NIMCET 2016

Answer key

1.	(2)	**21.**	(4)	**41.**	(4)	**61.**	(1)	**81.**	(4)	**101.**	(4)
2.	(3)	**22.**	(3)	**42.**	(1)	**62.**	(2)	**82.**	(3)	**102.**	(1)
3.	(2)	**23.**	(1)	**43.**	(2)	**63.**	(3)	**83.**	(4)	**103.**	(1)
4.	(3)	**24.**	(1)	**44.**	(1)	**64.**	(1)	**84.**	(3)	**104.**	(2)
5.	(4)	**25.**	(4)	**45.**	(2)	**65.**	(4)	**85.**	(3)	**105.**	(3)
6.	(1)	**26.**	(1)	**46.**	(3)	**66.**	(3)	**86.**	(1)	**106.**	(2)
7.	(2)	**27.**	(1)	**47.**	(4)	**67.**	(2)	**87.**	(3)	**107.**	(1)
8.	(4)	**28.**	(1)	**48.**	(1)	**68.**	(2)	**88.**	(3)	**108.**	(4)
9.	(3)	**29.**	(2)	**49.**	(3)	**69.**	(4)	**89.**	(4)	**109.**	(2)
10.	(3)	**30.**	(4)	**50.**	(2)	**70.**	(2)	**90.**	(2)	**110.**	(1)
11.	(2)	**31.**	(2)	**51.**	(4)	**71.**	(4)	**91.**	(3)	**111.**	(2)
12.	(2)	**32.**	(2)	**52.**	(1)	**72.**	(4)	**92.**	(4)	**112.**	(3)
13.	(4)	**33.**	(2)	**53.**	(1)	**73.**	(4)	**93.**	(1)	**113.**	(3)
14.	(1)	**34.**	(3)	**54.**	(3)	**74.**	(4)	**94.**	(4)	**114.**	(4)
15.	(3)	**35.**	(1)	**55.**	(1)	**75.**	(1)	**95.**	(2)	**115.**	(2)
16.	(4)	**36.**	(4)	**56.**	(2)	**76.**	(3)	**96.**	(3)	**116.**	(3)
17.	(4)	**37.**	(1)	**57.**	(4)	**77.**	(4)	**97.**	(3)	**117.**	(4)
18.	(3)	**38.**	(3)	**58.**	(2)	**78.**	(3)	**98.**	(2)	**118.**	(2)
19.	(2)	**39.**	(1)	**59.**	(1)	**79.**	(2)	**99.**	(2)	**119.**	(2)
20.	(2)	**40.**	(4)	**60.**	(3)	**80.**	(4)	**100.**	(1)	**120.**	(4)

SOLUTIONS

1. According to the given information we can make the following family tree.

Hence C is A's Son. **Choice (2)**

2. It is given that if P is true then Q is true and if Q is true then R is true, so we can say that if P is true R is also true, also if S is true one statement among Q and R has to false. Now among the choices given option (3) is definitely correct, since if P is true Q and R both are true thus S has to be false, otherwise if S is true one among Q and R has to be false which is a contradiction. **Choice (3)**

Solution for questions 3 to 6: From the given information it is clear that J lives on 6^{th} floors and there is one person between O & L. O lives immediately below L and O is on 3^{rd} floor. Two persons are between K & Q and K is on even numbered floor except 2, so K will be on 8^{th} numbered floor and Q is on 5^{th} floor.

Floor	Person
8	K
7	N
6	J
5	Q
4	L
3	O
2	M
1	P

3. **Choice (2)**

4. **Choice (3)**

5. **Choice (4)**

6. **Choice (1)**

7. In the given code language, code of a particular alphabet is some of digit of its alphabetical number

Alphabet	Code	Alphabet	Code
E	0+5=5	G	0+7=7
X	2+4=6	O	1+5=6
A	0+1=1	V	2+2=4
M	1+3=4	E	0+5=5
I	0+9=9	R	1+8=9
N	1+4=5	N	1+4=5
A	0+1=1	M	1+3=4
T	2+0=2	E	0+5=5
I	0+9=9	N	1+4=5
O	1+5=6	T	2+0=2
N	1+4=5		

Choice (2)

8. Let there are *x* boys and *y* girls in that family, So each boy in the family has *x*-1 brothers and *y* sisters, and each girl in the family has *y*-1 sisters and *x* brothers.

$x-1=y$

$x=2(y-1)$

Solving both equation we get $x = 4$ and $y = 3$

Choice (4)

9. Choice (3)

Solutions for questions 10 to 12: According to given conditions we can make various cases as per the questions asked

10. Since G is selected the possible combination can be GFADJE or GFADJB but either way the maximum size of the team can be six. **Choice (3)**

11. The largest team possible cannot have more than six members. **Choice (2)**

12. Choice (2)

13. Choice (4)

14. Let total children are x, given that

$\frac{x}{5}=\frac{405}{x}\Rightarrow x^2=2025=x=45$ **Choice (1)**

15. Choice (3)

16. Choice (4)

Solutions for questions 17 to 19: According to the peculiarities given in the question, only one case is possible

E-K-A-J-B-I-G-C-H-D-F

17. Choice (4)

18. Choice (3)

19. Choice (2)

20. Choice (2)

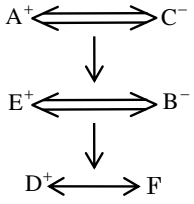
21. Each time when we order 2, one orange is added and each time when we order 4, one orange is removed from the basket. So, total oranges were in the basket at the end of the sequence = number of 2s – number of 4s = 6 – 4 = 2 **Choice (4)**

22. In the given situation boy will add fruit when we order 1, 2 or 3. But whenever we order 4, two fruits are removed from it, so number of fruit in the basket at the end of the given sequence = 11 **Choice (3)**

23. Only one pair of NS has as many letters between them in the word as there are between them in alphabetical order. **Choice (1)**

24. Given sequence represents Fibonacci series, so missing number is 29 + 47 = 76. **Choice (1)**

Solution for questions 25 to 27: From the given information below family tree can be formed



According to the weight, the sequence of the members from heaviest to lightest is as follows:

A	C	E	B	D/F	F/D

25. Choice (4)

26. Choice (1)

27. Choice (1)

28. Given that Raman Birth date was 5th March 1970 and Laxman birth date was 25 days earlier then Raman i.e. 8th February. Now given that 26th January of that year was on Monday. Therefore, 8 Feb. will fall on Sunday. **Choice (1)**

29. Since the clock is losing 16 minutes in every 24 hours, thus in this clock 24 hours i.e. 1440 minutes are same as 1424 minutes. Now from 5 a.m. to 10 p.m. on the third day the total hours = 65 hours. Hence by using unitary method $\frac{1440}{1424}\times 65=65.73$ (approx).

So the correct time will be 10:45 p.m. (approx).

Choice (2)

Solution for questions 30 to 32: From the given information below table can be formed

Red	Orange	White
S	U	P
Road		
T	Q	R
Blue	Green	Yellow

According to the height, the sequence of the houses from tallest to shortest is as follows:

T	S/Q	Q/S	P	R	U

30. Choice (4)

31. Choice (2)

32. Choice (2)

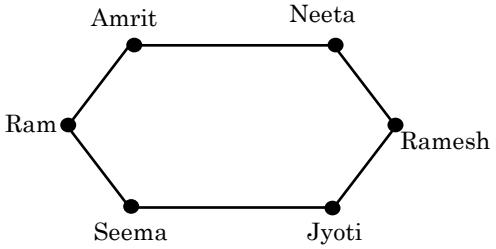
33. ONGEAR = ORANGE
NOONI = ONION
ALPEP = APPLE
AUVAG = GUAVA
Onion is different among four options.

Choice (2)

34. Choice (3)

35. Choice (1)

Solution for questions 36 to 39: From the given information it is clear that Neeta is sitting opposite to Seema but not next to Ram and Ram is sitting opposite to Ramesh and there is one person sitting between Amrit and Ramesh. Jyoti and Seema sitting adjacent to each other.



36. Choice (4)

37. Choice (1)

38. Choice (3)

39. **Choice (1)**

40. **Choice (4)**

41. $(100)_{10}$ in binary system 1100100

Now two's complement = 1st complement + 1

= 0011011 + 1

= 0011100

For (–100) will be 10011100 **Choice (4)**

42. **Choice (1)**

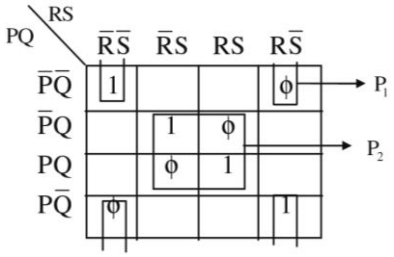
43. **Choice (2)**

44. **Choice (1)**

45. The K map for the function is

$P_1 = \overline{Q}\overline{S}$ and $P_2 = QS$

$\Rightarrow F(P,Q,R,S) = P_1 + P_2 = QS + \overline{Q}\overline{S}$



Choice (2)

46. The equation $(43)_x = (y3)_8$ where x and y are unknown. The number of possible solutions is

$3 + 4x = 3 + 8y$ where $0 \le y \le 7$

and $x \ge 5$ (because the number represented in base x is 43)

$x = 2y$ and $0 \le y \le 7$

The following are possible solutions

$y = 3, 4, 5, 6, 7$

$x = 6, 8, 10, 12, 14$

Hence the answer is 5 **Choice (3)**

47. Taking 1's complement of 1010 = 0101

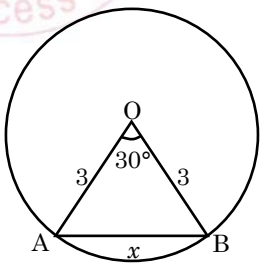
adding this to 1101 gives 0010 with a carry 1. Removing the carry and adding back to unit's place gives 0011 **Choice (4)**

48. **Choice (1)**

49. **Choice (3)**

50. **Choice (2)**

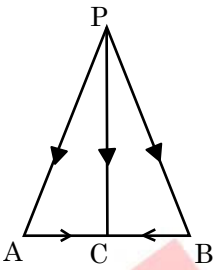
51. Let the side of the regular polygon is x



$\cos 30° = \dfrac{3^2 + 3^2 - x^2}{2 \times 3 \times 3} \Rightarrow x = \sqrt{18 - 9\sqrt{3}}$ **Choice (4)**

52. Given that C is mid point of AB and P is any point outside AB, so by using triangle of addition of vector in triangle PAC end PBC, we have

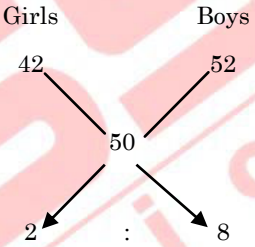
$\vec{PA} + \vec{AC} = \vec{PC}$ and $\vec{PB} + \vec{BC} = \vec{PC}$



$\Rightarrow \vec{PA} + \vec{PB} + (\vec{AC} + \vec{BC}) = 2\vec{PC}$

$\Rightarrow PA + PB = 2\vec{PC}$ **Choice (1)**

53. This question can simply be solved by alligation,



So ratio of boys to girls is class is 4 : 1, which shows there are 80% boys in that class. **Choice (1)**

54. We have to select 5 people group from 9 people such that two particular persons are not selected together,

Number of ways = 5 people are selected from 9 – 2 particular people already in the same group

$= {}^9C_5 - {}^7C_3 = 91$. **Choice (3)**

55. The given equation is

$(\log_x 2)(\log_{2x} 2) = \log_{4x} 2$

$\Rightarrow \left(\dfrac{1}{\log_2 x}\right)\left(\dfrac{1}{\log_2 2x}\right) = \dfrac{1}{\log_2 4x}$

$\Rightarrow \left(\dfrac{1}{\log_2 x}\right)\left(\dfrac{1}{1 + \log_2 x}\right) = \dfrac{1}{2 + \log_2 x}$

Let $\log_2 x = t$, then

$t(1 + t) = 2 + t$ or $t = \pm\sqrt{2}$

Thus $x = 2^{\pm\sqrt{2}}$. **Choice (1)**

56. Equation of two diameters is given and intersection point of both diameters is centre of the circle.

$2x - 3y + 12 = 0$…(1)

$x + 4y - 5 = 0$…(2)

After solving above equation, we get

$x = -3$, and $y = 2$

Hence, centre of the circle is (–3, 2)

Also given that area of circle = 154 sq. unit

$\pi r^2 = 154 \Rightarrow r = 7$

So required equation of circle is

$\Rightarrow (x+3)^2+(y-2)^2=7^2$

$x^2+y^2+6x-4y-36=0$ **Choice (2)**

57. Here, $I=\int \frac{x^2-1}{x^3\sqrt{2x^4-2x^2+1}}dx$

Divide numerator and denominator by x^5

$$I=\int \frac{\frac{1}{x^3}-\frac{1}{x^5}}{\sqrt{2-\frac{2}{x^2}+\frac{1}{x^4}}}dx$$

Put $2-\frac{2}{x^2}+\frac{1}{x^4}=t \Rightarrow \left(\frac{4}{x^3}-\frac{4}{x^5}\right)dx=dt$

$$\Rightarrow \frac{1}{4}\int \frac{dt}{\sqrt{t}}=\frac{1}{4}\frac{\sqrt{t}}{1/2}$$

$$=\frac{\sqrt{2x^4-2x^2+1}}{2x^2}+C$$ **Choice (4)**

58. Given that $|\vec{a}|=|\vec{b}|=|a+\vec{b}|=\alpha$

$|\vec{a}+\vec{b}|^2=|\vec{a}|^2+|\vec{b}|^2+2\vec{a}\vec{b}$

$\vec{a}\vec{b}=-\frac{\alpha^2}{2}$

Then, $|\vec{a}-\vec{b}|^2=|\vec{a}|^2+|\vec{b}|^2-2\vec{a}\vec{b}=3\alpha^2$

$\Rightarrow |\vec{a}-\vec{b}|=\sqrt{3}\alpha$ **Choice (2)**

59. Total ways of selecting 4 caps ${}^{12}C_4$

Favorable ways such that none of them is green cap $={}^{7}C_4$

Required Probability $=\frac{{}^{7}C_4}{{}^{12}C_4}=\frac{35}{495}=\frac{7}{99}$ **Choice (1)**

60. $y=mx+c$ is tangent if $c^2=a^2m^2+b^2$

$$\left(\frac{k}{5}\right)^2=25\left(-\frac{3}{5}\right)^2+16$$

$\Rightarrow k=\pm 25$ **Choice (3)**

61. Given that $X=4^n-3n-1$

$4^n-3n-1=(1+3)^n-3n-1$

$=({}^nC_0+{}^nC_1\times 3+{}^nC_2\times 3^2+.....+{}^nC_n3^n)-(3n+1)$

$=3^2({}^nC_2+{}^nC_3\times 3+.....+{}^nC_n3^{n-2})$

X contains some multiples of 9 and Y contains all multiple of 9. So, $X\cup Y$ equal to Y **Choice (1)**

62. We have,

$$I=\int\left\{\frac{(\log x-1)}{1+(\log x)^2}\right\}^2 dx$$

Let t = log x

$$\Rightarrow I=\int e^t\frac{(t-1)^2}{(t^2+1)^2}dt,$$

$$\Rightarrow I=\int e^t\left[\frac{t^2+1-2t}{(t^2+1)^2}\right]dt$$

$$\Rightarrow I=\int e^t\left[\frac{1}{(t^2+1)}-\frac{2t}{\left(t^2+1\right)^2}\right]dt$$

As we know $\int e^t\left[f(t)+f'(t)\right]dt=e^tf(t)$

$$\Rightarrow I=\frac{e^t}{t^2+1}+C=\frac{x}{(\log x)^2+1}+C$$ **Choice (2)**

63. Required volume = u.(v × w)

i.e. $\begin{vmatrix}1 & 2 & -1\\ -2 & 0 & 3\\ 0 & 7 & -4\end{vmatrix}=-23$

Volume cannot be negative so, volume of the parallelepiped = 23 **Choice (3)**

64. Given that point A (1, –1, 0), B (2, 1, –1), C (–1, 1, 2)

$\vec{AB}=(1,2,-1), \vec{AC}=(-2,2,2)$

The vector perpendicular to the plane is = AB×AC

$$\vec{AB}\times\vec{AC}=\begin{vmatrix}i & j & k\\ 1 & 2 & -1\\ 2 & 2 & 2\end{vmatrix}$$

$= 6i + 6k$ **Choice (1)**

65. Let α,β be the roots of the given equation, then, $\alpha+\beta=a-2$ and $\alpha\beta=-(a+1)$

$\Rightarrow \alpha^2+\beta^2=a^2-2a+6=(a-1)^2+5$

Clearly, $\alpha^2+\beta^2\geq 5$. So, the minimum value of $\alpha^2+\beta^2$ is 5 at a = 1. **Choice (4)**

66. Given that

$P(A\cup B)=0.6$

$P(A\cap B)=0.3$

$P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\Rightarrow$ P (A) + P (B) = 0.9

$1-P(\overline{A})+1-P(\overline{B})=0.9$

$P(\overline{A})+P(\overline{B})=1.1$ **Choice (3)**

67. Given that there are m and n elements in set A and B respectively.

$2^m=2^n+56$

$\Rightarrow 2^n(2^{m-n}-1)=8\times 7$

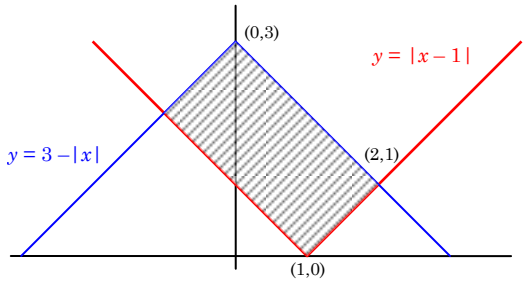
$\Rightarrow n=3$ and $m=6$ **Choice (2)**

68. **Choice (3)**

69. We have $2x^2+7xy+3y^2+8x+14y+\lambda=0$ represents pair of straight line if $abc+2fgh-af^2-bg^2-ch^2=0$

Putting all the values we get $\lambda=8$. **Choice (4)**

70. Bounded region is a rectangle as shown in the diagram



Sides of the rectangle are $\sqrt{(0+1)^2+(3-2)^2}=\sqrt{2}$ and $\sqrt{(2-0)^2+(1-3)^2}=2\sqrt{2}$

So area of rectangle is $2\sqrt{2}\times\sqrt{2}=4$ **Choice (2)**

71. Two sides and one angle of triangle ABC is given, using cosine rule a = 4, b = 3 and A = 60°

$$\therefore \cos A=\frac{b^2+c^2-a^2}{2bc}$$

$$\Rightarrow \cos 60^\circ=\frac{9+c^2-16}{BC}\Rightarrow c^2-3c-7=0$$ **Choice (4)**

72. Given $\cos\theta=\frac{5}{13},\frac{3\pi}{2}<\theta<2\pi$

we know than $\tan 2\theta=\frac{2\tan\theta}{1-\tan^2\theta}$ $[3\pi<2\theta<4\pi]$

so, $\tan\theta=\frac{-12}{5}$

$$\therefore \tan 2\theta=\frac{2\times\left(\frac{-2}{5}\right)}{1\times\left(\frac{-12}{5}\right)^2}=\frac{120}{119}$$ **Choice (4)**

73. Let common outcomes are m

given that $P(A)=\frac{4}{10}$

let B have n outcomes. Then $P(B)=\frac{n}{10}$

For independent event

$P(A\cap B)=P(A).P(B)$

$$\frac{m}{10}=\frac{4}{10}\times\frac{n}{10}\Rightarrow n=\frac{5}{2}m$$

Since n and m are both countable numbers, hence m can be 1 or 2 and n = 5, 10 **Choice (4)**

74. $\vec{a}+2\vec{b}=\lambda\vec{c}$, and $\vec{b}+3\vec{c}=\mu\vec{a}$

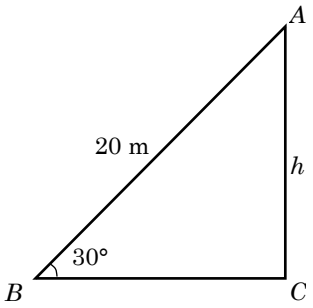
$$\Rightarrow\frac{\vec{a}+2\vec{b}}{\lambda}=\frac{\mu\vec{a}-\vec{b}}{3}$$

$$\Rightarrow 3\vec{a}+6\vec{b}=\mu\lambda\vec{a}-\lambda\vec{b}$$

$$\Rightarrow\lambda=-6 \text{ and } \mu=-\frac{1}{2}$$

$$\vec{a}+2\vec{b}+6\vec{c}=(\lambda+6)\vec{c}=0$$ **Choice (4)**

75. Length of the rope is 20 m, let height of the pole is h



$$\sin 30^\circ=\frac{AC}{BC}$$

$$\Rightarrow\frac{1}{2}=\frac{h}{20}\Rightarrow h=10$$ **Choice (1)**

76. Given 15 is directly opposite to the point 49 so, there are 33 pair of points. Then, total number of points are 33 × 2 = 66 **Choice (3)**

77. **Choice (2)**

78. Probability that they both contradict when only one of them is speaking truth so the required probability is

$P(A).P(\bar{B})+P(B).P(\bar{A})$

$$\Rightarrow\frac{4}{5}\times\frac{1}{4}+\frac{3}{4}\times\frac{1}{5}=\frac{7}{20}$$ **Choice (3)**

79. $$S=\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+....+\frac{1}{\sqrt{80}+\sqrt{81}}$$

Rationalizing each term of the series

$$S=\frac{\sqrt{2}-\sqrt{1}}{2-1}+\frac{\sqrt{3}-\sqrt{2}}{3-2}+.....+\frac{\sqrt{81}-\sqrt{80}}{81-80}$$

$$S=\sqrt{2}-1+\sqrt{3}-\sqrt{2}+.....+\sqrt{81}-\sqrt{80}$$

S = 8 **Choice (2)**

80. Given $f(x)=\begin{cases}x^2-1 & x<3\\ 2ax & x\geq 3\end{cases}$

If t is continuous at x = 3 then

$f(3)=\lim\limits_{h\to 0} f(3-h)=\lim\limits_{h\to 0} f(3+h)$

$$6a=8\Rightarrow a=\frac{4}{3}$$ **Choice (4)**

81. Number of way in which three persons can apply for three houses in 3 × 3 × 3 = 27 ways.

Since each person apply for the same house so, required probability = $\frac{3}{27}=\frac{1}{9}$ **Choice (4)**

82. Probability that one of the two horses will win the race is $\frac{1}{5}+\frac{1}{5}=\frac{2}{5}$. **Choice (3)**

83. Given $3^x=4^{x-1}$

Taking logarithm both side

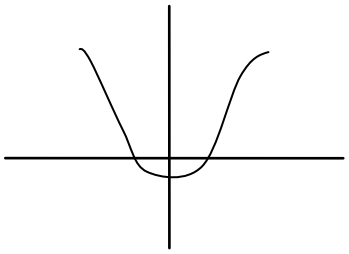
$x\log 3=(x-1)\log 4$

$$x=\frac{\log 4}{\log 4-\log 3}$$

$$x=\frac{2\log_3 2}{2\log_3 2-1}$$ **Choice (4)**

84. Given that AB and BA both exist, hence
$x + 5 = y$ and $11 - y = x$
Solving these equations, we have $x = 3$ and $y = 8$.
Choice (3)

85. Given that $y(x) = x^2 - x\sin x - \cos x = 0$
$y'(x) = 2x - \sin x - x\cos x + \sin x$
$\Rightarrow y'(x) = x(2 - \cos x)$
when x is positive y increases and when x is negative it decreases, thus at $x = 0$, y is minimum.
At $x = 0$, $y = -1$. Therefore the graph will intersect twice.



Choice (3)

86. According to question total number of arrangements are
$= \lfloor 5 \lfloor 4 \lfloor 3 = 17280$ **Choice (1)**

87. Standard deviation and variance do not change if all the numbers of the series are increased or decreased by the same amount. **Choice (3)**

88. $4^x - 3(2^{x+3}) + 128 = 0$
Put $2^x = a$
$a^2 - 24a + 128 = 0$
$\Rightarrow (a-8)(a-16) = 0$
$\Rightarrow a = 16, 8$
$\Rightarrow 2^x = 16, 8$
$\Rightarrow x = 3, 4$
$\therefore$ Sum of the root is 7 **Choice (3)**

89. Let slope of lines are m_1 and m_2
Then $m_1 + m_2 = -\frac{2c}{7}$
$m_1 m_2 = -\frac{1}{7}$
Given that
$m_1 + m_2 = 4 m_1 m_2$
$\Rightarrow c = 2$ **Choice (4)**

90. Given that
$x + y + 2z = a$
$x + z = b$
$2x + y + 3z = c$
$y - x = a - 2b$ .... (i)
$x - y = 3b - c$ ....(ii)
$\Rightarrow a - 2b = c - 3b = a + b = c$ **Choice (2)**

91. Let α and β are the roots of given equation
$\alpha + \beta = b$ and $\alpha\beta = c$
Given that $\alpha\beta + \alpha + \beta = 35$
or $(\alpha + 1)(\beta + 1) = 36$
Since α and β are prime numbers, hence
$\Rightarrow \alpha = 11, \beta = 2$
And the equation is $x^2 - 13x + 22 = 0$
so minimum value of $f(x)$ will be $\frac{4ac - b^2}{4a} = \frac{-81}{4}$
Choice (3)

92. Given focus (–1, 1) and directrix 4x + 3y – 24 = 0, then equation of axis which is perpendicular to directrix 3x – 4y + c = 0 point (–1, 1) lie on above equation.
– 3 – 4 + c = 0 ⇒ c = 7
Then equation of axis is 3x – 4y + 7 = 0
Hence vertex will be $\left(1, \frac{5}{2}\right)$ **Choice (4)**

93. cos 20° + cos 100° + cos 140°
$2\cos\frac{(20+100)}{2}\cos\frac{(100-20)}{2} + \cos 140°$
$\Rightarrow \cos 40° + \cos 140°$
$\Rightarrow 2\cos\left(\frac{140+40}{2}\right)\cos\left(\frac{140-40}{2}\right)$
$\Rightarrow 2\cos 90° \cdot \cos 50° = 0$ **Choice (1)**

94. **Choice (4)**

95. Given that foci of ellipse and hyperbola coincide
$\Rightarrow 16 - b^2 = \left(\frac{12}{5}\right)^2 + \left(\frac{9}{5}\right)^2 \Rightarrow b^2 = 7$ **Choice (2)**

96. $\vec{a} + \vec{b} = 2i + 3j + 4k$
$\Rightarrow (\vec{a} + \vec{b}).(-7i + 2j + 3k)$
$\Rightarrow (2i + 3j + 4k).(-7i + 2j + 3k) = 4$ **Choice (3)**

97. We know
$\sqrt{\frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2} = \sigma$
$\Rightarrow \frac{400}{n} - \left(\frac{80}{n}\right)^2 \geq 0 \Rightarrow n \geq 16$, so, n can be 20.
Choice (3)

98. Suppose equation of the ellipse is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and any point on it is $(a\cos\theta, b\sin\theta)$, then area of the rectangle inscribed in it is $4ab\sin\theta\cos\theta = 2ab\sin 2\theta$.
Hence maximum area is $2ab$ as $\sin 2\theta \leq 1$. **Choice (2)**

99. The equation of tangent to parabola is $y = mx + \frac{2a}{m}$
it touches $x^2 + y^2 = 2a^2$, then
$c^2 = a^2(1 + m^2)$
$\left(\frac{2a}{m}\right)^2 = 2a^2(1 + m^2)$

$\Rightarrow m^4 + m^2 - 2 = 0$

$\Rightarrow (m^2+2)(m^2-1) = 0 \Rightarrow m^2 - 1 = 0 \Rightarrow m = \pm 1$

so the common tangents are $y = \pm(x + 2a)$ **Choice (2)**

100. Given that first term of AP is 0, let d is the common difference of given AP

$a_1 = 0,\ a_2 = d,\ a_3 = 2d,\ a_4 = 3d,\ a_5 = 4d \ldots\ldots a_n = (n-1)d$

$$\left(\frac{a_3}{a_2} + \frac{a_4}{a_3} + \ldots\ldots \frac{a_n}{a_{n-1}}\right) - a_2\left(\frac{1}{a_2} + \frac{1}{a_3} \ldots\ldots \frac{1}{a_{n-2}}\right)$$

$$= \left(\frac{2}{1} + \frac{3}{2} + \ldots\ldots \frac{n-1}{n-2}\right) - \left(1 + \frac{1}{2} \ldots\ldots \frac{1}{n-3}\right)$$

$$n - 3 + \frac{n-1}{n-2} \Rightarrow \frac{(n-2)^2 + 1}{n-2} = (n-2) + \frac{1}{(n-2)}$$

Choice (1)

101. The price of the cement is going up because of the deliberate attempt made by the manufacturers to create an artificial short supply in their own self-interest. **Choice (4)**

102. According to the given passage, the artificial scarcity causes increase in the cement price which is the crisis faced by cement tile manufactures. **Choice (1)**

103. In the above passage, artificial signifies deliberate since it is not happening in the natural course of events but is done in self-interest of the manufactures. **Choice (1)**

104. The word 'basic' in the above passage signifies which is very much necessary and important. The word opposite in meaning to it will be 'Unimportant'. **Choice (2)**

105. Choice (3)

106. Theatrical means behaving or done in a way that is meant to attract attention that is often not genuine or sincere. Similarly, histrionic means deliberate display of emotion in order to make a deeper impact. **Choice (2)**

107. Choice 2, 3, 4 all are related to something, which cannot be relied upon or is suspected. Contrary to this Choice 1 means something which cannot be denied or challenged. **Choice (1)**

108. A person who makes money by starting or running business is called an Entrepreneur. **Choice (4)**

109. 'Swarm' is a collective noun aptly justifying a group of insects. **Choice (2)**

110. The statement in active voice is in simple past, hence the correct passive voice form will be Choice 1. **Choice (1)**

111. Choice (2)

112. Choice (3)

113. Similar to scale which consists of series of tones of varying value, spectrum also consists of series of color of varying value. **Choice (3)**

114. Choice (4)

115. The correct preposition would be 'out on' **Choice (2)**

116. Since darkest starts with a consonant, and is definite in context, hence, the appropriate article is 'The' **Choice (3)**

117. When steak when cold and tough gets it cannot be eaten, hence the correct word is 'inedible' **Choice (4)**

118. Since, there is no definite time specified, 'for' is the correct word. **Choice (2)**

119. Choice (2)

120. The question and the answer tag are always complementary to each other is sentence formation and modal phrase used in the question is 'should', hence the correct Choice is 4. **Choice (4)**