

**XAT-2011**  
**EXPLANATORY**  
**ANSWERS**

**SECTION-A**

*Solutions for questions 1 to 4:*

The data in given line-graphs can be represented as shown in table below:

Year	Assets	Sales	CSR spending
2004	$100 \times 10^7$	$60 \times 10^5$	$1 \times 10^5$
2005	$110 \times 10^7$	$55 \times 10^5$	$1.1495 \times 10^5$
2006	$125 \times 10^7$	$80 \times 10^5$	$2 \times 10^5$
2007	$135 \times 10^7$	$90 \times 10^5$	$2 \times 10^5$
2008	$150 \times 10^7$	$120 \times 10^5$	$2.472 \times 10^5$
2009	$160 \times 10^7$	$200 \times 10^5$	$3.16 \times 10^5$

- Thus, increase in CSR spending was maximum in year 2006. Hence, [B].
- CSR Assets,
  - For 2004 =  $1 \times 10^{-4}$
  - For 2005 =  $1.045 \times 10^{-4}$
  - For 2006 =  $1.6 \times 10^{-4}$
  - For 2007 =  $1.48 \times 10^{-4}$
  - For 2008 =  $1.648 \times 10^{-4}$
  - For 2009 =  $1.975 \times 10^{-4}$
 Hence, [E].
- It was nearly 3 crores in the year 2009. Hence, [D].
- It can be seen from the table that spending on CSR does not decline in any of the years as compared to previous year. Hence, [E].

- Percentage of ex-defence servicemen for:

$$\text{Level 1} = \frac{6}{52} \times 100 = 11.54\%$$

$$\text{Level 2} = \frac{8}{65} \times 100 = 12.31\%$$

$$\text{Level 3} = \frac{30}{210} \times 100 = 14.28\%$$

$$\text{Level 4} = \frac{25}{130} \times 100 = 19.23\%$$

$$\text{Level 5} = \frac{60}{330} \times 100 = 18.18\%$$

Hence, [D].

6. It can be seen that in level 4 almost half the posts are vacant and in other levels such a high fraction of posts will have to be abolished. Hence, [D].

7. Percentage of Ex-policemen for:

$$\text{Level 1} = \frac{4}{52} \times 100 = 7.69\%$$

$$\text{Level 2} = \frac{4}{65} \times 100 = 6.15\%$$

$$\text{Level 3} = \frac{9}{210} \times 100 = 4.28\%$$

$$\text{Level 4} = \frac{7}{130} \times 100 = 5.38\%$$

$$\text{Level 5} = \frac{15}{330} \times 100 = 4.545\%$$

Hence, [C].

8. Consider this as an arrangement of 10 things in which two out of 3 particular things are never together.

First put 7 things in a row.

Now there are 8 empty slots (including the two ends) out of which three are to be selected.

$$\therefore \text{Required number of ways} = {}^8C_3 = 56$$

Hence, [A].

9.  $x = (9 + 4\sqrt{5})^{48}$

Let  $y = (9 - 4\sqrt{5})^{48}$

Now,

$$(9 + 4\sqrt{5})^{48} \times (9 - 4\sqrt{5})^{48} = (81 - 80)^{48} = 1 \quad \dots\dots(i)$$

$$\text{Also, } (9 + 4\sqrt{5})^{48} + (9 - 4\sqrt{5})^{48} = \left[ {}^{48}C_0 9^{48} + {}^{48}C_1 9^{47} (4\sqrt{5}) + {}^{48}C_2 9^{46} (4\sqrt{5})^2 + \dots \right.$$

$$\left. + {}^{48}C_{47} (9)(4\sqrt{5})^{47} + {}^{48}C_{48} 9(4\sqrt{5})^{48} \right] + \left[ {}^{48}C_0 9^{48} - {}^{48}C_1 9^{47} (4\sqrt{5}) + {}^{48}C_2 9^{46} (4\sqrt{5})^2 - \dots \right.$$

$$\left. - {}^{48}C_{47} (9)(4\sqrt{5})^{47} + {}^{48}C_{48} (4\sqrt{5})^{48} \right] = 2 \left[ {}^{48}C_0 9^{48} + {}^{48}C_2 9^{46} (4\sqrt{5})^2 + \dots + {}^{48}C_{48} (4\sqrt{5})^{48} \right]$$

$\therefore x + y = 2(k)$ , which will be an even number

Now,

$$0 < 9 - 4\sqrt{5} < 1$$

$$\therefore 0 < (9 - 4\sqrt{5})^{48} < 1$$

$$\therefore 0 < y < 1 \quad \dots\dots (ii)$$

$$\text{Also, } x = [x] + f, \quad 0 < f < 1 \quad \dots\dots (iii)$$

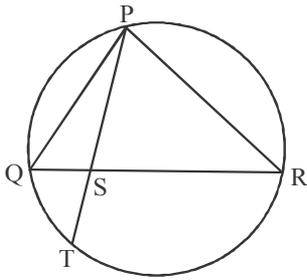
∴  $[x] + f + y$  is even  
 As  $[x]$  is an integer,  $f + y$  is an integer.  
 From (ii) and (iii)  
 $0 < f + y < 2$   
 ∴  $f + y = 1$   
 Now,  $x(1 - f) = xy$   
 But from (i),  $xy = 1$   
 ∴  $x(1 - f) = 1$   
 Hence, [A].

10.  $a_{741} = 11111\dots741$  times  
 Now,  $7 + 4 + 1 = 12$   
 ∴ Sum of digits of  $a_{741} = 1 + 1 + 1 + \dots + 1 = 741$  which is divisible by 3.  
 ∴ Similarly,  $a_{534}$  and  $a_{123}$  are also divisible by 3.  
 Thus, we can conclude that option [D] is the correct answer. Hence, [D].

11. Sangeeta's total income = 337425  
 Income tax for first Rs.1,90,000 = 0  
 Income tax for next 1,10,000 = 10% of 1,10,000 = Rs.11000  
 Income tax for next 37425 = 20% of 37425 = Rs.7485  
 Income tax = Rs.11000 + Rs.7485 = Rs.18485  
 Education cess =  $18485 \times 0.02 = 369.7$   
 Secondary and Higher Education Cess =  $18485 \times 0.01 = 184.85$   
 Total income tax =  $18485 + 369.7 + 184.85 = 19039.55$   
 ∴ Required percentage =  $\frac{19039.55}{37425} \times 100 \approx 5.64\%$   
 Hence, [A].

12. Let Mr. Madan's total income be Rs.x  
 Tax on first Rs.160000 = 0  
 Tax on next Rs.140000 = 10% of 140000 = 14000  
 Tax on next Rs.200000 = 20% of 200000 = 40000  
 Tax on remaining Rs.(x - 500000) = 30% of (x - 500000) =  $0.3 \times (x - 500000)$   
 Total income tax payable (obtaining by adding surcharges)  
 $(1.01 + 1.02)[14000 + 40000 + 0.3 \times (x - 500000)]$   
 $10.03 \times (54000 + 0.3x - 150000)$   
 Given that total tax deduction = Rs.317910  
 ∴  $1.03 \times (54000 + 0.3x - 150000) = 317910 \Rightarrow x \approx \text{Rs.}1348835$   
 Hence, [A].

13.



From the properties of chord of a circle

$$PS \times ST = QS \times SR$$

Also, Geometric mean  $\geq$  Harmonic mean

$$\therefore \sqrt{PS \times ST} \geq \frac{2}{\frac{1}{PS} + \frac{1}{ST}} \Rightarrow \sqrt{QS \times SR} \geq \frac{2}{\frac{1}{PS} + \frac{1}{ST}}$$

$$\Rightarrow \frac{1}{PS} + \frac{1}{ST} \geq \frac{2}{\sqrt{QS \times SR}}$$

$$\text{Also } \frac{QS \times SR}{2} > \sqrt{QS \times SR} \Rightarrow \frac{2}{QR} < \frac{1}{\sqrt{QS \times SR}} \Rightarrow \frac{4}{QR} < \frac{2}{\sqrt{QS \times SR}}$$

Also, if  $PS = ST$ , then  $QS \neq SR$  and if  $QS = SR$ ,  $PS \neq ST$

$$\therefore \frac{1}{PS} + \frac{1}{ST} > \frac{4}{QR}$$

Hence, [D].

14. Let  $f(X) = 21 \sin X + 72 \cos X$ 

$$\therefore f'(X) = 21 \cos X - 72 \sin X$$

when  $f(X)$  is maximum  $f'(X) = 0$

$$\text{i.e., } 21 \cos X - 72 \sin X = 0 \Rightarrow \tan X = \frac{21}{72} = \frac{7}{24}$$

$$\cos 2X = \frac{1}{1 + \tan^2 X} = \frac{1}{1 + \frac{72}{242}} = \frac{242}{252} \Rightarrow \cos X = \frac{24}{25}$$

$$\therefore \sin X = \sqrt{1 - \cos^2 X} = \sqrt{1 - \frac{242}{252}} = \frac{7}{25}$$

$$\text{Also, } f''(X) = -21 \cos X - 72 \sin X = -21 \times \frac{24}{25} - 72 \times \frac{7}{25}$$

$$\therefore f''(X) \text{ is negative at } f'(X) = 0$$

Thus,  $f(X)$  has maximum at  $f'(X) = 0$

$$\therefore \text{Maximum possible value of } 21 \sin X + 72 \cos X = 21 \times \frac{7}{25} + 72 \times \frac{24}{25} = 75.$$

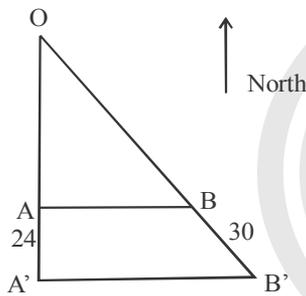
Hence, [D].

15. Required probability =  $(1 - 0.418) \times (1 - 0.612) \times (1 - 0.355) \times (1 - 0.520) \approx 0.069$

Hence, [A].

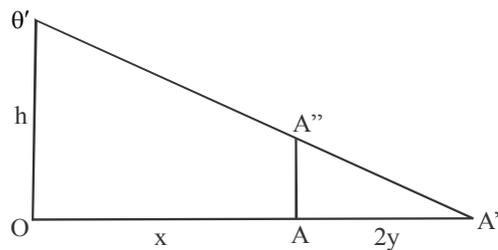
**Answers to questions 16 and 17:**

When we look from the top  
 A is the initial position of man and  
 B is his second position  
 $\therefore AB = 300$



(i)

At first position



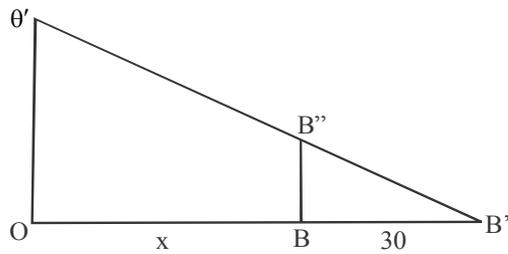
(ii)

$$AA'' = 6\text{m}$$

$$OO'' = h$$

$$\text{Let } OA = x$$

At second position



(iii)

From diagram (i),

$$\text{Now } OB = \sqrt{OA^2 + 300^2}$$

$$\text{Now } BB'' = AA''$$

$$\therefore \frac{A''A}{OO'} = \frac{B''B}{OO'}$$

$$\therefore \frac{x + 24}{24} = \frac{\sqrt{x^2 + 300^2} + 30}{30}$$

$$\Rightarrow \frac{x}{24} = \frac{\sqrt{x^2 + 300^2}}{30} \Rightarrow \frac{25}{16}x^2 = x^2 + 300^2$$

$$\Rightarrow \left(\frac{3}{4}x\right)^2 = 300^2 \Rightarrow x = 400 \text{ m}$$

$$\therefore OA = 400 \text{ m and } OB = \sqrt{400^2 + 300^2} = 500 \text{ m}$$

$$\frac{A''A}{O'O} = \frac{A'A}{A'O}$$

$$\frac{6}{O'O} = \frac{24}{24 + 400}$$

$$OO' = 424 \times \frac{1}{4}$$

Now, both the questions can be answered.

16 - [E]      17 - [C]

18. Initial height at which the ladder rests on wall =  $\sqrt{25^2 - 7^2} = 24$

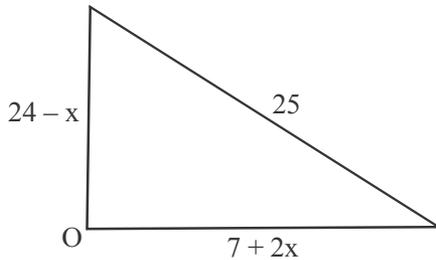
Let the base of ladder be moved by  $2x$ .

$\therefore$  The height at which the ladder rests on wall is reduced by  $x$ .

$$\therefore (24 - x)^2 + (7 + 2x)^2 = 25^2$$

$$\Rightarrow x^2 - 48x + 576 + 4x^2 + 28x + 49 = 576$$

$$\Rightarrow 5x^2 - 20x = 0 \Rightarrow x = 0 \text{ or } x = 4$$



$$\therefore 2x = 8 \text{ ft}$$

It does not lie in any of the ranges given in the options. Hence, [E].

19.  $f(x) = \log_7 \{ \log_3 (\log_5 (20x - x^2 - 91)) \}$   
 $\therefore \log_3 \{ \log_5 (20x - x^2 - 91) \} > 0$   
 $\Rightarrow \log_5 (20x - x^2 - 91) > 1 \Rightarrow 20x - x^2 - 91 > 5$   
 $\Rightarrow -x^2 + 20x - 96 > 0 \Rightarrow x^2 - 20x + 96 < 0$   
 $\Rightarrow x^2 - 12x - 8x + 96 < 0 \Rightarrow (x - 8)(x - 12) < 0$   
 $\therefore x$  lies between 8 and 12 i.e., the domain of the function  $f(x)$  is (8, 12)  
Hence, [B].

20. The mechanic takes 20 minutes to walk to the bus stop  
 $\therefore$  He has  $32 - 20 = 12$  minutes to identify the two faulty machines  
Time required to check one machine = 12 minutes  
 $\therefore$  He can check only two machines  
Thus, he will identify the two faulty machines if both of the machines he checks are faulty or both of them are not faulty.

$$\text{Probability that both the machines he checks are faulty} = \frac{2}{4} \times \frac{1}{2} = \frac{1}{6}$$

$$\text{Similarly, probability that both the machines he checks are not faulty} = \frac{2}{4} \times \frac{1}{2} = \frac{1}{6}$$

$$\therefore \text{Required probability} = \frac{1}{6} + \frac{1}{6} = \frac{1}{3}. \text{ Hence, [D].}$$

21. Let there be  $n$  teams other than the 10 teams at the bottom of the table.  
For each match, 1 point is awarded.  
Total number of matches played / points scored by bottom 10 teams against each other  
 $= {}^{10}C_2 = 45$   
 $\therefore$  Total number of points scored by bottom 10 teams against top 10 teams = 45  
Now, total number of matches played/points scored between top  $n$  teams and bottom 10 teams  
 $= n \times 10 = 10n$   
 $\therefore$  Total number of points scored by top  $n$  teams against bottom teams =  $10n$  – points scored by bottom 10 teams against top  $n$  teams =  $10n - 45$

Now, total number of matches played/points scored by top  $n$  teams against each other =  $nC_2$   
 Given that exactly half of the points earned by each team who earned in against the bottom 10 teams.

$$\therefore 10n - 45 = {}^nC_2$$

$$\Rightarrow 10n - 45 = \frac{n(n-1)}{2} \Rightarrow 20n - 90 = n^2 - n$$

$$\Rightarrow n^2 - 21n + 90 = 0 \Rightarrow n = 6 \text{ or } n = 15$$

If  $n = 6$ , average points scored by top 6 teams =  $\frac{{}^6C_2 + 10 \times 6 - 45}{6} = \frac{30}{6} = 5$

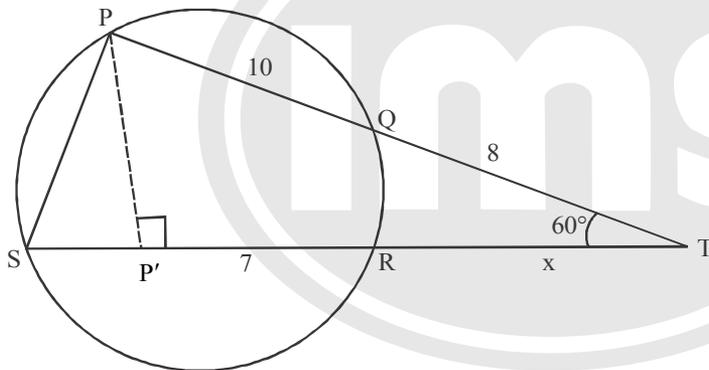
and average points scored by bottom 10 teams =  $\frac{90}{10} = 9$

Thus,  $n = 6$ , cannot be true, since average points scored by top 6 teams should be more than average point scored by bottom 10 teams.

Thus,  $n = 15$

$\therefore$  Total number of teams =  $n + 10 = 15 + 10 = 25$ . Hence, [D].

22.



From chords' properties

$$QT \times PT = RT \times ST$$

$$8 \times (10 + 8) = x \times (7 + x)$$

$$144 = 7x + x^2$$

$$x^2 + 7x - 144 = 0$$

$$x^2 + 16x - 9x - 144 = 0$$

$$x = -16 \text{ or } x = 9$$

$$\text{Area of } \Delta PST = \frac{1}{2} \times PP' \times ST = \frac{1}{2} \times \sin 60^\circ PT \times ST = \frac{1}{2} \times \frac{\sqrt{3}}{2} \times 18 \times (7 + 9)$$

$$= 72\sqrt{3} \text{ square units. Hence, [C].}$$

23. Let us look at the situation when n number of people are standing along the circle.

n	Winner Number
n = 1	1
n = 3	3
n = 4	1
n = 5	3
n = 6	5
n = 7	7
n = 8	1
n = 9	3
n = 10	5
n = 11	7

Thus, we see that for every  $n = 2^m$  where m is a natural number, the winner is person numbered 1 and then for consecutive n's, the winners are persons numbered in A.P. with common difference 2.

Therefore, if  $n = 512$ , winner is contender numbered 1.

∴ if  $n = 545$ , winner is contender numbered  $[1 + 2 \times (545 - 512)] = 67$

Hence, [B].

24. As we saw in earlier question, if alternate contender was removed for different n's, the winner numbers were in A.P. of 2.

If every third contender is removed, we can see that for different n's, the winner numbers are in A.P. of 3 as shown below:

n	Winner Number
4	1
5	4
6	$7 \equiv 7 - 6 = 1$
7	4
8	7
9	$10 \equiv 10 - 9 = 1$
10	4
11	7
12	10
13	13
14	$16 \equiv 16 - 14 = 2$
15	5
16	8
"	"
"	"
"	"

Similarly, if every 300<sup>th</sup> contender is removed, the winner numbers will be in A.P. of 300.

Given that for  $n = 542$ , winner will be contender no.437

n	Winner Number
542	437
543	$437 + 300 = 737 \equiv 737 - 543 = 194$
544	$194 + 300 = 494$
545	$494 + 300 = 794 \equiv 794 - 545 = 249$

Thus, the winner will be contender numbered 249.

Hence, [C].

25. Every number other than zero is of the form  $1xyz$ .  
Little Pika can add the two consecutive numbers if the first of the two numbers is of the form  $1xyz$  where each of  $x, y, z$  belongs is of the form  $1xyz$  where each of  $x, y, z$  belongs to any digit from 0 to 5.

If any of  $x, y, z$  is 9 then the corresponding digit in the next number should be 0.

(i)  $\therefore$  Number of such numbers in which neither of  $x, y, z$  are 9 =  $5 \times 5 \times 5 = 125$

(ii) If  $z = 9$

$\therefore$   $x$  and  $y$  can take 5 values each.

$\therefore$  Number of such numbers =  $5 \times 5 = 25$

(iii) If  $y = 9$ , and  $z = 9$

$x$  can take 5 values

$\therefore$  Number of such numbers.

(iv) If number is 1999

1999 + 2000 can be added by little Pika

$\therefore$  Required numbers of pairs of integers =  $125 + 25 + 5 + 1 = 156$

Hence, [C].

26. Total number of roads in the country =  ${}^{20}C_2 = 190$

Every candidate uses exactly 20 roads

If there are  $n$  candidates,  $20 \times n \leq 190$

$\therefore n \leq 9$

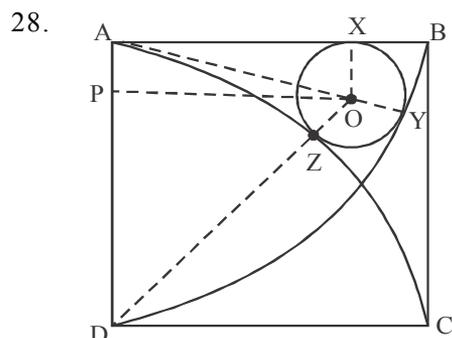
Also we can observe that every candidates can use a different road from any other candidate (we can check this by assuming less number of cities e.g. 3 or 4 in the country and try to find the paths for different candidates). So for every  $m$  cities, maximum possible number

of candidates is  $\frac{{}^m C_2}{m} \therefore n \leq 9$

Hence, [E].

27. If the digit 5 is skipped, the base system changes from 10 to 9 and also the actual value of any digit greater than 5 will be reduced by 1.

$\therefore$  In base 9, actual value of 3016 will be 3015 and its value in base 10 will be  $3 \times 9^3 + 0 \times 9^2 + 1 \times 9 + 5 = 2201$ . Hence, [A].



Let O be the center of the smaller circle and X, Y and Z be the points where the circle touches side AB, arc BD and arc AC respectively.

Let OP is a line perpendicular to AP meeting AD at P.

Let r be the radius of the smaller circle.

Now,  $OY = 60$

$$\therefore AO = OY - OY = 60 - r$$

Also,  $OX = r$

Thus  $OP^2 = OX^2 = (60 - r)^2 - r^2$  .....(i) (By Pythagoras theorem in  $\Delta AOX$ )

Also,  $OD = DZ + ZO = 60 + r$

and  $PD = AD - AP = 60 - r$

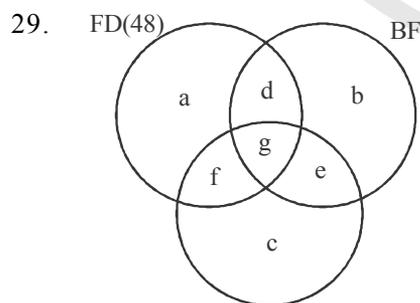
$\therefore OP^2 = OD^2 - PD^2 = (60 + r)^2 - (60 - r)^2$  .....(ii) (By Pythagoras theorem in  $\Delta POD$ )

From (i) and (ii), we have

$$(60 - r)^2 - r^2 = (60 + r)^2 - (60 - r)^2$$

$$\Rightarrow 120r + 3600 = 240r \Rightarrow r = 10 \text{ cm}$$

Hence, [B].



Given that  $g = 4$ ,  $f = 4g$  and  $f = 2d$

$$\therefore f = 4 \times 4 = 16 \text{ and } d = \frac{f}{2} = \frac{16}{2} = 8$$

$$\therefore a = 48 - (d + g + f) = 28 - (8 + 4 + 16) = 20$$

Also given that,  $f = g + e$

$$\therefore e = f - g = 16 - 4 = 12$$

$$\therefore c = 124 - (f + g + e) = 124 - (16 + 4 + 12) = 92$$

$$\therefore b = 240 - 59 - (1 + c + d + e + f + g)$$

$$= 240 - 59 - (20 + 92 + 8 + 12 + 16 + 4) = 29$$

Hence, [A].

30. LMNO is a quadrilateral

∴ PL + PN will be minimum when P is on diagonal LN; and PM + PO will be minimum when P is on diagonal MO.

∴ For PL + PM + PN + PO to be minimum, point P should be at the intersection of the two diagonals.

$$\therefore PL + PM + PN + PO = \text{Sum of diagonal} = LN + MO$$

$$= \sqrt{(-5-0)^2 + (0-5)^2} + \sqrt{[1-(-1)]^2 + (-1-5)^2}$$

$$= \sqrt{50} + \sqrt{40} = 5\sqrt{2} + 2\sqrt{10}$$

Hence, [B].

31. Number of ways of selecting  $x_1x_2x_3 = 10 \times 10 \times 10 = 1000$

If  $x_4x_5x_6$  is same as  $x_1x_2x_3$

Number of ways of selecting  $x_4x_5x_6 = 1$  (same as  $x_1x_2x_3$ )

and number of ways of selecting  $x_7 = 10$

$$\therefore \text{Magic numbers with } x_1x_2x_3 \text{ same as } x_4x_5x_6 = 1000 \times 1 \times 10 = 10000$$

Similarly magic numbers with  $x_1x_2x_3$  same as  $x_4x_5x_6 = 1000 \times 10 \times 1 = 1000$

But we counted numbers with each of  $x_1$  to  $x_7$  as 0, 1, 2, ..., 9 twice

Also, 20000000 is not a valid account number.

$$\therefore \text{Maximum possible number of customers having a 'magic' account number} = 1000 + 10000 - 10 - 1 = 199989$$

Hence, [E].

32. Mode = 4

$$\text{Mean of the 7 integers} = \frac{4 + 4 + 4 + 8 + 10 + 20 + x}{7} = \frac{50 + x}{7}$$

when  $x = 6$ , mean = 8 and median = 6

∴ mode, median and mean are in A.P.

when  $x > 6$ , median = 8

∴ Difference between median and mode =  $8 - 4 = 4$

∴ Difference between mean and median for other possible value of  $x = 4$

i.e., mean =  $8 + 4 = 12$

$$\therefore \frac{50 + x}{7} = 12 \Rightarrow x = 34$$

∴ Sum of the two possible values of  $x = 6 + 34 = 40$

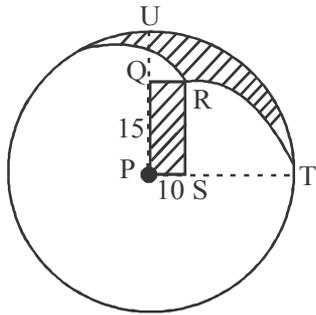
Hence, [E].

33. Sum of the first three numbers should be divisible by 3.

We can say that only sum of 76, 82 and 91 is divisible by 3.

We can also check this conveniently by looking at other three numbers from the two numbers given in each option. Hence, [C].

34. Initially, available area for cow to graze =  $\pi \times 25^2$   
 After construction of shed PQRS, the area shaded will not be available for grazing.



$$\therefore \text{Now, available area for grazing} = \left( \frac{3}{4} \times \pi \times 25^2 \right) + \text{quadrant } \cup QR + \text{quadrant } RST$$

$$= \frac{3}{4} \times \pi \times 25^2 + \frac{1}{4} \times \pi \times 10^2 + \frac{1}{4} \times \pi \times 15^2$$

$$\text{Ratio of areas available for grazing} = \frac{\frac{3}{4} \times \pi \times 25^2 + \frac{1}{4} \times \pi \times 10^2 + \frac{1}{4} \times \pi \times 15^2}{\pi \times 25^2}$$

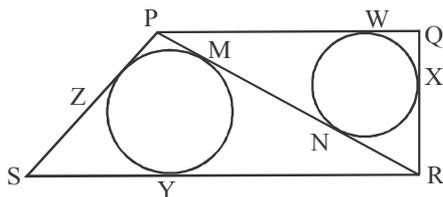
$$= \frac{1}{4} \left( 3 + \frac{10^2}{25^2} + \frac{15^2}{25^2} \right) = \frac{1}{4} \left( 3 + \frac{4}{25} + \frac{9}{25} \right)$$

$$= \frac{75 + 4 + 9}{100} = \frac{88}{100}$$

$$\therefore \text{Required modified rent} = \frac{88}{100} \times 1000 = \text{Rs.880}$$

Hence, [B].

- 35.



Let the circles touch the sides of quadrilateral PQRS at points W, X, Y and Z as shown in the figure above.

Statement I: From statement I, sum of the opposite sides of the quadrilateral will be equal to each other.

$$\therefore PQ + SR = PS + QR$$

$$\Rightarrow PW + WQ + SY + NR = PZ + ZS + QX + XR$$

Now, WQ = QX and SY = ZS

$$\therefore PW + YR = PZ + XR$$

Also, PW = PN, YR = RM, PZ = PM and XR = RN

$\therefore PN + RM = PM + RN$

Also,  $PN = PM + MN$  and  $RM = RN + MN$

$\therefore (PM + MN) + (RN + MN) = PM + RN \Rightarrow 2MN = 0 \Rightarrow MN = 0$

Thus, statement I alone is sufficient to answer the question.

Statement II: From statement II alone, length of MN cannot be found out.

Hence, [A].

36.  $PQ \times RQ = XXX$

$\therefore X$  can be either 1, 4, 5, 6, or 9

If  $X = 1$ ,  $XXX = 111 = 37 \times 3$  which is not of the form  $PQ \times RQ$

If  $X = 4$ ,  $XXX = 444 = 37 \times 12$  which is not of the form  $PQ \times RQ$

If  $X = 5$ ,  $XXX = 555 = 37 \times 15$  which is not of the form  $PQ \times RQ$

If  $X = 6$ ,  $XXX = 666 = 37 \times 18$  which is not of the form  $PQ \times RQ$

If  $X = 9$ ,  $XXX = 999 = 37 \times 27$  which is of the form  $PQ \times RQ$

$\therefore P + Q + R + X = 2 + 7 + 3 + 9 = 21$

Thus, none of the statements are necessary to answer the question. Hence, [E].

37. For output till 15000 sq.ft, Electricity cost increase in G.P. at every 25000 sq.ft.

$\therefore$  Common ratio of the G.P. =  $\frac{570}{3800} = 1.5$

$\therefore$  Electricity cost for 150000 sq.ft output =  $(3800) \times (.5)^5 = 28856.25$

After 1500 sq.ft of output, Electricity cost increased in A.P. for every 2500 sq.ft. of output.

Common difference of the A.P. =  $38856.50 - 28856.25 = 1000.25$

Output (Sq.ft)	Labour cost + Material cost + Administrative cost (A)	Electricity cost (B)	Total (A) + (B)	Cost per sq.ft = Output/(A) + (B)
25000	72550	3800	76350	3.054
50000	103500	5700	109200	2.184
75000	133000	8550	141550	1.887
100000	162000	12825	174825	1.748
125000	189750	19237.5	208987.5	1.672
150000	216700	28856.25	245556.25	1.637
175000	240650	38856.5	288506.5	1.649
200000	288000	48856.75	336856.75	1.684

Thus, the estimated cost per square feet of output is least for 150000 square feet output.

Hence, [D].

38. The data is tabulated as shown below:

Output	Material Cost	Spoilage cost per sq. ft.	Spoilage cost	Usage cost	Usage cost per sq. ft.
25000	11050	0.042	1050	10000	0.4
50000	22000	0.04	2000	20000	0.4
75000	33000	0.04	3000	30000	0.4
100000	44000	0.04	4000	40000	0.4
125000	54750	0.038	4750	50000	0.4
150000	65700	0.038	5700	60000	0.4
175000	76650	0.038	6650	70000	0.4
200000	88000	0.04	8000	80000	0.4

Thus, usage cost per sq.ft remains constant. Hence, [C].

39. Electricity cost per sq.ft. for difficult output is as shown in the table below:

Output	Electricity cost	Electricity cost per sq. ft.
25000	3800	0.15
50000	5700	0.11
75000	8550	0.11
100000	12825	0.13
125000	19237.5	0.15
150000	28856.25	0.19
175000	38856.5	0.22
200000	48856.75	0.24

Thus, the graph in option B most suitably represents the estimates of electricity cost per square feet of output varies monthly output. Hence, [B].

40. Let Mr. Sanyal's investments in Gold, US bonds and UK bonds be a, b and c respectively.

$$\text{Then } a + b + c = 80000 \quad \dots(i)$$

The value of his investment in gold on 31<sup>st</sup> August =  $20720a/2000 = 1.036a$ .

The value of his investment in US bonds on 31<sup>st</sup> August

$$= \frac{45}{40} \times b + \frac{8}{12} \times \frac{10}{100} \times b = 1.192b$$

The value of his investment in EU bonds on 31<sup>st</sup> August

$$= \frac{63}{60} \times c + \frac{8}{12} \times \frac{20}{100} \times c = 1.183c$$

$$\therefore 1.036a + 1.192b + 1.183c = 1.13 \times 800 \quad \dots (ii)$$

Calculating in a similar way for September

$$1.0425a + 1.25b + 1.217c = 1.1625 \times 80000 \quad \dots (iii)$$

Solving (i), (ii) and (iii),

$x \approx 38\%$ ,  $y \approx 38\%$  and  $z \approx 24\%$ . Hence, [B].

41. We can see that the return on gold and silver was never highest. The values of assets considering interest rates and exchange rates in different months are as shown in the table below:

Month	Gold	Silver	US Bonds USD	EU Bonds Euros	UK Bonds Pounds	Jap Bonds Yen
January	20000	300	40.33	61.00	70.88	0.50
February	20100	302	41.68	63.55	72.78	0.51
March	20250	307	42.03	65.10	73.66	0.53
April	20330	310	43.40	66.13	74.55	0.53
May	20400	312	43.75	67.71	76.50	0.54
June	20500	318	44.10	68.75	77.40	0.55
July	20650	330	46.57	70.35	79.39	0.57
August	20720	335	48.00	71.40	80.30	0.57
September	20850	340	50.53	73.60	82.33	0.59
October	20920	342	53.08	75.83	83.26	0.60
November	20950	345	54.58	76.92	84.74	0.62
December	21000	350	55.00	78.00	86.25	0.63

The percentage increase in each asset over the previous month is shown in table below:

Month	Gold	Silver	US Bonds USD	EU Bonds Euros	UK Bonds Pounds	Jap Bonds Yen
February	0.50	0.67	3.35	4.18	2.68	2.42
March	0.75	1.66	0.82	2.44	1.22	2.38
April	0.40	0.98	3.27	1.59	1.20	0.41
May	0.34	0.65	0.81	2.38	2.62	2.34
June	0.49	1.92	0.80	1.54	1.18	2.30
July	0.73	3.77	5.59	2.33	2.57	2.27
August	0.34	1.52	3.08	1.49	1.15	0.40
September	0.63	1.49	5.26	3.08	2.52	4.05
October	0.34	0.59	5.06	3.03	1.12	2.16
November	0.14	0.88	2.83	1.43	1.79	2.13
December	0.24	1.45	0.76	1.41	1.78	2.10

∴ The value of Mr. Sanyals's investments at the end of December =  $800000 \times 1.0418 \times 1.0244 \times \dots \times 1.0210 \approx 800000 \times 1.462$ , which is a gain of approximately 46.2%. The closest option is [B]. Hence, [B].

42. The percentage returns in the four quarters are as shown below:

Month	Gold	Silver	US Bonds USD	EU Bonds Euros	UK Bonds Pounds	Jap Bonds Yen
Q I	1.25	2.33	4.19	6.72	3.93	4.86
Q II	0.84	2.58	1.61	3.96	3.82	4.70
Q III	0.97	3.03	8.50	4.62	3.70	4.48
Q IV	0.38	2.34	3.61	2.86	3.6	4.28

We can see that silver consistently gave better returns than gold in the given period. Mr. Sanyal's investment strategy and corresponding returns are as follows:

Quarter	Bullion	Returns	Other instrument	Returns
Q I	Gold	1.25%	Indian FD	6.25%
Q II	Silver	2.58%	EU Bonds	3.96%
Q III	Silver	3.03%	Indian FD	6.25%
Q IV	Silver	2.34%	Indian FD	6.25%

∴ Total value of his assets at the end of the year = Rs.936838

If he had invested in US Bonds, he would have got  $800000 \times 55/40.33 = \text{Rs.}10910$

If he had invested in UK Bonds, he would have got  $800000 \times 86.25/70.88 = \text{Rs.}973476$

If he had invested in EU Bonds, he would have got  $800000 \times 78/61 = \text{Rs.}1022950$

If he had invested in Japanese Bonds, would have got  $800000 \times 0.63/0.50 = \text{Rs.}100800$

If he had invested the entire amount in his Indian bank, he would have got  $800000 \times 1.25 = \text{Rs.}100000$

∴ None of the options is correct.

43. The given question is not framed properly and hence cannot be answered.

## **SECTION-B**

44. Options [B], [C] and [E] are not mentioned at all. [A] is too general. [D] is Toyota's specific asset, as can be inferred from paragraph 2. Hence, [D].

45. According to the passage, Toyota's uniqueness lies in the fact that its workers constantly evolve their own solutions to problems. Therefore, the most important pre-condition for their success is management's faith in the workers' abilities to correctly solve the problems they are faced with. Hence, [E].

46. The gist of the passage is that the workers at Toyota – and not the management, specialists or customers – are empowered to solve their problems among themselves. Hence, [A].

47. According to the passage, the workers at Toyota are given freedom to find their own solutions to their problems. Thus, different groups of workers come up with different solutions, so

work norms vary across the organization. But these differences are tolerated, because imposing the same norms would take away the workers' freedom to experiment. Hence, [C].

48. A composition can be 'polished' (meaning 'flawless') or 'refined' (meaning 'precise, exact or free from impurities') but not 'honed' (meaning 'sharpened or made more effective'). This eliminates option [A]. You cannot compose something to the best of your 'mind' or 'thoughts' but to the best of your 'intellect' or 'ingenuity'. Thus, options [C] and [E] are eliminated. Both 'mind' and 'heart' correctly fit the third blank. However, 'noble' (meaning 'of a high quality or superior') better fits the last blank as compared to 'righteous' (meaning 'morally justifiable or right'). Hence, [B].
49. The correct usage is 'difficulty in getting to a place' not 'difficulty to getting to a place'. Thus, [B], [C] and [D] are eliminated. The third blank talks about how it is not possible to reach that place. Thus, the correct pronoun to replace 'that place' is 'it' not 'to'. Hence, [A].
50. Since the first part of the sentence is a condition, 'if' fits the blank correctly. Thus, [B], [C] and [D] are eliminated. In the third blank, 'to' is the correct preposition: one comes back 'to' someone not 'on' someone. Hence, [E].
51. All the options [A], [B], [C] and [D] have antonymous relationship with each other. However, 'devotion' (meaning 'strong attachment or religious zeal') is not the antonym of 'loathing' (meaning 'strong dislike or intense aversion'). Hence, [E].
52. According to the author, short-term pleasure seeking behaviour, such as playing video games, keeps people from evolving genuine fitness, distracts them from making technological progress, and leads to rampant consumerism. The author suggests that this is a major problem for any society, on Earth as well as hypothetical extraterrestrial ones. Hence, [C].
53. Option [E], which is the main point of the passage, is stated clearly in paragraph 2. [C] is other people's suggestion (which the author does not accept), and the other options are not mentioned at all. Hence, [E].
54. According to the author, modern people are too distracted by fitness-faking technology such as video games to pursue real fitness. He also suggests that the same impulse keeps people from acting in the real world and prevents them from exploring the universe. So it is likely that he would agree that if such fitness-faking technology had been available to European nations after the renaissance, they might have been too distracted by virtual reality to bother with conquest and colonization. Hence, [D].
55. The author believes that current technology encourages fitness-faking, not actual biological fitness, so statements I and II would challenge that assumption – violent crime and war are primordial expressions of biological superiority. Statement V shows a positive benefit of modern technology, so it too challenges the ideas in the passage. Statements II and IV, on the other hand, support the author's arguments. Hence, [E].

56. One of the adjectives used to describe nature in the sentence is ‘unchangeable’. Thus, ‘harsh’ and ‘inescapable’ do not complete the first blank correctly. However, ‘relentless’ (meaning ‘unyielding or inflexible’), ‘persistent’ (meaning ‘lasting or enduring’) and ‘inexorable’ (meaning ‘unyielding or unalterable’) can be appropriately used. This eliminates [D] and [E]. The second blank is followed by ‘as’. ‘Heartless as to whether’ and ‘apathetic as to whether’ are incorrect usage. Thus, [B] and [C] also get eliminated. Only option [A] fills all the blanks correctly: ‘Nature is relentless and unchangeable, and it is indifferent as to whether its hidden reasons and actions are understandable to man or not’. Hence, [A].
57. According to the statement, ideas follow from impressions – but that does not mean that every impression must lead to an idea. So I is invalid, but II is valid. IV can also be inferred from this point. The colour of the XAT booklet would be a ‘direct, vivid and forceful product of immediate experience’ for a student (who would have one in front of her while taking the test), so it is an ‘impression’. On the other hand, the memory of a colour television would be a copy of her original impression of watching television earlier, i.e. an ‘idea’. So III is also correct. Hence, [D].
58. According to the passage, the Internet has adversely affected our powers of concentration in recent years. Options [A] and [B] have no relevance to the powers of concentration at all. [C] and [E] weaken the argument. Only [D] strengthens it, by showing that people in this Internet age are increasingly unable to concentrate on printed information. Hence, [D].
59. As the argument in the passage is that the Internet has adversely affected our powers of concentration, options [C] and [E] both weaken the argument, as they both show that people who have grown up with the Internet have not been adversely affected by it. But [C] merely shows the lack of a negative effect, while [E] shows an actual positive effect of the Internet, so [E] weakens the argument more. Hence, [E].
60. Since the passage talks about dealing effectively with randomness, [A] is implicit. Since the passage is in general terms, it likely applies to everyone, so [D] is also implicit. Based on the last sentence, acknowledging the existence of randomness is a necessary – but not sufficient – condition for dealing with it. So [C] is implicit, as is its inverse, [E]. But [B] is not implicit, as it suggests that one can deal with randomness just by acknowledging it. Hence, [B].
61. Option [A] is implicit in the second line. [C] is stated in the last line, and [D] in the third one. The rhetorical question in the last line implies [E]. The first half of [B], i.e. that humanity is divided by war, is stated in the first line – but the second half, i.e. that humanity reunites in peace, is not implied in the poem at all. Hence, [B].
62. The first blank talks about walking in the Himalayas. Since the Himalayas are covered with snow, the correct word would be ‘slush’ which means ‘a watery mire or partly melted snow’. The next sentence talks about negotiating the Ganges. The correct word to fill this blank would be ‘sludge’ which means ‘a deposit of ooze at the bottom of a body of water’. The last blank talks about playing in the waters of the Arabian Sea. So, ‘sloshing’, which means ‘splashing or moving through water, mud or slush’, correctly fits the blank. Hence, [A].

63. 'Felon' should be preceded by an article in the first blank. Since there is no article before the blank, option [A] is eliminated. The club members can decide to 'felicitate' (meaning 'to congratulate or compliment') Arun as the member of the year. But 'facilitate' (meaning 'to assist the progress of') does not fit the second blank. This eliminates options [B] and [C]. Only 'freckles' (meaning 'brownish spots on skin') fits in the third blank. 'Febrile' (meaning 'feverish') cannot be used in the context of the last blank. However, 'felicific' meaning 'tending to cause happiness' correctly fits the last blank. Thus, the correct order of words is: 'feckless, felicitate, freckles, felicific'. Hence, [E].
64. 'Persons' requires an apostrophe before 's' to show the possessive form, i.e. 'person's'. The clause ends at 'development', so a comma is required after it. The sentence ends at 'competence', so a full-stop has to be inserted after it. 'Efficiency' and 'development' should be followed by a comma and full-stop respectively. 'Itself' should be followed by a colon, as the rest of the sentence is an elaboration of the point made in the earlier part of the sentence. The extract should end with a full-stop at the end. (Note that 'however' should also be followed by a comma, but none of the options match if this comma is used.) Hence, [E].
65. In all the options, the middle word connects the first and third words. 'Water' can be used to make 'dirty' things 'clean'. 'Wood' can be 'burnt' to cook 'food'. The 'battery' in a radio or music player can go 'dead' while listening to 'music'. Grape 'juice' can be 'fermented' to make 'wine'. However, 'rain', 'thunder' and 'hail' do not have the same relationship. Hence, [E].
66. 'When the balloon goes up' means 'when the trouble or action begins'. Thus, the 'spot fixing scandal' is meaningful in this context. 'In the altogether' means 'an informal way of saying nude'. Thus, 'bathtub' is contextually correct. 'The halcyon days' means 'a period of peace and happiness' which is usually associated with 'childhood'. Thus, this relationship is also correct. 'The real McCoy' means 'the genuine article', so 'Darjeeling Tea' could be an example of the same. The idiom 'throw down the gauntlet' means 'to challenge or to defy'. The duty of the UN peace keeping force is not to challenge or defy but to maintain peace. Thus, this relationship is not the same as that of the other options. Hence, [E].
67. Statement 3 introduces the topic by defining the term 'fiduciary'; 1 expands on that definition; 4 makes a general statement about the duties of a fiduciary; and 2 derives a conclusion from the preceding statements to make a specific conclusion about the role of directors as fiduciaries. Thus, we get the sequence 3, 1, 4, 2. Hence, [A].
68. The f, e link is the most prominent one: f mentions the creation of certain organizations in the 1980s, and e, beginning with 'more recently', mentions the same in the 1990s. The b, d link can also be inferred: b makes a general point about international society becoming more unified, and d expands on this point by stating how people feel responsible for problems all over the world. Both these links are found only in option [D], i.e. c, a, f, e, b, d. Hence, [D].
69. If statements i and iv are true, then the simulation mentioned in the passage is useless in predicting soldiers' reactions in combat. Statement ii shows that the simulation would not help the soldiers get accustomed to stress. Statement v questions the whole point of conducting simulations

in the first place. So all of these weaken the logic of the passage. On the other hand, statement iii strengthens the logic of the passage. Hence, [D].

70. According to the passage, conspiracy theories are the result of people's great need for order. So statement i, which claims that the need for order is exaggerated, weakens the argument. Statement iii weakens the point that the conspiracy buffs are working with a long list of 'coincidences'. Statement iv weakens the argument by showing that the conspiracy theories are not seriously believed, as they're just a form of fiction. Hence, [C].
71. According to the passage, people believe in conspiracies and sinister forces when they cannot comprehend certain aspects of how the universe works. Both statements i and iv are examples of science falling short in explaining certain phenomena, so they would strengthen the belief in sinister forces and conspiracies. Statement ii is a case in which conspiracy theories regarding paranormal forces turn out to be true, so it certainly strengthens belief in sinister forces and conspiracies as well. Hence, [D].
72. The passage shows that there is a flaw in the generally accepted notions about the efficacy of monetary incentives, and that after a certain limit, money actually has a negative influence on tasks requiring higher-level cognitive skills. So iv is implicit; and v is a valid suggestion. Statements ii and iii are too negative. The second half of i has no basis in the passage. Hence, [E].
73. Paradox emphasizes the importance of 'being', and says that reality resides in the world of 'being' rather than 'becoming'. So he would agree with I – i.e. that from the point of view of the fly, the arrow belongs to the realm of being. The rest of the options are either inconsistent with Paradox's views or cannot be inferred from the passage. Hence, [A].
74. Herodotus emphasizes the role of change, and claims that all things are in a flux. According to him, the basis of morality lies in the principle of continuous transformation. Thus [B] is implicit in Herodotus's ideas. Hence, [B].
75. The reviewer [C] is likely to have read the novel in greater detail than the others, as he/she analyses the plot and the author's philosophy, while the rest make relatively more superficial statements about the popularity or impact of the novel. Hence, [C].
76. The reviewer [B] makes the most objective statement, as he/she states facts about the novel, such as its popularity among the youth, which can be verified by any independent observer. [A], [C] and [D] mention their personal views of the author or the novel, while [E] mentions a fact, but it is of a subjective nature (people's experiences when reading the novel). Hence, [B].
77. The reviewer [D] praises the author ('writer of great power' and 'subtle and ingenious mind') rather than saying much about the novel itself. Hence, [D].

**SECTION-C**

78. Statement ii is the easiest to eliminate. It is the responsibility of the top management to keep the mid-level management in line, so this excuse cannot be used to evade responsibility. So, any option with ii can be eliminated. This leaves options [B] and [C]. Statement iv is weak, as it tries to shift blame through a vague argument, rather than give a strong reason for why the target could not be achieved. So [C] is also ruled out. Hence, [B].
79. On reading the five statements, it can be easily deduced that iv is a very sensible option. The top management of LMN has changed so one need not be biased; also, iv talks about the benefit of shareholders. So, iv must definitely be a part of the answer. This leaves us with [B], [D] and [E]. Out of i, ii and v, v is the most practical response. Statement i is a very emotional response and ii is driven by personal gain only. Statement v takes into consideration the difficulty in raising money and the greater financial problems of LMN (which have been talked about in the passage). Hence, [E].
80. [E] is the strongest argument against investing in the merged entity as LMN seems to be taking on a lot of high cost debt (which is quite risky) and it is already purchasing another similar entity. This is leading to no visible advantage for the resultant entity (created by the merger of ABC and LMN). This is the only option that clearly establishes that the resultant entity is weak. The situations in [A] and [B] can be overcome and [D] need not work against the resultant entity. [C] is irrelevant as 'grand' strategies need not be presented to investors to succeed. Hence, [E].
81. Statement a is weak and not backed by evidence. Statement d is irrelevant as the mistakes of employees are not evident at all. Statements c, b and e are astute observations and directly weaken the CEO's argument. Hence, [D].
82. 31 can be written as  $31 = \underbrace{2^0 + 2^1 + 2^2 + 2^3 + 2^4}_{5 \text{ terms}}$   
 $\therefore$  Timon can do pieces of size 1, 2, 4, 8 and 16 inches.  
 On 1<sup>st</sup> day, Timon will give bar of size 1 inch.  
 On 2<sup>nd</sup> day, he will given bar of size 2 inch and take back bar of size 1 inch.  
 On 3<sup>rd</sup> day, he will give back bar of size 1 inch.  
 On 4<sup>th</sup> day, he will give bare of size 4 inch and take back bars of size 1 inch and 2 inch.  
 ..... and so on.  
 Thus, Timon makes 5 pieces of the silver bar.  
 Hence, [A].
83. The CTM management has always had the best interests of its employees at heart. To stop the investigation into the possible exploitation of contract workers would be unethical. So, I is not right. Increasing the wages of contract labourers just because they have very aggressively demanded the same is also not right. So, V should not be done. Thus, we are left only with

option [D]. Though there was nothing wrong with II, it is not a part of the answer choice we are left with. III is the most sensible step to take and it will help solve a number of problems. IV is also the right thing to do. Hence, [D].

84. Since no regular workers were involved in the fiasco and since the CTM management has not blamed CMMS, [A] is not required. Adopting a neutral stand in public would mean not condemning the obvious wrongdoing by the contract labourers. So, [E] is not an option. In fact, CMMS should utilize this opportunity to enhance its support base (the case mentions that CMMS leadership was wary about the slow erosion of its support base). [B] would not be the right step as the employment parameters for contract workers and regular workers are not at par. [D] is illogical: why would regular workers organize a union for contractual workers? [C] is the best option, which would get CMMS leadership the support of the contract labourers and preclude the need for another union. Hence, [C].
85. As the question is about government action at the national level, only [D] is relevant. The other options mention action at a micro level. Hence, [D].
86. As the whole issue is about the contract labourers who are dissatisfied, [E] is the best option. Only when this problem is tackled will things return to normal. Hence, [E].
87. The managers should be allotted the rooms such that the sum of the 'preference number' of the rooms allotted to them is minimum.  
 Now three of them have 1st preference as 302.  
 Therefore the sum of preference numbers will be at least  $1 + 1 + 1 + 2 + 2 = 7$   
 So, a maximum of three managers can be allotted their most preferred room.  
 This can be done by allotting room numbers 301 and 303 to M5 and M3; 302 to M1; 301 to M2; and 305 to M4. Hence, [C].
88. As explained in answer to previous question, the total preference ranking will be 7.  
 Hence, [C].
89. For any of the combinations of allotments we see that the sum of the preference ranking will be 9. Hence, [E].
90. Suppose members that are represented by points and friendships by lines between two points. Consider a person A who has two friends  $F_1$  and  $F_2$ . From condition 2,  $F_1$  and  $F_2$  cannot be friends.  
 By condition 3, there should be atleast one more member.  
 $\therefore$  4 can be the minimum possible number of members. But we know that the number of members  $\geq 5$ .  
 Now let A have m friends  $F_1, F_2, F_3, \dots, F_m$ .  
 From the similar logic  $X_{13}, X_{ij}$ . (There are  ${}^m C_2$  such members.) Note that no other  $F_i$  can join  $X_{ij}$ , else condition 3 is violated. Now, by condition 3, every member is either A's friend or A's friend's friend.  
 So, the members are A;  $F_i$ 's, who are A's friends (minimum number);  $X_{ij}$ 's who are A's friends' friends and are  ${}^m C_2$  in number.

$$\therefore \text{No. of members } n = 1 + m + \frac{m(m-1)}{2}$$

We know that the minimum value of  $n$  is 4, for  $m = 2$

For  $m = 3$ ,  $n = 1 + 3 + 3 = 7$

In that case the members are  $A, F_1, F_2, F_3, X_{12}, X_{13}$  and  $X_{23}$ .

$F_3$  cannot be  $X_{12}$ 's friend as condition 3 is violated with respect to  $A$  and  $X_{12}$ .

$X_{23}$  cannot be  $X_{12}$ 's friend as  $F_2, X_{12}$  and  $X_{23}$  form a triangle, which will violate condition 2. So  $X_{12}$  can have only 2 friends which contradicts the fact that every person has exactly  $m (= 3)$  friends.

For  $m = 4$ ,  $n = 1 + 4 + 6 = 11$

The members are  $A, F_1, F_2, F_3, F_4, X_{12}, X_{13}, X_{14}, X_{23}, X_{24}$  and  $X_{34}$

$X_{12}$ 's friends are  $F_1, F_2, X_{34}$ . Considering any other person as his friend violates condition 2 or 3 as in the above case. So he has only 3 friends and not 4.

So,  $n = 1$  is not valid.

Now, when  $m = 5$ ,  $n = 16$  and when  $m = 6$ ,  $n = 22$ .

But  $n < 22$ .

$\therefore m = 5$  is correct and  $n = 16$  members are there in the club. Hence, [D].

91. From the answer to the previous question, each person has exactly 5 friends. Hence, [C].
92. *Cozy\_travel*'s offer has on the whole the most number of positive points: it offers two free tickets; it allows a change of name on the free tickets (which means that they can be transferred to someone else); it does not restrict the travel time date for the free tickets; and it offers free air tickets on purchase of any kind of service, not just air tickets. So *Cozy\_travel* is most likely to become the most popular among travellers. Therefore, options [C] and [D] can be eliminated (note that though [D] is a good offer, its best feature – i.e. being applicable to anyone, even those who don't want to travel again in the near future – is not mentioned in the option). Among [A], [B] and [E], [B] mentions the main reason that the *Cozy\_travel* offer is most likely to become popular among travellers, i.e. people can transfer the free tickets to anyone else if they are not planning on using them themselves. Hence, [B].
93. [A] simply changes the airline from one to another. [B] simply reduces the refund period by a week. [D] adds just one more airline to the offer. [E] takes away the best feature of the *Cozy\_travel Offer*. [C] will allow customers to book tickets for any travel date, thus making it superior to the *Cool\_yatra Offer*. Hence, [C].
94. The date restrictions in [B], [C] and [E] definitely do not suit Jagan as *Cozy\_travel* requires that the request for free tickets be submitted at least 21 days in advance, whereas Jagan has at most 15 days. The date restrictions in [A] (i.e. Ek ke Sath Ek Offer) are not clearly stated. Either the main ticket has to be booked between 11 – 31 January or the free ticket has to be for those dates. The first scenario does not suit Jagan as his test is on 2nd January. The second scenario may suit Jagan if his interview date is on or before 31<sup>st</sup> January, and if he gets to know of the date 15 days beforehand. [D] is less restrictive than [A]. Even if his interview is after 31<sup>st</sup> January, Jagan could still use this offer. Hence, [D].

95. [E] will not allow any savings. [B] will allow savings of Gs. 800 only. The date restrictions of [A] do not suit Janaki. She could go for either [C] or [D] but [C] is better as she will become eligible for two free tickets. Hence, [C].

**Solutions for 96 to 98:**

For the given statements, we can conclude that there are 2 Engineers, 3 Teachers, and 1 Doctor, Let us tabulate the data as below by first writing the cities and then filling the remaining information as explained below the table:

From city	Getting down at	Age	Profession	Name
Chennai		35	Engineer	
Bengaluru	Koderma	> 35	Engineer	
Kochi		35	Teacher	
Kolkata		Oldest	Teacher	
Mumbai	Mughal Sarai	< 34	Teacher	Y
Hyderabad	Kanpur	31	Doctor	Z

Given that person from Chennai and Bengaluru all Engineers  
 Also, given that one of the teacher is from Kochi and the person from Mumbai is not Doctor. Thus, the person from Mumbai is Teacher. Also, given that person from Kolkata is oldest and so he cannot be the Doctor because Doctor is youngest among the six.

∴ Person from Kolkata is Teacher and person from Hyderabad is Doctor and he is Z.

The Doctor from Hyderabad is 31 years old.

∴ The Teacher from Kochi is 35 years old.

Now from 3<sup>rd</sup> condition Teacher from either Kochi or Mumbai got down at Mughal Sarai but from 7<sup>th</sup> condition person who got down at Mughal Sarai is less than 34 years old.

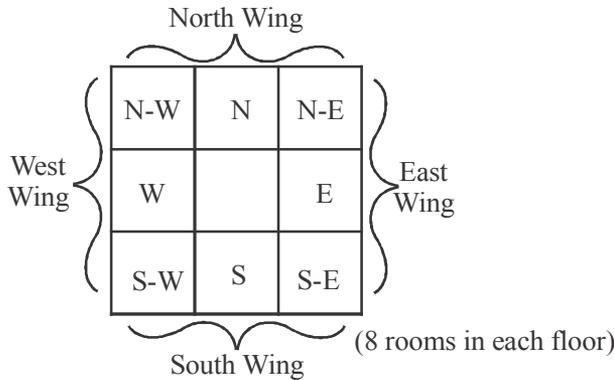
∴ Teacher from Mumbai got down at Mughal Sarai and he is Y.

From 6<sup>th</sup> condition, Engineer from Chennai is 35 years in age. Thus, person from Bengaluru is more than 35 years in age. Thus, from 4<sup>th</sup> condition, person from Bengaluru got down at Koderma and person from Hyderabad got down at Kanpur.

96. Only option E is right. Hence, [E].
97. From given condition, person from Kochi, Mumbai and Chennai cannot be from military background because they are not the eldest among the persons of same profession. Thus, person from Bengaluru, Kolkata and Hyderabad all the three persons from military background and thus, person from Kochi, Mumbai and Chennai joined as fresh graduates. Hence, [E].
98. From the given condition, W cannot be from Kolkata, Bengaluru or Chennai. Thus, she is from Kochi. Hence, [D].

**Solutions to questions 99 to 101:**

The arrangement of each room in ground floor and first floor is as shown below:



Now, there are 8 rooms on ground floor. So there are at least 8 students in ground floor. Therefore, there are at least  $8 \times 2 = 16$  students at first floor.

So, minimum number of students =  $8 + 16 = 24$

But in this case there cannot be 11 students in each wing.

Therefore number of students  $> 24$

Also, each wing has 11 students and there are 4 wings.

$\therefore$  Number of students =  $4 \times 11 = 44$ . But the students in corner rooms are counted twice. There are a total of 8 rooms at corners. Therefore, there are at least 8 students in the corner rooms.

$\therefore$  Maximum possible number of students =  $44 - 8 = 36$

But if total number of students = 36, number of students on ground floor = 12 and number of students on first floor = 24

But if number of students on first floor = 24, each room on first floor will have 3 students.

Also, each of the rooms on ground floor have at least one student. This will make number of students in each wing = at least  $3 \times 3 + 3 = 12$ , which is not possible.

Therefore, total number of students  $< 36$ .

Also, the total number of students expected as well as the number of students who actually came to rent are multiple of 3.

$\therefore$  These numbers can be 33, 30 or 27.

Now, if expected number of students = 33

Number of students in ground floor = 11 and

Number of students in first floor = 22

Now, in each wing number of students on first floor cannot be more than 8 (otherwise total number of students in each wing cannot be 11)

This can be done by keeping 2 students in two diagonally opposite corner rooms on first floor. But this will allow only one student in each of the rooms in ground floor which is not possible.

Thus, expected number of students cannot be 33 and number of students who actually came for rent = 27.

99. Hence, [B].

100. If N-W corner room has 2 students.  
Number of students on ground floor in North, West, South and East wings are 4, 4, 3 and 3 respectively.  
∴ Number of students on first floor in North, West, South and East wings are 7, 7, 8 and 8 respectively.  
∴ Now, number of students in corner rooms on first floor =  $(7 + 7 + 8 + 8 - 18) = 12$   
∴ Each of the corner rooms has 3 students.  
∴ Number of students in the middle room in the first floor of the East wing =  $8 - 3 - 3 = 2$   
Hence, [C].
101. There are a total number of 30 students with 10 on ground floor and 20 on first floor.  
Given that N-W corner room in the ground floor has 1 student.  
Therefore, N-E and S-W corner rooms on ground floor should have 2 students each, while S-E corner room on ground floor should have 1 student so that there are a total number of 10 students on ground floor.  
Also, in first floor, if we keep 2 students in each of the corner rooms, all the conditions will be satisfied. Hence, [B].

