y'$ (d) $x'.y'$

66. D as a function of x and y is given by
(a) x + y (b) x. y (c) x ⊕ y (d) x ⊗ y

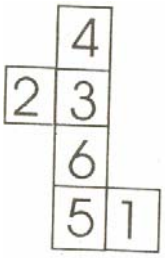
67. The missing term in the series 0, 3, 8, 15, 24, …., 50 is
(a) 35 (b) 48 (c) 36 (d) 49

68. The number of 1's in the binary representation of $12 \times 16^3 + 13 \times 16^2 + 14 \times 16 + 5$ is
(a) 7 (b) 8 (c) 10 (d) none

69. The number of zeros in the binary representation of $7\times8^5 +4\times8^4 +2\times8^2 +6\times8+3$ is
(a) 5 (b) 9 (c) 12 (d) none

70. A six faced die has 1, 2, 3, 4, 5, 6 etched on its faces. Sum of the number in the opposite faces is 7. If the die is rolled and 3 comes uppermost, then the sum of the number in the 5 visible faces is
(a) 16 (b) 18 (c) 20 (d) none

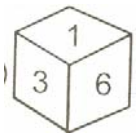
71. Faces shown in the figure are folded to form a cube, in which of the cubes shown below can it result.



(a) 

(b) 

(c) 

(d) 

72. f 'A*B' means that 'A is sister of B'.
'A%B' means that 'A is father of B'.
'A@B' means that 'A is brother of B',
Which of the following means 'L is aunt of N'?
(a) K%L@M*N (b) K%L *M@N
(c) L*K%M@N (d) K@L%M*N

73. Which one of the following is true?
(a) {x ↓ y) ↑ z = x ↓ (y ↑ z) (b) (x ↑ y) ↑ z = x ↑ (y ↑ z)
(c) (x ↓ y) ↓ z = x ↓ (y ↓ z) (d) none of these

74. I3th January 1995 was a Friday. In which year the next 13th January fall on a Friday?
(a) 2000 (b) 2001 (c) 2006 (d) none

75. If $\frac{ELK}{GNU}=\frac{2}{3}$ and $\frac{HEN}{FOX}=\frac{3}{5}$ then what is $\frac{PIG}{RAM}=?$
(a) 1 (b) 11/13 (c) 13/15 (d) none

76. The functions f (x. y) defined by the following table is given by

x	y	f (x, y)
0	0	1
0	1	0
1	0	0
1	1	1

(a) $xy + x'y'$ (b) $x'y + xy'$ (c) $x+x'y'$ (d) $xy+y'$

Directions (Q.77 – 83): Study the following information and answer the questions
(i) An examination was held during the two week of January–Sunday the 3rd to Saturday the 16th.
(ii) There was one paper each for the six subjects, viz Physics, Chemistry, Biology, Mathematics, English and Hindi. There was not more than one paper on any day.
(iii) No paper was held on Saturday and Sunday and the national holiday on the 5th. Only three papers were there in a week.
(iv) Chemistry was before Biology and mathematics was on the next day of Hindi. .
(v) The day on which the paper of Biology and Mathematics were held was the same, while that for Physics and Chemistry was also the same.
(vi) There was no paper for three days between Physics and the paper prior to it.
(vii) Papers in Hindi and English were on Tuesday and Thursday respectively.
(viii) There was at least a gap of one day between any two Science papers.

77. If by arrangements Mathematics was held on 15th, how many days' gap would have been between Physics and Mathematics?
(a) 1 (b) 2 (c) 3 (d) none

78. On which of the following groups of dates excluding Saturdays and Sundays were there no papers?
(a) 6th, 14th, 15th (b) 8th, 14th, 15th
(c) 4th, 14th, 15th (d) none of these

79. Which of the following papers was held on the day following Biology?
(a) Physics (b) Chemistry (c) English (d) Hindi

80. On which of the following dates was the Hindi paper?
(a) 5th (b) 6th (c) 12th (d) 13th

81. Which one of the following papers was held on the 4th?
(a) Physics (b) Chemistry (c) English (d) Mathematics

82. How many days gap was there between Chemistry and English?
(a) 1 (b) 2 (c) 3 (d) 4

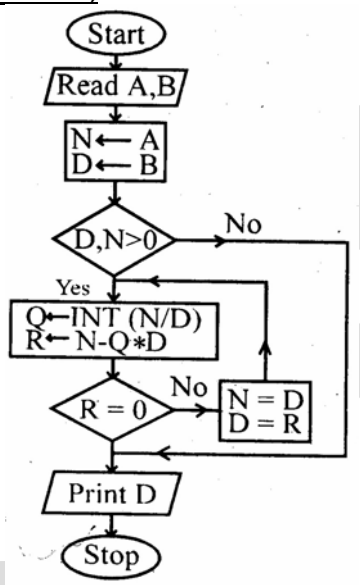
83. Which of the following groups of papers was held in the first week?
(a) Biology, Chemistry and English
(b) Biology and Chemistry only
(c) Hindi, Physics, and Mathematics (d) none of these

84. Consider the following equations
$x = 4$
$x + y = 5$
$x - y = 7$
Then the set of an possible values of y are
(a) {–1} (b) {–3} (c) {–1, 1} (d) none

85. Let p be "Rohit speaks punjabi" and let q be "Lalit speaks gujrati". Then "It is not true that Rohit speaks neither punjabi nor gujrati" in symbolic form is (¬, stands for negation)
(a) $\neg(\neg p \vee \neg q)$ (b) $\neg(\neg p \wedge \neg q)$ (c) $\neg P \wedge \neg q$ (d) $\neg p \vee \neg q$

86. Which of the following are logically equivalent?
(a) $p \rightarrow q$ and $q \rightarrow p$ (b) $p \rightarrow q$ and $\neg p \rightarrow \neg q$
(c) $\neg p \rightarrow \neg q$ and $\neg (p \wedge q)$ (d) $p \vee q$ and $\neg (\neg p \wedge \neg q)$

Directions (Q. 87 – 88): Consider the flowchart



87. Given INT (X/Y) = m where X=m*Y+n, then the output of the following flowchart if A = 20 and B = 3 is
(a) 1 (b) 2 (c) 6 (d) none

88. If D=2, Q=3 and R=0 then what are the values of A and B initially?
(a) 0, 2 (b) 4, 2 (c) 6, 2 (d) none of these

89. The binary number $(111111111.11111)_2$ is equivalent to
(a) $(1773.73)_8$ (b) $(777.76)_8$
(c) $(1773.76)_8$ (d) none of these

90. The difference $(562)_8 - (371)_8$ is
(a) $(171)_8$ (b) $(191)_8$ (c) $(151)_8$ (d) none

91. If $a = x_1 \text{ O } x_2 \text{ O } x_3 \text{ O } \ldots$ and all variables are low then the output is
(a) 0 (b) 1 (c) 0 or 1 (d) none

Directions (Q. 92 – 97): Read the calendar given below and answer the questions that follow it. In this calendar you are to remember that:
I. A number shown inside a square is a holiday
II. Saturdays and Sundays are weekend days
III. All days except holidays and weekends are working days
IV The first day of autumn is September 21.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

92. Which of the following is the third working day after the holiday?
(a) 13th (b) 14th (c) 15th (d) 16th

93. The calendar given above could be of either of the months of which of the following pairs of months?
(a) March–December. (b) March–June
(c) April–November (d) June–December

94. On what date does the third Tuesday of the month fall
(a) 15th (b) 17th (c) 22nd (d) 24th

95. How many working days are there in the given calendar if weekend days are consider equal to half working day?
(a) Twenty–two (b) Twenty–nine
(c) Twenty–one (d) Twenty–five

96. Which of the following is the seventh working day after the third Monday of the month?
(a) 9th (b) 27th (c) 29th (d) 30th

97. If the calendar above is of September month, how many working days are there after the holiday but before beginning of Autumn?
(a) Five (b) Six (c) Seven (d) Eight

98. A code is formed by permuting the 26 letters of the alphabet. The word ALPHA can be coded into:
(a) ASPRO (b) MAXIM (c) MINIM (d) STATS

Directions (Q. 99 – 100): Read the following instructions: In the following questions the world DELIBERATION has been written in four different code languages as shown below against (1), (2), (3) and (4) followed by two words as two questions. In each question the word in CAPITAL is written in four code languages given below in (1), (2), (3) and (4). Select the right alternative:
(1) mgaslgdnesbr (2) fmasgmxnesbr
(3) jpasgpxutsnr (4) rpxslpdgisnt

99. NATION:
(a) tgenst (b) rntsbr (c) rutsnr (d) rgesbr

100. RATE:
(a) d n i g (b) d n e m (c) x u e p (d) d g i p