NIMCET 2013

ANSWER KEY

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

SOLUTIONS

1. We have $6A^{-1} = A^2 + cA + dI$

Multiplying both side by A, we have

$6I = A^3 + cA^2 + dA$

$A^3 + cA^2 + dA - 6I = 0$ (i)

According to Cayley Hamilton Theorem

$$\begin{vmatrix} 1-\lambda & 0 & 0 \\ 0 & 1-\lambda & 1 \\ 0 & -2 & 4-\lambda \end{vmatrix} = 0$$

$\Rightarrow (1-\lambda)[(1-\lambda)(4-\lambda)+2] = 0$

$\Rightarrow \lambda^3 - 6\lambda^2 + 11\lambda - 6 = 0$ (ii)

On comparing (i) and (ii) c = –6 and d = 11.

Choice (A)

2. Multiplying by b in the given relation

We have $b.(a \times b) + b.c = 0 \Rightarrow b.c = 0$

Also given that $a.b = 3$, suppose $b = xi + yj + zk$

Thus $y - z = 3$ and $x - y - z = 0$

From these equations $x = 2z + 3, y = z + 3$.

So the vector $b = (2z+3)i + (z+3)j + zk$

Now again from the relation $(a \times b) + c = 0$.

We get $z = -2$, thus vector $b = -i + j - 2k$. **Choice (A)**

3. $A \cup B \cup C \cup B$

$= A + B + C + D - (A \cap B) - (A \cap C) - (A \cap B) - (B \cap C)$

$-(B \cap D) - (C \cap D) + (A \cap B \cap C) + (A \cap B \cap D) +$

$(A \cap C \cap D) + (B \cap C \cap D) - (A \cap B \cap C \cap D)$

= 150 + 180 + 210 + 240 – 15 – 15 – 15 – 15 – 15 – 15

+ 3 + 3 + 3 + 3 + 3 – 0 = 702 **Choice (D)**

4. $ax + by + c = 0$ passes through (1, –2)

So point will satisfy the equation

We have, $a - 2b + c = 0$

$\Rightarrow a + c = 2b$

So a, b, c are in A.P. **Choice (A)**

5. Let the probability to show an even number = P According to question probability to show an odd number = 3P

3P + P = 1

$P = \frac{1}{4}$ and $3P = \frac{3}{4}$

Now the sum of the numbers in two throws is even when either both are odd or even.

So required probability $= \frac{3}{4} \times \frac{3}{4} + \frac{1}{4} \times \frac{1}{4} = \frac{5}{8}$

Choice (B)

6. $I_n = \int_0^{\pi/4} \tan^n \theta d\theta$

$I_n = \int_0^{\pi/4} \tan^{n-2} \theta . \tan^2 \theta d\theta$

$$I_n = \int_0^{\pi/4} \tan^{n-2}\theta.(\sec^2\theta - 1)d\theta$$

$$I_n = \int_0^{\pi/4} \tan^{n-2}\theta.\sec^2\theta - \int_0^{\pi/4} \tan^{n-2}\theta d\theta$$

$$I_n + I_{n-2} = \int_0^1 t^{n-2}dt = \left[\frac{t^{n-1}}{n-1}\right]_0^1 \quad \therefore \tan\theta = t$$

$I_n + I_{n-2} = \dfrac{1}{n-1}$ putting n = 8

$I_8 + I_6 = \dfrac{1}{7}$ **Choice (D)**

7. We know that area of triangle = $\dfrac{1}{2}ab\sin\theta$

$= \dfrac{1}{2}\times 8\times 5\sin\theta = 10\sqrt{3} \Rightarrow \sin\theta = \dfrac{\sqrt{3}}{2}$

$\theta = 60°$ or $120°$ **Choice (A)**

8. The Probability that the target is hit atleast two times is $AB\overline{C} + A\overline{B}C + \overline{A}BC + ABC$

$$= \frac{4}{5}\times\frac{3}{4}\times\frac{1}{3} + \frac{4}{5}\times\frac{1}{4}\times\frac{2}{3} + \frac{1}{5}\times\frac{3}{4}\times\frac{2}{3} + \frac{4}{5}\times\frac{3}{4}\times\frac{2}{3}$$

$= \dfrac{1}{5} + \dfrac{2}{15} + \dfrac{1}{10} + \dfrac{2}{5} = \dfrac{50}{60} = \dfrac{5}{6}$ **Choice (C)**

9. $I = \displaystyle\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}dx$ (i)

$$I = \int_0^{\pi/2} \frac{\sqrt{\sin\left(\frac{\pi}{2} - x\right)}}{\sqrt{\sin\left(\frac{\pi}{2} - x\right)} + \sqrt{\cos\left(\frac{\pi}{2} - x\right)}}dx$$

$I = \displaystyle\int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}}dx$ (ii)

Adding (i) and (ii)

$$2I = \int_0^{\pi/2} 1.dx \Rightarrow 2I = [x]_0^{\pi/2} \Rightarrow 2I = \frac{\pi}{2}$$

$\Rightarrow I = \dfrac{\pi}{4}$ **Choice (D)**

10. $\begin{vmatrix} -\omega^2 & \omega^2 & \omega \\ \omega & \omega & -\omega^2 \\ -1 & \omega & -\omega^2 \end{vmatrix} = \omega^2 \begin{vmatrix} -\omega & \omega & -1 \\ -1 & 1 & -\omega \\ -1 & \omega & \omega^2 \end{vmatrix}$

$= \omega^2 \begin{vmatrix} 0 & \omega & -1 \\ 0 & 1 & -1 \\ \omega - 1 & \omega & \omega^2 \end{vmatrix} = -3\omega^2$ **Choice (D)**

11. The volume of parallelepiped

$= \begin{vmatrix} 2 & -3 & 0 \\ 1 & 1 & -1 \\ 3 & 0 & -1 \end{vmatrix} = [2(-1) + 3(3)] = 4$ **Choice (C)**

12. Let the terms be $a, ar, ar^2, ar^3....$

According to the condition we have
$a = ar + ar^2 \Rightarrow 1 - r - r^2 = 0$

$\Rightarrow r = \dfrac{-1 \pm \sqrt{5}}{2}$

Since r is positive, hence $r = \dfrac{-1+\sqrt{5}}{2}$. **Choice (D)**

13. $f(x) = \tan^{-1}\left[\dfrac{2\sin x/2.\cos x/2}{2\cos^2 x/2}\right]$

$\Rightarrow f(x) = \tan^{-1}\left[\tan\dfrac{x}{2}\right]$

$\Rightarrow f(x) = \dfrac{x}{2} \Rightarrow f'(x) = \dfrac{1}{2}$ **Choice (A)**

14. $\sin x + 1 = \cos x$

$\cos x - \sin x = 1$

$\dfrac{1}{\sqrt{2}}\cos x - \dfrac{1}{\sqrt{2}}\sin x = \dfrac{1}{\sqrt{2}}$

$\cos\left(x + \dfrac{\pi}{4}\right) = \cos\dfrac{\pi}{4}$

$\left(x + \dfrac{\pi}{4}\right) = 2n\pi \pm \dfrac{\pi}{4}$

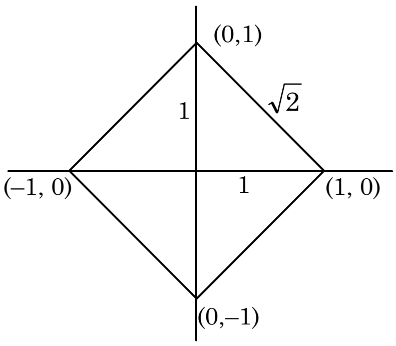
Putting $n = 0$ and 1, $x = 0$ and $\dfrac{3\pi}{2}$. **Choice (D)**

15. According to the question we have
${}^{n+1}C_3 - {}^{n}C_3 = 21$

We know ${}^{8}C_3 - {}^{7}C_3 = 21 \Rightarrow n = 7$ **Choice (B)**

16. Choice (D)

17. The graph of the given function is given below **:**



This is a square of side $\sqrt{2}$ **,** so area = $\left(\sqrt{2}\right)^2 = 2$ square unit. **Choice (D)**

18. Suppose the 2 degree polynomial is $f(x) = px^2 + qx + r$

Given that $f(1) = f(-1)$

$\Rightarrow p + q + r = p - q + r \Rightarrow q = 0$

Hence $f'(x) = 2px$ and $f'(a), f'(b), f'(c)$ will be $2pa$, $2pb$ and $2pc$, will be in AP. **Choice (D)**

19. Slope = $\frac{dy}{dx} = \frac{4}{2\sqrt{4x-3}} = \frac{2}{3}$

$\sqrt{4x-3} = 3 = 4x - 3 = 9 \Rightarrow x = 3$

and $y = 2$

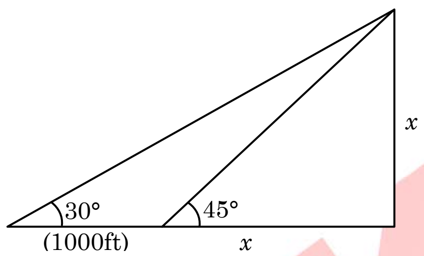
Required point is (3, 2). **Choice (B)**

20. They are likely to contradict each other in stating the same fact only when one will speak truth and other will speak lie so the required probability is

$\frac{7}{10} \times \frac{4}{10} + \frac{3}{10} \times \frac{6}{10}$

$\frac{28}{10} + \frac{18}{100} = \frac{46}{100} = \frac{23}{50}$. **Choice (C)**

21.



$\tan 30° = \frac{x}{x + 1000}$

$\frac{1}{\sqrt{3}} = \frac{x}{x + 1000} \Rightarrow x + 1000 = \sqrt{3}x$

$\Rightarrow (\sqrt{3} - x) = 1000 \Rightarrow x = \frac{1000}{\sqrt{3} - 1}$

The distance of the first point of observation from the foot of the mountain $= \frac{1000}{\sqrt{3} - 1} + 1000$

$\Rightarrow 500\sqrt{3}(\sqrt{3} + 1)$ ft **Choice (A)**

22. According to the question $T_n = 2n$, $a = n$

$2n = n + (n - 1)d$

$\Rightarrow n = (n - 1)d$

$\Rightarrow d = \frac{n}{n - 1}$

We have $\frac{n}{2}[2.n + (n-1)d] = 216$

$\Rightarrow \frac{n}{2}[3n] = 216$

$\Rightarrow \frac{3}{2}n^2 = 216 \Rightarrow n^2 = \frac{2 \times 316}{3}$

$\Rightarrow n^2 = 2 \times 72 = n = 12 \Rightarrow d = \frac{12}{11}$ **Choice (D)**

23. Resultant force = $5i + 3j + 2k$ and the displacement is $2i - 2j + 10k$

Work done is $(5i + 3j + 2k).(2i - 2j + 10k)$

= 10 – 6 + 20 = 24. **Choice (C)**

24. The number $9^{\frac{1}{3}}\, 9^{\frac{1}{9}}\, 9^{\frac{1}{27}} \ldots = 9^{\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\ldots\infty}$

$= 9^{\frac{\frac{1}{3}}{1-\frac{1}{3}}}$ $\left[a + ar + ar^2 + \ldots\infty = \frac{a}{1-r}\right]$

$= 9^{1/2} = 3.$ **Choice (A)**

25. There is no maxima and minima for any odd degree function as they can increase upto any value and decrease upto any level. **Choice (D)**

26. Required ways $= \frac{7!.5!}{2!.3!} = 7 \times 120 \times 60$

= 50400 **Choice (D)**

27. $\log_2 x = 10 \Rightarrow x = 2^{10}$

$\Rightarrow \log_{2^{10}} y = 100 \Rightarrow y = (2^{10})^{100}$

$y = 2^{1000}$. **Choice (C)**

28. Slope of line $2x - 3y = 7$ is $\frac{2}{3}$.

Required line is parallel to this line so slope of the line will be $\frac{2}{3}$.

Mid point of line segment joining the points (1, 3) and (1, –7) is (1, –2)

Required line is $y + 2 = \frac{2}{3}(x - 1)$

$\Rightarrow 3y + 6 = 2x - 2 \Rightarrow 2x - 3y - 8 = 0$ **Choice (C)**

29. $(a + b)^2 - c^2 = ab$

$a^2 + b^2 + 2ab - c^2 = ab$

$a^2 + b^2 + ab - c^2 = 0$

$a^2 + b^2 - c^2 = -ab$

We know $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$

$\cos C = \frac{-ab}{2ab} = -\frac{1}{2} \Rightarrow C = \frac{2\pi}{3}$ **Choice (C)**

30. The numbers containing 1 is $10^3 - 9^3$. **Choice (D)**

31. Since the lines are parallel, thus distance between them is the diameter of the circle.

The lines are $3x - 4y + 4 = 0$ and $3x - 4y - \frac{7}{2} = 0$

Distance between them is $\dfrac{4-(-7/2)}{\sqrt{3^2+4^2}} = \dfrac{15}{10}$

Thus the radius is $\dfrac{15}{20} = \dfrac{3}{4}$. **Choice (B)**

32. Area of the parallelogram whose sides are p and q is

$|p \times q|$ = magnitude of $\begin{vmatrix} i & j & k \\ 3 & 1 & -2 \\ 1 & -3 & 4 \end{vmatrix}$

= magnitude of $-2i - 14j - 10k = \sqrt{300} = 10\sqrt{3}$

Choice (A)

33. Given that $\sin x + a\cos x = b$,

suppose $a\sin x - \cos x = p$

Squaring and adding, we have

$\sin^2 x + a^2\cos^2 x + a^2\sin^2 x + \cos^2 x = b^2 + p^2$

$\Rightarrow p^2 = 1 + a^2 - b^2$

Hence $|p| = |a\sin x - \cos x| = \sqrt{1+a^2-b^2}$. **Choice (D)**

34. $P(B) = 1 - \dfrac{1}{2} = \dfrac{1}{2}$

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

$\Rightarrow \dfrac{5}{6} = P(A) + \dfrac{1}{2} - \dfrac{1}{3}$

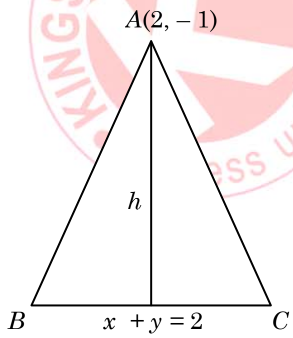
$\Rightarrow P(A) = \dfrac{4}{6} = \dfrac{2}{3}$

Since $P(A).P(B) = P(A \cap B)$, thus the events are independent. **Choice (B)**

35. Since the vectors are coplanar, hence

$\begin{vmatrix} 2 & -1 & 1 \\ 1 & 2 & -3 \\ 3 & \lambda & 5 \end{vmatrix} = 0 \Rightarrow \lambda = -4.$ **Choice (D)**

36. Suppose the triangle is ABC



Length of perpendicular = $\left|\dfrac{2-1-2}{\sqrt{2}}\right| = \dfrac{1}{\sqrt{2}}$

Thus side of the triangle is $\dfrac{h}{\sin B} = \dfrac{1/\sqrt{2}}{\sqrt{3}/2} = \sqrt{\dfrac{2}{3}}$.

Choice (C)

37. Single digit numbers are 3.

Two digit numbers are 3×2 = 6

Three digit numbers are 3×2×1 = 6

Total numbers are 15. **Choice (C)**

38. $\dfrac{dy}{dx} = \dfrac{dy/dt}{dx/dt} = \dfrac{-b}{a}\cot$

Suppose $u = \dfrac{dy}{dx} = \cot t$

Now $\dfrac{d^2y}{dx^2} = \dfrac{du}{dx} = \dfrac{du}{dt} \times \dfrac{dt}{dx} = \left(\dfrac{b}{a}\operatorname{cosec}^2 t\right) \times \left(\dfrac{-1}{a\sin t}\right)$

$= \dfrac{-b}{a^2\sin^3 t} = \dfrac{-b^4}{a^2y^3}$ **Choice (A)**

39. We know that variance is $\sum (x_i - \bar{x})^2 p_i$

Where mean $\bar{x} = \sum p_i x_i = 1\times0.3 + 2\times0.4 + 3\times0.3 = 2$

Thus variance is

$= (1-2)^2 \times 0.3 + (2-2)^2 \times 0.4 + (3-2)^2 \times 0.3 = 0.6$

Choice (B)

40. We know that

$\tan A - \cot A = \dfrac{\sin^2 A - \cos^2 A}{\cos A \sin A} = \dfrac{-2\cos 2A}{\sin 2A} = -2\cot 2A$

Adding and subtracting $\cot\theta$ from the given expression, we have

$\underbrace{\tan\theta - \cot\theta} + 2\tan 2\theta + 4\tan 4\theta + 8\cot 8\theta + \cot\theta$

$= \underbrace{-2\cot 2\theta + 2\tan 2\theta} + 4\tan 4\theta + 8\cot 8\theta + \cot\theta$

$= \underbrace{-4\cot 4\theta + 4\tan 4\theta} + 8\cot 8\theta + \cot\theta = \cot\theta$.

[Alternate method: The question can be easily solved by putting value of θ in the questions and in the four choices. Only choice (A) is correct.] **Choice (A)**

41. The integers will be

203 + 210 + ……+ 399

There are $\dfrac{399-203}{7} + 1 = 29$ terms in the series.

Sum = $\left(\dfrac{203+399}{2}\right) \times 29 = 8729.$ **Choice (A)**

42. The given expression is

$\lim\limits_{x\to0}\left[\dfrac{\tan x - x}{x^2\tan x}\right] = \lim\limits_{x\to0}\left[\dfrac{\sec^2 x - 1}{x^2\sec^2 x + 2x\tan x}\right]$

(Applying D.L Hospital rule)

$= \lim\limits_{x\to0}\left[\dfrac{1-\cos^2 x}{x^2 + 2x\sin x\cos x}\right]$

$$= \lim_{x\to 0}\left[\frac{\sin^2 x}{x^2+2x\sin x\cos x}\right] = \lim_{x\to 0}\left[\frac{\sin^2 x/x^2}{1+2\frac{\sin x}{x}\cos x}\right]$$

$= \frac{1}{3}$. **Choice (D)**

43. The sum of the dices can be 2, 3, 5, 7, 11. Thus the number of ways of getting these sums are 1, 2, 4, 6 and 2 respectively. Required probability is

$\frac{1+2+4+6+2}{36} = \frac{15}{36} = \frac{5}{12}$. **Choice (B)**

44. Since the centre lies on the line $x+2y+3=0$, suppose the centre is $(-2\alpha-3, \alpha)$, then its distance from the given two points $(-1, 1)$ and $(2, 1)$

$\Rightarrow (-2\alpha-3+1)^2 + (\alpha-1)^2 = (-2\alpha-3-2)^2 + (\alpha-1)^2$

$\Rightarrow (-2\alpha-2)^2 = (-2\alpha-5)^2$

$\Rightarrow \alpha = -\frac{7}{4}$, thus the centre is $\left(\frac{1}{2}, -\frac{7}{4}\right)$

Radius is $\sqrt{\frac{157}{16}}$, thus the equation of the circle is

$\left(x-\frac{1}{2}\right)^2 + \left(y+\frac{7}{4}\right)^2 = \frac{157}{16}$

$\Rightarrow 2x^2+2y^2-2x+7y-13=0$. **Choice (A)**

[**Alternate method:** Question can also be solved by checking the choices which satisfies the given points (– 1, 1) and (2, 1)]

45. The two adjacent sides of the triangle are represented by $(\vec{b}-\vec{a})$ and $(\vec{c}-\vec{a})$, thus it's area will be

$\frac{1}{2}\left|(\vec{b}-\vec{a})\times(\vec{c}-\vec{a})\right| = \frac{1}{2}\left|\vec{b}\times\vec{c}-\vec{b}\times\vec{a}-\vec{a}\times\vec{c}\right|$

$= \frac{1}{2}\left|\vec{b}\times\vec{c}+\vec{a}\times\vec{b}+\vec{c}\times\vec{a}\right|$ **Choice (B)**

46. This is a standard result, $PS + PS' = 2a$. **Choice (C)**

47. From the given relations $\sin x + \sin^2 x = 1$,

$\sin x = 1-\sin^2 x = \cos^2 x$ or $\cos^2 x = \sin x$

The given expression is $\cos^2 x + \cos^4 x$ can be written as $\sin x + \sin^2 x$ that is 1. **Choice (B)**

48. Suppose probability of success is $2p$ and that of failure is p, then $2p + p = 1 \Rightarrow p = \frac{1}{3}$, hence probability of success is $\frac{2}{3}$ and that of the failure is $\frac{1}{3}$. Now of of 6 trials, there must be at least 4 successes, required probability is

$${}^6C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^2 + {}^6C_5\left(\frac{2}{3}\right)^5\left(\frac{1}{3}\right)^1 + {}^6C_6\left(\frac{2}{3}\right)^6$$

$= \frac{15\times16+6\times32+64}{3^6} = \frac{16(15+12+4)}{3^6} = \frac{496}{729}$.

Choice (B)

49. The series can be written as

$(-1^2+2^2)+(-3^2+4^2)+\ldots(-19^2+20^2)$

= 3 + 7 + 11 +…….+ 39

There will be 10 terms in the series given above.

Hence the required sum = $\left(\frac{3+39}{2}\right)\times 10 = 210$.

Choice (C)

50. $\tan(\alpha+\beta) = \frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$

$$= \frac{\frac{m}{m+1}+\frac{1}{2m+1}}{1-\left(\frac{m}{m+1}\right)\left(\frac{1}{2m+1}\right)} = \frac{2m^2+2m+1}{2m^2+2m+1} = 1$$

$\Rightarrow \alpha + \beta = \pi/4$. **Choice (B)**

51. Let the speed of the trains is S m/sec and length of the train be l mts. Then

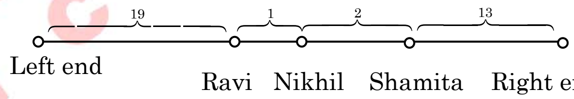
$\frac{l+162}{S} = 18$ (i)

$\frac{l+120}{S} = 16$ (ii)

By solving (i) and (ii), we get

S = 14 m/sec and l = 90 mts. **Choice (C)**

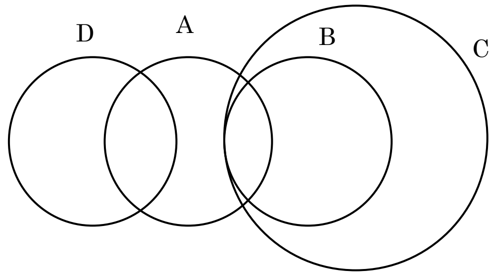
52.



So total number of students is

= 19 + 1 + 2 + 13 + Ravi + Nikhil + Shamika = 38 **Choice (B)**

53. Using the given statements, Venn Diagram can be like this



So except choice (A) all are true. **Choice (A)**

Solutions for 54 to 56: There are total 6 person in that family and from which two are couples.

Lawyer (Head)

Mukesh (Teacher) → Wife (Doctor) → Ajay (son)

Rakesh (Teacher) → Mrs. Reena(Lawyer)

And it is given that Mrs. Reena and his mother in law so head of the family will be her mother in law.

54. Lawyer teacher is definitely a couple. **Choice (A)**

55. Rakesh wife is Mrs. Reena who is a lawyer. **Choice (C)**

56. **Choice (D)**

57. The pattern is

A (1) CD (2) GHI (3) MNOP (4) UVWXY

+1, +2, +3, +4

Hence the missing term is MNOP. **Choice (B)**

58. Given that FRIEND is coded as GTLISJ, which means we are adding 1, 2, 3, .. to the corresponding alphabets.

$F \xrightarrow{+1} G$	$H \xleftarrow{+1} G$
$R \xrightarrow{+2} T$	$W \xleftarrow{+2} U$
$I \xrightarrow{+3} L$	$D \xleftarrow{+3} A$
$E \xrightarrow{+4} I$	$V \xleftarrow{+4} R$
$N \xrightarrow{+5} S$	$I \xleftarrow{+5} D$
$D \xrightarrow{+6} J$	

So GUARD will be coded as HWDVI **Choice (B)**

59. Dave = 2 + Bob

Bob = Carl – 1

Alan = Carl – 2

Given that Alan is 34 years old, hence 34 = Carl – 2

$\therefore$ Carl = 36, Bob = 35 and Dave = 37 **Choice (D)**

Solutions for 60 to 62: The arrangements of all the candidates will be as follows:

1	2	3	4	5	6
Tim	Donald	Mike	Brown	Hardy	Robert

60. Farthest from Mr. Brown is office 1. Answer is Mr. Tim. **Choice (C)**

61. **Choice (D)**

62. **Choice (D)**

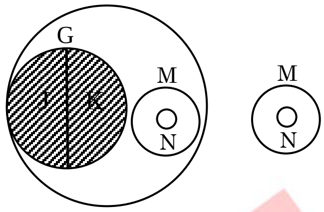
63. When doctor was saying to compounder it was 1 hour 20 mins take then he earlier visited the patient and he visits in every 3 hour 30 minutes. Next time he will visit at 1 : 40. So his earlier visit was at 10 : 10 so the information was given to compounder is 1 hr. 20 min late i.e. 11:30 A.M. **Choice (A)**

64.

42 →(–2) 40 →(–2) 38 →(–3) 35 →(–2) 33 →(–2) 31 →(–3) 28

So the next terms will be 26 and 24. **Choice (C)**

Solutions for 65 to 66: The combined Venn Diagram of these all statements can be like then



65. If P is not K and it is in G than it has to be J because G is only either J or K. **Choice (B)**

66. If some H are both M and G then it means there is some part common between M and G which is contradictory with No M are G. **Choice (C)**

67. Shyam > Pradeep = Anurag

Suresh > Anand

Suresh = Anurag

Pradeep > Praveen

Combining the information

Shyam > Pradeep = Anurag = Suresh > Anand > Pradeep > Praveen

So the tallest person is Shyam. **Choice (D)**

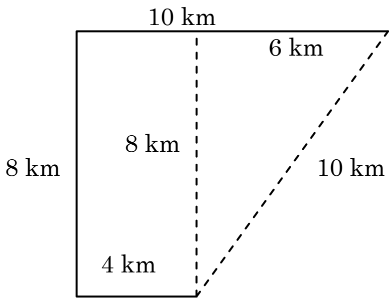
68. As per given information when Rajeev was born his father was 32 years older than his brother, and his mother was 25 years older than his sister, and three years younger than his father.

So when Rajeev's brother is 6 years old.

Rajeev's brother	Father	Mother
6	38	35

So his sister is 10 years older when he born. **Choice (D)**

69. The diagram is given below:



So the shortest distance is 10 km. **Choice (C)**

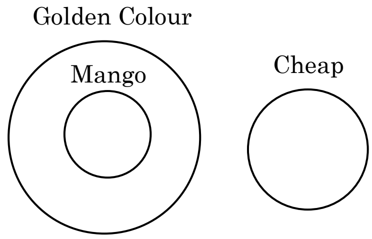
70. Gold coins are less than 100. In terms of $3k + 1$, $4k + 2$, $5k + 3$, $6k + 4$ so the total number of coins will be

LCM (3, 4, 5, 6)k – Constant difference

$= 60k - 2$.

So number of coins will be 58. **Choice (A)**

71.



So, only conclusion II follows **Choice (B)**

Solutions for 72 to 73: Here we can write all given conditions in terms of equations like
A = 2B, B = 4.5C, 2C = D, 2D = E. Now from these equations we can write the following ratios:

A : B : C : D : E
2 : 1
9 : 2
1 : 2
1 : 2
So A : B : C : D : E = 18 : 9 : 2 : 4 : 8

72. Choice (A)

73. Choice (A)

Solutions for 74 to 76: Here we are taking ON means 1 and OFF means 0.

Condition 1 can be written as this

	A	B	C
Initial	1	0	0
Changed to	1	1	0

Condition 2 can be written as this

	A	B	C
Initial	1	1	0
Changed to	1	1	1

Condition 3 can be written as this

	A	B	C
Initial	1	1	1
Changed to	1	1	0

Except these three conditions in any other case we will change 1 to 0 and 0 to 1.

74. If A = 1, B = 1 and C = 0 than it will be changed according to condition 2 i.e. A = 1, B = 1 and C = 1. **Choice (B)**

75. If A = 0, B = 1 and C = 0 than it will be changed according to condition 4 i.e. A = 1, B = 0 and C = 1. **Choice (C)**

76. If A = 0, B = 1 and C = 0 after change than this change is not because of condition 1,2 and 3, So initial position should be A = 1, B = 0 and C = 1. **Choice (B)**

77. Third of a month is Friday then 25^{th} of the same month will be Saturday. **Choice (C)**

78. If Andrew has one brother than he must have two sisters of whom one is Ana will not have equal number of brother and sister, so andrew has two brothers and four sisters of whom one is Ana who has three brothers and three sisters. Hence the total number of children of Emma is seven. **Choice (D)**

Solutions for 79 to 81: By the given conditions we can say

Binu > Eenu > Anu > Cini
Dany > Anu

Here Binu is taller than Eenu is taller than Anu is taller than Cini. Dany is taller than Anu but the relation of Dany with Binu and Eenu is not clear.

79. Choice (C)

80. Choice (A)

81. Choice (D)

82. Karan beats by 10 meter in a race of 100 meter that means when Karan runs 100 meter Arjun runs 90 meters, so the ratio of their speeds is 10 : 9. Hence in the second race when Karan runs 110 meters Arjun will run 99 meters only, so Karan will beat Arjun by 1 meter. **Choice (D)**

83. The given data can be tabulated in the following manner:

	Win	Loss
India	4	2
Australia	2	2
West Indies	4	2
New Zealand	0	4

So New Zealand lost the maximum number of matches. **Choice (C)**

84. Choice (A)

Solutions for 85 – 87: With the given conditions there can be many cases like:

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Step 6	-	B	B	-	C	C
Step 5	B	D	D	C	-	-
Step 4	D	-	C	-	A	A
Step 3	C	C	-	A	-	B
Step 2	-	-	A	B	B	D
Step 1	A	A	-	D	D	-

85. If A is standing on step 1 then C must be on step 3, so only choice D is possible. **Choice (D)**

86. If D is standing on step 1 than B is at step 2 and A can be at step 3 or 4. **Choice (C)**

87. If there are two steps between A and D than A can be at step 1, 2 or 4. **Choice (B)**

88. Sachin and Mohan are of same age and Ravi is younger to both of them. So Ravi is youngest. **Choice (B)**

89. When Jimmy left and returned his house the Hour hand is 20^{o} away from 4 in both the cases. That means he left his house at 3:20 and returned at 4:40. So he was out for 80 minutes but he took 20 minutes to go and return back. Hence he spends 60 minutes in all at tennis court. **Choice (A)**

90. We will divide these 8 balls in three groups of 3, 3 and 2. First we will compare first two groups which are either equal or not equal. If they are equal than the heavier ball is out of last two balls which can be identified in one more weighing. But if they are not equal then the heavier ball is among the first two groups of three balls each. Now from the group which have heavier ball, we will put one and one ball on weighing balance which will be again equal or not equal. If it is equal than the third ball is heavier ball, otherwise out of these two. **Choice (B)**

91. Someone – because you can have joint accounts with a particular person and not with 'anyone' and 'everyone'. **Choice (D)**

92. Stringing together of diamonds forms a necklace and many flowers tied together form a Bouquet. **Choice (B)**

93. The verb angry is always followed by prepositions 'at' or 'with'. **Choice (D)**

94. Because universal truths are expressed in simple present tense. **Choice (A)**

95. Close shave is a narrow escape. **Choice (B)**

96. It should be "an M.A." because the sound of vowel 'e' is clear in pronunciation of letter 'em'. **Choice (B)**

97. 'Gave up' means abandon, surrender. Hence abandon all Hope. **Choice (C)**

98. Affluent means rich so its opposite is poor. **Choice (B)**

99. The popular usage is blame for one's fault. **Choice (D)**

100. The principle subject here is 'The Instructor', which is singular. Hence 'is'. **Choice (D)**

101. Comprehension means understanding and when you are not able to understand, it is 'beyond your comprehension'. Here beyond means outside. **Choice (D)**

102. Here the sentence is giving a general advice that you should leave by 7.30. At 7.30 would mean a specific time and instruction. **Choice (B)**

103. To have suspicion or doubt about something is to smell a rat. **Choice (A)**

104. Abridge means to abbreviate or reduce. Hence 'shorten'. **Choice (C)**

105. A bad piece of work is denoted as a dog's breakfast. **Choice (B)**

106. The sentence in direct speech tells you a habitual action; hence the tense will not change in indirect speech. **Choice (A)**

107. Q is the only opening sentence in the question, which is logically followed by R as in "note that". **Choice (D)**

108. We always use one among the many. Hence 'one of the average students' **Choice (A)**

109. Here the principle subject is 'The decoration' which is singular, hence 'is' should be used. We cannot use more pleasing because there is no comparison in the story. **Choice (C)**

110. Here again the principle is 'The President' which is singular. Hence 'was' should be used as a singular helping verb. **Choice (C)**

111. XOR and XNOR are the universal gates. All the other gates can be realized by these gates and so as all the other circuits too. So the answer is (A) exclusive OR gates **Choice (A)**

112. This is the property, which says

$a + \overline{a}b = a + b$. **Choice (B)**

113. Flip-flop is the most basic memory device used in computer organizations which is used to store 1 bit of data (either 0 (off state if flip flop) or 1(on state if flip flop)). All the other memory units are constructed using these flip-flops only. **Choice (A)**

114. First covert the given no. into its equivalent binary form using 4 bits for each decimal digit. Then convert that binary no. into octal reorientation using the group of 3 bits from right to left.

So the binary representation for the given number is

4(0100), D(1101),F(1111) = 010011011111

Octal representation is 2337. **Choice (B)**

115. We know that $x + \overline{x} = 1$, thus $x + \overline{y} + \overline{x} = 1 + \overline{y}$ which is always 1. **Choice (C)**

116. Choice (C)

117. LASER stands for Light Amplification by Stimulated Emission of Radiation. Compact Disc (CD) works on the principle of LASER only. **Choice (D)**

118. Choice (D)

119. If you know binary multiplication then this question will be solved very easily and rapidly too. The answer of binary multiplication is 101000010

The hexadecimal equivalent of this is 142. Second approach is to covert both the binary into decimal, multiply, convert the answer into hexadecimal.

Choice (C)

120. As we know 7 bits can be used to represent numbers from 0 to 127(total 128). From these 7 bits we can represent any character printable or non printable Later UTF-8 was introduced where each character was represented using 8 bits, the 8^{th} bit was used to represent sign but still with 7 bits we can represent any character so the answer is 7. **Choice (D)**