SECTION I

Sub-section I-A: Number of Questions = 10

Note: Questions 1 to 10 carry one mark each.

Directions for Questions 1 to 5: Answer the questions independently of each other.

(1) If x = $(16^3 + 17^3 + 18^3 + 19^3)$, then x divided by 70 leaves a remainder of

    (1) 0   (2) 1   (3) 69   (4) 35

Sol. $a^3 + b^3 + c^3 + d^3$ is divisible by $(a + b + c + d)$

    $\therefore$ $16^3 + 17^3 + 18^3 + 19^3$ will be divisible by $16 + 17 + 18 + 19$ i.e. 70

    $\therefore$ remainder is 0. **Ans.(1)**

2. A chemical plant has four tanks (A, B, C and D), each containing 1000 litres of a chemical. The chemical is being pumped from one tank to another as follows:

    From A to B @ 20 litres/minute

    From C to A @ 90 litres/minute

    From A to D @ 10 litres/minute

    From C to D @ 50 litres/minute

    From B to C @ 100 litres/minute

    From D to B @ 110 litres/minute

    Which tank gets emptied first and how long does it take (in minutes) to get empty after pumping starts?

    (1) A, 16.66   (2) C, 20   (3) D, 20   (4) D, 25

Sol. For A quantity of water flowing per minutes is 90 – 10 – 20 = 60 liter.

    For B it is 110 – 100 + 20 = 30

    For C it is 100 – 90 – 50 = –40

    For D it is 10 + 50 – 110 = –50

    For D Tank will get emptied first in $\dfrac{1000}{50} = 20$ minutes. **Ans.(3)**

3. Two identical circles intersect so that their centres, and the points at which they intersect, form a square of side 1 cm. The area in sq. cm of the portion that is common to the two circles is

    (1) $\dfrac{\pi}{4}$ (2) $\dfrac{\pi}{2} - 1$ (3) $\dfrac{\pi}{5}$ (4) $\sqrt{2} - 1$

Sol. Since angle AOB is 90°

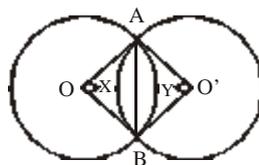   Area of segment A*B = area of sector – Area of triangle

    $\dfrac{90}{360}\pi 1^{(2)} - \dfrac{1}{2} * 1 * 1$

    $\dfrac{\pi}{4} - \dfrac{1}{2}$ sq. km

    Similarly area of segment AYB

    $= \left|\dfrac{\pi}{4} - \dfrac{1}{2}\right|$ sq. km

    Combined area $= 2 \times \left|\dfrac{\pi}{4} - \dfrac{1}{2}\right|$. **Ans.(2)**

4. A jogging park has two identical circular tracks touching each other, and a rectangular track enclosing the two circles. The edges of the rectangles are tangential to the circles. Two friends, A and B, start jogging simultaneously from the point where one of the circular tracks touches the smaller side of the rectangular track. A jogs along the rectangular track, while B jogs along the two circular tracks in a figure of eight. Approximately, how much faster than A does B have to run, so that they take the same time to return to their starting point?

(1) 3.88%   (2) 4.22%   3. 4.44%   (4) 4.72%

Sol. Let radius circle is r m.

∴ Length of a rectangle is 4r and breadth is 2r.

Total distance which A has to cover is $4(r + 2r) \times 2 = 12r$ m.

Total distance, which B has to cover is $2 \times 2\pi r = 4\pi r$ m.
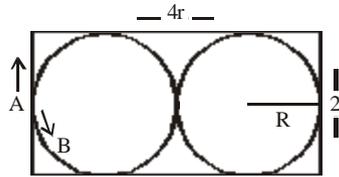
Let speed of A is 1m/sec and the speed of B is x m/sec

The time taken by both is equal

$$\frac{12r}{1} = \frac{4\pi r}{x}$$

$$x = \frac{\pi}{3} = \frac{22}{21}$$

B is faster than A by

$$= \frac{22}{21} \Big/ 1 - 1 \times 100 = \frac{100}{21} = 4.72\% . \textbf{ Ans.(4)}$$

5. In a chess competition involving some boys and girls of a school, every student had to play exactly one game with every other student. It was found that in 45 games both the players were girls, and in 190 games both were boys. The number of games in which one player was a boy and the other was a girl is

(1) 200   (2) 216   (3) 235   (4) 256

Sol. Let there are x boys & y girls

Total no. of games between boys are $^{x}C_2 = 190$

$$\frac{x(x-1)}{2} = 190 .$$

By solving this we get x = 20.

Similarly total games between girls = 45.

∴ y = 10.

Therefore no. of games in which one player was a boy and a girl = 20 × 10 = 200. **Ans.(1)**

Directions for Questions 6 and 7: Answer the questions on the basis of the information given below.

Ram and Shyam run a race between points A and B, 5 km apart. Ram starts at 9 a.m. from A at a speed of 5 km/hr, reaches B, and returns to A at the same speed. Shyam starts at 9:45 a.m. from A at a speed of 10 km/hr, reaches B and comes back to A at the same speed.

6. At what time do Ram and Shyam first meet each other?

(1) 10 a.m.   (2) 10:10 a.m.   (3) 10:20 a.m.   (4) 10:30 a.m.

Sol.

Ram start at 09:00 am @ 5 km/hr.

Shyam starts at 09:45 am when @ 10 km/hr.

At 10:00 am Ram is at point B and Shyam is at point C which is $2\frac{1}{2}$ km from A.

(∵ Distance covered by Shyam = 15 min × 10 km/hr = 2.5 km)

Now time when Ram and Shyam will meet

$$Time = \frac{Distance}{Speed} = \frac{2.5}{10+5} = \frac{2.5}{15} = \frac{1}{6} hrs = 10 \ min$$

∴ 10:00 + 10 min = 10:10 min. **Ans.(2)**

7. At what time does Shyam overtake Ram?

(1) 10:20 a.m.   (2) 10:30 a.m.   (3) 10:40 a.m.   (4) 10:50 a.m.

Sol. At 10:15am Shyam is at point B where as Ram has covered $1.25 \times 5 = 6(1/4)$ kms.

Ram will be $1(1/4)$ km away from point B.

Ram and Shyam will meet (or Shyam will overtake when Shyam will gain $1(1/4)$ km over Ram)

$$\therefore \text{Time} = \frac{1\frac{1}{4}}{10-5} = \frac{5}{4 \times 5} = \frac{1}{4} \text{ hrs} = 15 \text{ min}$$

$\therefore$ Time when Shyam overtakes = 10:15 + 15 min = 10:30 am. **Ans.(2)**

Directions for Questions 8 to 10: Answer the questions independently of each other.

8. If $R = \frac{30^{65} - 29^{65}}{30^{64} + 29^{64}}$ then

(1) $0 < R \leq 0.1$ (2) $0.1 < R \leq 0.5$ (3) $0.5 < R \leq 1.0$ (4) $R > 1.0$

Sol. $R = \frac{(30)^{65} - (29)^{65}}{(30)^{64} - (29)^{64}}$

$R = \frac{(30-29)(30)^{64} + (30)^{63} \times 29 + \dots + (29)^{64}}{(30)^{64} + (29)^{64}}$

$R = \frac{\left[(30)^{64} + (29)^{64}\right] + (30)^{63} \times 29 + \dots}{(30)^{64} + (29)^{64}}$

$R = 1 + \frac{(30)^{63} \times 29 + \dots}{(30)^{64} + (29)^{64}}$

$R > 1$. **Ans.(4)**

9. What is the distance in cm between two parallel chords of lengths 32 cm and 24 cm in a circle of radius 20 cm?

(1) 1 or 7   (2) 2 or 14   (3) 3 or 21   (4) 4 or 28

Sol. Let AB and CD are the words

then one from center will bisect the cord.

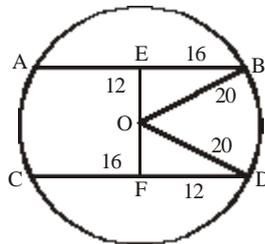$\therefore OB^2 = BE^2 + OE^2$

$20^2 = 16^2 + OE^2$

$OE^2 = 144$

$OE = 16.$

Similarly DF = 16.

Hence the distance between then = 16 + 12 = 28.

If the two cords are on the same side the distance is difference between 16 – 12 = 4. **Ans.(4)**

10. For which value of k does the following pair of equations yield a unique solution for x such that the solution is positive?

$x^2 - y^2 = 0$

$(x - k)^2 + y^2 = 1$

(1) 2 (2) 0 (3) $\sqrt{2}$ (4) $-\sqrt{2}$

Sol. $x^2 - y^2 = 0 \Rightarrow x^2 = y^2$ ....(1)

$(x - k)^2 + y^2 = 1$

$x^2 + k^2 - 2xk + y^2 = 1$

By equation (1)

$x^2 + k^2 - 2xk + x^2 = 1$

$2x^2 - 2xk + (k^2 - 1) = 0 \Rightarrow x = \dfrac{2k \pm \sqrt{4k^2 - 4 \times 2(k^2 - 1)}}{4}$

if this equation has a unique solution

∴ D = 0

$4k^2 - 4 \times 2 \times (k^2 - 1) = 0$

$k^2 - 2k^2 + 2 = 0$

$k^2 = 2$

$k = \pm\sqrt{2}$

We can take

$k = -\sqrt{2}$

Because then the solution is negative

∴$k = \sqrt{2}$. **Ans.(3)**

Sub-section I-B: Number of Questions = 20

Note: Questions 11 to 30 carry two marks each.

Directions for Questions 11 to 30: Answer the questions independently of each other.

11. Let n! = $1 \times 2 \times 3 \times ... \times n$ for integer n ≥ 1. If p = 1! (2 × 2!) + (3 × 3!) + ... + (10 × 10!), then p + 2 when divided by 11! leaves a remainder of
    (1) 10   (2) 0   (3) 7   (4) 1

Sol. If we take two terms in p

P = 1! + 2 * 2! = 1 + 4 = 5 $\Rightarrow$ p + 2 = 5 + 2 = 7.

This when divided by 3! gives a remainder 1.

Now take three terms

P = 1! + 2 * 2! + 3 * 3! = 1 + 4 + 18 = 23 + 2 = 25.

This when divided by 4! Remainder 1, hence if we take n terms and divided by (n + 1)! Remainder is 1.

Hence 1! + 2 * 2! + 3 * 3! .... 10 * 10!. When divided by 11! Will give a remainder 1. **Ans.(4)**

12. Consider a triangle drawn on the X-Y plane with its three vertices at (41, 0), (0, 41) and (0, 0), each vertex being represented by its (X, Y) coordinates. The number of points with integer coordinates inside the triangle (excluding all the points on the boundary) is
    (1) 780   (2) 800   (3) 820   (4) 741

Sol. The number of integral solutions will be no. of integers satisfying x + y < 41.

So we have co-ordinates from,

(1, 1) (1, 2) (1, 3) .... (1, 39) - 39 points.

(2, 1) (2, 2) (2, 3) .... (2, 38) - 38 points

⋮

(40, 40) .... - 1 points.

So the total number of integral points inside the triangle = 39 + 38 +....1

= 39 × 40/2 = 780. **Ans.(1)**

13. The digits of a three-digit number A are written in the reverse order to form another three-digit number B. If B > A and B-A is perfectly divisible by 7, then which of the following is necessarily true?
    (1) 100 < A < 299   (2) 106 < A < 305   (3) 112 < A < 311   (4) 118 < A < 317

Sol. If the three digit no. is A is 'abc' such that c > a because the no. formed by reversing the digits

B i.e. 'cba' is greater than A then B-A = 100c + 10b + a − 100a − 10b − c

= 99c − 99a = 99(c − a).

To be a multiple of 7, (c − a) should be a multiple of 7. So two possible values of c & a are (8, 1) and (9, 2).

So minimum & maximum values of A are 108 and 299. Hence **Ans.(2)**

14. If $a_1 = 1$ and $a_{n+1} - 3a_n + 2 = 4n$ for every positive integer n, then a_{100} equals
    (1) $3^{99} - 200$ (2) $3^{99} + 200$ (3) $3^{100} - 200$ (4) $3^{100} + 200$

Sol. Given $a_1 = 1$

$a_{n+1} - 3a_n + 2 = 4n$ ....(1)

$a_1 = 3^1 - 2 \times 1$

Put n = 1 in equation (1)

$\Rightarrow a_2 - 3a_1 + 2 = 4 \times 1$

$\Rightarrow a_2 - 3 \times 1 + 2 = 4$

$\Rightarrow a_2 = 5$

$= 3^2 - 2 \times 2$.

Put n = 2 in equation (1)

$a_3 - 3a_2 + 2 = 4 \times 2$

$a_3 - 3 \times 5 + 2 = 8$

$a_3 = 21$

$= 27 - 6 = 3^3 - 2 \times 3$.

∴ By mathematical induction

$a_{100} = 3^{100} - 2 \times 100$

$3^{100} - 200$. **Ans.(3)**

15. Let S be the set of five-digit numbers formed by the digits 1, 2, 3, 4 and 5, using each digit exactly once such that exactly two odd positions are occupied by odd digits. What is the sum of the digits in the rightmost position of the numbers in S?

    (1)   228   (2)   216   (3)   294   (4)   192

Sol. Case 1. Last digit is even.

Position 1st 2nd 3rd 4th 5th

Of last digit is even, we are left with two even places and two odd places

$\Rightarrow$ We have to arrange two odd nos. from three odd nos. which can be done in 3_{p_2} ways.

Now, 1 even digit can be arranged in 21 ways

$\therefore$ Sum = 3_{p_2} $\times 2! \times (2 + 4)$

= $3! \times 2! \times 6 = 72$. Ways   ....(1)

Case 2. Last digit is odd.

From the rest four positions,

Choosing one odd out of 2 in $^2C_1$ ways

Selecting one odd digit of 2 in $^2C_1$ ways

Balance odd in 2 even places in $^2C_1$ ways

$\therefore$ Sum = $2 \times 2 \times 2 \times 2 \times (5 + 3 + 1) = 144$ ways

$\therefore$ So the required sum is $72 + 144 = 216$ ways. **Ans.(2)**

16. The rightmost non-zero digit of the number 30^{2720} is

    (1)   1   (2)   3   (3)   7   (4) 9

Sol. $30^{2720} = 3^{2720} \times 10^{2720}$

Check the power cycle 3. 30^{2720} will end with 1.

Hence the product will end with 1 followed by 2720 zeros. **Ans.(1)**

17. Four points A, B, C and D lie on a straight line in the X-Y plane, such that AB = BC = CD, and the length of AB is 1 metre. An ant at A wants to reach a sugar particle at D. But there are insect repellents kept at points B and C. The ant would not go within one metre of any insect repellent. The minimum distance in metres the ant must traverse to reach the sugar particle is

    (1) $3\sqrt{2}$ (2) $1 + \pi$ (3) $\dfrac{4\pi}{3}$ (4)   5

Sol. The ant will go through the path ABCD

Length of arc AB $\dfrac{1}{4} \times 2\pi r = \dfrac{\pi}{2}$

Arc CD $\dfrac{\pi}{2}$

Similarly arc CD = $\dfrac{\pi}{2}$

$ABCD = \dfrac{\pi}{2} + 1 + \dfrac{\pi}{2} = \pi + 1$. **Ans.(2)**

18. If $x \geq y$ and $y > 1$, then the value of the expression $\log_x\left(\dfrac{x}{y}\right) + \log_y\left(\dfrac{y}{x}\right)$ can never be

    (1) -1 (2) -0.5 (3)   0   (4)   1

Sol. $x \geq y$, $y > 1$

Then A = $\log_x\left(\dfrac{x}{y}\right) + \log_y\left(\dfrac{y}{x}\right)$

$= \dfrac{\log\left(\dfrac{x}{y}\right)}{\log x} + \dfrac{\log\left(\dfrac{y}{x}\right)}{\log y}$

$= \dfrac{\log x - \log y}{\log x} + \dfrac{\log y - \log x}{\log y}$

= $1 - \log_x y + 1 - \log_y x$

= $2 - \log_x y - \log_y x$

A = $2 - (\log_x y + \log_y x)$

Now since x ≥ y, y > 1

Then $\log_y x \geq 1$

Since $\log_x y$ is not negative

∴ $(\log_x y + \log_y x) > 1$

∴ $(\log_x y + \log_y x) > 1$

∴ $\log_x y + \log_y x \neq 1$

∴ A ≠ 2 − 1 = 1. **Ans.(4)**

19. For a positive integer n, let p_n denote the product of the digits of n, and s_n denote the sum of the digits of n. The number of integers between 10 and 1000 for which $p_n + s_n = n$ is

(1)　81　　　　　　　　　(2)　16　　　　　　　　　(3)　18　　　　　　　　　(4)　9

Sol. Let n be 2 digit number 10x + y

$P_n = xy$　　　$S_n = x + y$　　　　　n = 10x + y

⇒ xy + x + y = 10x + y

⇒ xy = 9x

⇒ y = 9.

∴ If we keep value of y as 9, then x can take any single digit value for ex: 19, 29.

∴ There are 9 values.

Now when n is three digit numbers then

xyz + x + y + z = 100x + 10y + z

xyz = 99x + 9y

xyz − 9y = 99x

y(xz − 9) = 99x.

Now if we take maximum value of y to be 9 then

xz − 9 = 11x

x(z − 11) = 9.

Which is not possible, hence no such three digit number exist. **Ans.(4)**

20. Rectangular tiles each of size 70 cm by 30 cm must be laid horizontally on a rectangular floor of size 110 cm by 130 cm, such that the tiles do not overlap. A tile can be placed in any orientation so long as its edges are parallel to the edges of the floor. No tile should overshoot any edge of the floor. The maximum number of tiles that can be accommodated on the floor is

(1)　4　　　　　　　　　(2)　5　　　　　　　　　(3)　6　　　　　　　　　(4)　7

Sol. The position will be like this
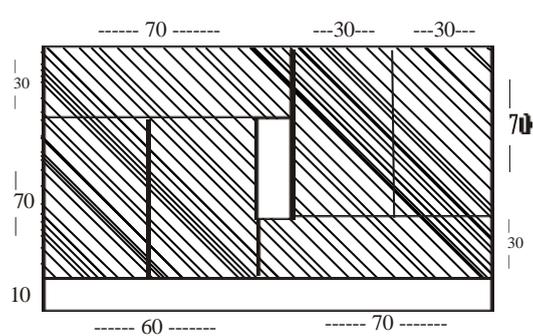
Total 6 tiles. **Ans.(3)**

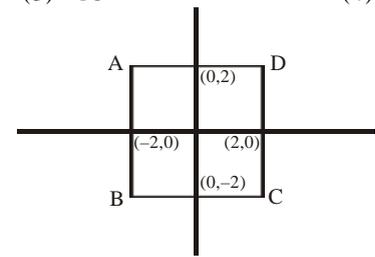21. In the X-Y plane, the area of the region bounded by the graph of |x + y| + |x − y| = 4 is

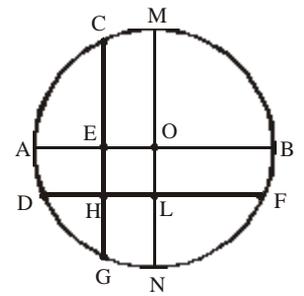(1)　8　　　　　　　　　(2)　12　　　　　　　　　(3)　16　　　　　　　　　(4)　20

Sol. (x + y) + (x − y) = 4

The equations are

1　(x + y) + (x − y) = 4 or x = 2

2　(x + y) + (y − x) = 4 or y = 2

3　(−x − y) + (x − y) = 4 or y = −2

4　(−x − y) + (y − x) = 4 or x = −2

Area = (4^2) = 16. **Ans.(3)**

22. In the following figure, the diameter of the circle is 3 cm. AB and MN are two diameters such that MN is perpendicular to AB. In addition, CG is perpendicular to AB such that AE:EB = 1:2, and DF is perpendicular to MN such that NL:LM = 1:2. The length of DH in cm is

(1) $2\sqrt{2}-1$

(2) $\dfrac{\left(2\sqrt{2}-1\right)}{2}$

(3) $\dfrac{\left(3\sqrt{2}-1\right)}{2}$

(4) $\dfrac{\left(2\sqrt{2}-1\right)}{3}$

Sol. Radius 3/2 cm

AB = 3 cm

AE : EB = 1: 2

AE = 1 and OE = $\dfrac{3}{2}-1=\dfrac{1}{2}$ cm

HL = $\dfrac{1}{2}$

Similarly OL = 1/2

Let OH = x and OD = $\dfrac{3}{2}$ radius

in Δ ODL by Pythagoras theorem

$OD^2 = DL^2 + DL^2$

$\left(\dfrac{3}{2}\right)^2 = \left(\dfrac{1}{2}\right)^2 + \left(x+\dfrac{1}{2}\right)^2$
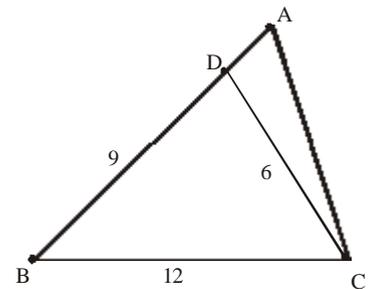
$x = \dfrac{2\sqrt{2}-1}{2}$. **Ans.(2)**
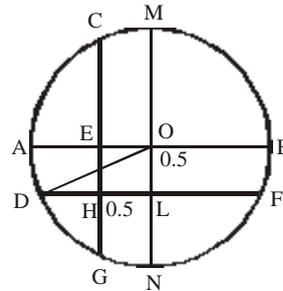
23. Consider the triangle ABC shown in the following figure where

BC = 12 cm, DB = 9 cm,

CD = 6 cm and $\angle BCD = \angle BAC$.

What is the ratio of the perimeter of the triangle ADC to that of the triangle BDC?

(1) $\dfrac{7}{9}$

(2) $\dfrac{8}{9}$

(3) $\dfrac{6}{9}$

(4) $\dfrac{5}{9}$

Sol. In Δ BCD and Δ ABC

$\angle BCD = \angle BAC$

$\angle ABC = \angle CBD$

$\Delta ABC \sim \Delta CBD$

$\Rightarrow \dfrac{AB}{BC} = \dfrac{BC}{BD} = \dfrac{AC}{CD}$

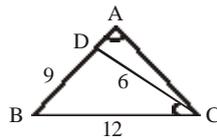$\Rightarrow \dfrac{AB}{12} = \dfrac{12}{9} = \dfrac{AC}{6}$

$\Rightarrow$ AB = 16, AC = 8

$\therefore$ AD = 7.

Perimeter of Δ ADC = 7 + 8 + 6 = 21

Perimeter of Δ BCD = 6 + 9 + 12 = 27

$\therefore$ Required ratio = 21:27 = 7:9. **Ans.(1)**

24. P, Q, S, and R are points on the circumference of a circle of radius r, such that PQR is an equilateral triangle and PS is a diameter of the circle. What is the perimeter of the quadrilateral PQSR?

(1) $2r(1+\sqrt{3})$ (2) $2r(2+\sqrt{3})$ (3) $r(1+\sqrt{5})$ (4) $2r+\sqrt{3}$

Sol. $\angle QPO = 30°$

∴ $\angle QOS = 60$ (angle at the center)

∴ $\angle OQS = \angle OSQ = 60$

∴ $QS = r$

$\angle POQ = 120$
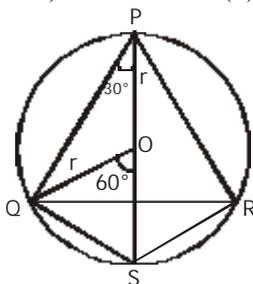
By sine rule

$$\frac{\sin 30}{r} = \frac{\sin 120}{pq}$$

$$\frac{1}{2r} = \frac{\sqrt{3}}{2*PQ}$$

$PQ = r\sqrt{3}$.

Perimeter = $r\sqrt{3} + r\sqrt{3} + r + r = 2r(\sqrt{3}+1)$. **Ans.(1)**

25. Let S be a set of positive integers such that every element n of S satisfies the conditions
a) $1000 \le n \le 1200$
b) every digit in n is odd
Then how many elements of S are divisible by 3?
(1) 9   (2) 10   (3) 11   (4) 12

Sol. The nos. are 1113, 1119, 1131, 1137, 1155, 1173, 1179, 1191, 1197 Total 9. **Ans.(1)**
Note: '0' should not be there because it is an odd.

26. Let $x = \sqrt{4+\sqrt{4-\sqrt{4+\sqrt{4-... \text{ to infinity}}}}}$. Then x equals

(1) 3   (2) $\left|\frac{\sqrt{13}-1}{2}\right|$ (3) $\left|\frac{\sqrt{13}+1}{2}\right|$ (4) $\sqrt{13}$

Sol. By the value given of x in question

$x = \sqrt{4+\sqrt{4-x}}$

$x^2 = 4+\sqrt{4-x}$

$x^2 - 4 = \sqrt{4-x}$

$(x^2 - 4)^2 = 4 - x$

Now go by options. On putting option (3) in the above equation it satisfied both the sides.
That is L.H.S. = R.H.S. for option (3). **Ans.(3)**

27. Let g(x) be a function such that g(x + 1) + g(x – 1) = g(x) for every real x. Then for what value of p is the relation g(x + p) = g(x) necessarily true for every real x?
(1) 5   (2) 3   (3) 2   (4) 6

Sol. g(x + 1) + g(x – 1) = g(x)
g(x + 1) = g(x) – g(x – 1)
Checking by options
g(x + 6) = g(x + 5) – g(x + 4)
[g(x = 4) – g(x + 3)] – g(x + 4)
= –g(x + 3)
= – [g(x + 2) – g(x + 2)]
= – [g(x + 1) – g(x) – g(x + 1)]
= – [–g(x)]
= g(x). **Ans.(4)**

28. A telecom service provider engages male and female operators for answering 1000 calls per day. A male operator can handle 40 calls per day whereas a female operator can handle 50 calls per day. The male and the female operators get a fixed wage of Rs.250 and Rs.300 per day respectively. In addition, a male operator gets Rs.15 per call he answers and a female operator gets Rs.10 per call she answers. To minimize the total cost, how many male operators should the service provider employ assuming he has to employ more than 7 of the 12 female operators available for the job?

(1) 15   (2) 14   (3) 12   (4) 10

Sol. By the condition given in question.

Each male operator get Rs.250/40 = Rs.6.25 for one call and

each female operator get Rs.300/50 = Rs.6 for one call.

So, female operator is cheaper than man to minimize one should use the maximum possible number of female operators. The telecom service provider engages maximum 12 female operator, which will answer $12 \times 50 = 600$ calls. The remaining 400 calls will be answered by 10 operators. **Ans.(4)**

29. Three Englishmen and three Frenchmen work for the same company. Each of them knows a secret not known to others. They need to exchange these secrets over person-to-person phone calls so that eventually each person knows all six secrets. None of the Frenchmen knows English, and only one Englishman knows French. What is the minimum number of phone calls needed for the above purpose?

(1) 5   (2) 10   (3) 9   (4) 15

Sol. For min number of phone calls let

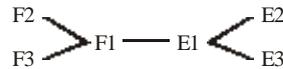|	
E2 & E3 converse individually	-- 2 calls
F2 & F3 converse to F1	-- 2 calls
E1 & F1 interchange their code	--1 call
Now F1 calls F2 & F3	--2 calls
and E1 calls to E2 & E3	--2 calls

Total calls = 2 + 2 + 1 + 2 + 2 = 9. **Ans.(3)**

30. A rectangular floor is fully covered with square tiles of identical size. The tiles on the edges are white and the tiles in the interior are red. The number of white tiles is the same as the number of red tiles. A possible value of the number of tiles along one edge of the floor is

(1) 10   (2) 12   (3) 14   (4) 16

Sol. Let, the rectangular floor has breadth x and length y.

Then by the condition given in question

$2x + 2(y - 2) + (x - 2)(y - 2) = xy$

$\Rightarrow y = \dfrac{2x}{x - 4} + 2$

When x = 4, y = 2

       x = 5   y = 12. **Ans.(2)**

SECTION II

Sub section 1I-A: Number of Questions = 10

Note: Questions 31 to 40 carry one mark each.

Directions for Questions 31 to 34: The passage given below is followed by a set of four questions. Choose the best answer to each question.

A game of strategy, as currently conceived in game theory, is a situation in which two or more "players" make choices among available alternatives (moves). The totality of choices determines the outcomes of the game, and it is assumed that the rank order of preferences for the outcomes is different for different players. Thus the "interests" of the players are generally in conflict. Whether these interests are diametrically opposed or only partially opposed depends on the type of game.

Psychologically, most interesting situations arise when the interests of the players are partly coincident and partly opposed, because then one can postulate not only a conflict among the players but also inner conflicts within the players. Each is torn between a tendency to cooperate, so as to promote the common interests, and a tendency to compete, so as to enhance his own individual interests.

Internal conflicts are always psychologically interesting. What we vaguely call "interesting" psychology is in very great measure the psychology of inner conflict. Inner conflict is also held to be an important component of serious literature as distinguished from less serious genres. The classical tragedy, as well as the serious novel, reveals the inner conflict of central figures. The superficial adventure story, on the other hand, depicts only external conflict; that is, the threats to the person with whom the reader (or viewer) identifies stem in these stories exclusively from external obstacles and from the adversaries who create them. On the most primitive level this sort of external conflict is psychologically empty. In the fisticuffs between the protagonists of good and evil, no psychological problems are involved or, at any rate, none are depicted in juvenile representations of conflict.

The detective story, the "adult" analogue of a juvenile adventure tale, has at times been described as a glorification of intellectualized conflict. However, a great deal of the interest in the plots of these stories is sustained by withholding the unraveling of a solution to a problem. The effort of solving the problem is in itself not a conflict if the adversary (the unknown criminal) remains passive, like Nature, whose secrets the scientist supposedly unravels by deduction. If the adversary actively puts obstacles in the detective's path toward the solution, there is genuine conflict. But the conflict is psychologically interesting only to the extent that it contains irrational components such as a tactical error on the criminal's part or the detective's insight into some psychological quirk of the criminal or something of this sort. Conflict conducted in a perfectly rational manner is psychologically no more interesting than a standard Western. For example, Tic-tac-toe, played perfectly by both players, is completely devoid of psychological interest. Chess may be psychologically interesting but only to the extent that it is played not quite rationally. Played completely rationally, chess would not be different from Tic-tac-toe.

In short, a pure conflict of interest (what is called a zero-sum game) although it offers a wealth of interesting conceptual problems, is not interesting psychologically, except to the extent that its conduct departs from rational norms.

31. According to the passage, internal conflicts are psychologically more interesting than external conflicts because
    (1) internal conflicts, rather than external conflicts, form an important component of serious literature as distinguished from less serious genres.
    (2) only juveniles or very few "adults" actually experience external conflict, while internal conflict is more widely prevalent in society.
    (3) in situations of internal conflict, individuals experience a dilemma in resolving their own preferences for different outcomes.
    (4) there are no threats to the reader (or viewer) in case of external conflicts.
Sol. Para 3 explains the notion that internal conflicts are more interesting as they involve psychological dilemma. External conflicts on the other hand, do not offer same. Hence **Ans.(3)**

32. Which, according to the author, would qualify as interesting psychology?
    (1) A statistician's dilemma over choosing the best method to solve an optimisation problem.
    (2) A chess player's predicament over adopting a defensive strategy against an aggressive opponent.
    (3) A mountaineer's choice of the best path to Mt. Everest from the base camp.
    (4) A finance manager's quandary over the best way of raising money from the market.
Sol. Only option 2 offers the situation where two parties with multi-option preference situation face each other and make choices among available alternatives. It also involves psychological dilemma. Hence it would certainly qualify as interesting psychology. **Ans.(2)**

33. According to the passage, which of the following options about me application of game theory to a conflict-of-interest situation is true?
    (1) Assuming that the rank order of preferences for options is different for different players.
    (2) Accepting that the interests of different players are often in conflict.
    (3) Not assuming that the interests are in complete disagreement.
    (4) All of the above.
Sol. Para 1 of the passage clearly contains all the options. Hence **Ans.(4)**

34. The problem solving process of a scientist is different from that of a detective because
    (1)   scientists study inanimate objects, while detectives deal with living criminals or law offenders.
    (2)   scientists study known objects, while detectives have to deal with unknown criminals or law offenders.
    (3)   scientists study phenomena that are not actively altered, while detectives deal with phenomena that have been deliberately influenced to mislead.
    (4)   scientists study psychologically interesting phenomena, while detectives deal with "adult" analogues of juvenile adventure tales.

Sol. The question asks the fundamental difference between the processes adopted by a scientist and a defective while solving a problem. Para 4 clearly mentions the point that it is the "alteration" element, which makes a scientist's problem solving different from a defective. **Ans.(3)**

Directions for Questions 35 to 37: The sentences given in each question, when properly sequenced, form a coherent paragraph. Each sentence is labeled with a letter. Choose the most logical order of sentences from among the given choices to construct a coherent paragraph.

35. (A)   Similarly, turning to caste, even though being lower caste is undoubtedly a separate cause of disparity, its impact is all the greater when the lower-caste families also happen to be poor.
    (B)   Belonging to a privileged class can help a woman to overcome many barriers that obstruct women from less thriving classes.
    (C)   It is the interactive presence of these two kinds of deprivation - being low class and being female - that massively impoverishes women from the less privileged classes.
    (D)   A congruence of class deprivation and gender discrimination can blight the lives of poorer women very severely.
    (E)   Gender is certainly a contributor to societal inequality, but it does not act independently of class.
       (1)   EABDC   (2)   EBDCA   (3)   DAEBC   (4)   BECDA

Sol. EB is the clue & 'A' will be last statement as it talks about 'Caste' which is a distinct factor from 'Class' that has been discussed in the passage. **Ans.(2)**

36. (A)   When identity is thus 'defined by contrast', divergence with the West becomes central.
    (B)   Indian religious literature such as the Bhagavad Gita or the Tantric texts, which are identified as differing from secular writings seen as 'western', elicits much greater interest in the West than do other Indian writings, including India's long history of heterodoxy.
    (C)   There is a similar neglect of Indian writing on non-religious subjects, from mathematics, epistemology and natural science to economics and linguistics.
    (D)   Through selective emphasis that point up differences with the West, other civilizations can, in this way, be redefined in alien terms, which can be exotic and charming, or else bizarre and terrifying, or simply strange and engaging.
    (E)   The exception is the Kamasutra in which western readers have managed to cultivate an interest.
       (1)   BDACE   (2)   DEABC   (3)   BDECA   (4)   BCEDA

Sol. CE is the mandatory Pair. Hence we have two choices (1) & (4). Statement A is a conclusive statement that should come at the last of the paragraph. Therefore **Ans.(4)**

37. (A)   This is now orthodoxy to which I subscribe - up to a point.
    (B)   It emerged from the mathematics of chance and statistics.
    (C)   Therefore the risk is measurable and manageable.
    (D)   The fundamental concept: Prices are not predictable, but the mathematical laws of chance can describe their fluctuations.
    (E)   This is how what business schools now call modern finance was born.
       (1)   ADCBE   (2)   EBDCA   (3)   ABDCE   (4)   DCBEA

Sol. E is the starting statement, which initiates the idea. Hence **Ans.(2)**

Directions for Questions 38 to 40: In each question, the word at the top of the table is used in four different ways, numbered 1 to 4. Choose the option in which the usage of the word is incorrect or inappropriate.

38. NEAR

(1)	I got there just after you left - a near miss!
(2)	She and her near friend left early.
(3)	The war led to a near doubling of oil prices.
(4)	They came near to tears seeing the plight of the victims.

Sol. The usage "near friend" is inappropriate. Hence (2) should be the answer. **Ans.(2)**

39. HAND

(1)	I have my hand full, I cannot do it today.
(2)	The minister visited the jail to see the breach at first hand.
(3)	The situation is getting out of hand here!
(4)	When the roof of my house was blown away, he was willing to lend me a hand.

Sol. The correct phase will be hands full in option (1). **Ans.(1)**

40. FOR

(1)	He has a great eye for detail.
(2)	We are waiting for the day.
(3)	I can't bear for her to be angry.
(4)	It couldn't be done for ever.

Sol. Answer is (3). Bear for her incorrect & doesn't hold any meaning. **Ans.(3)**

Directions for Questions 41 to 48: Each of the two passages given below is followed by a set of four questions. Choose the best answer to each question.

PASSAGE I

Crinoline and croquet are out. As yet, no political activists have thrown themselves in front of the royal horse on Derby Day. Even so, some historians can spot the parallels. It is a time of rapid technological change. It is a period when the dominance of the world's superpower is coming under threat. It is an epoch when prosperity masks underlying economic strain. And, crucially, it is a time when policy-makers are confident that all is for the best in the best of all possible worlds. Welcome to the Edwardian Summer of the second age of globalisation.

Spare a moment to take stock of what's been happening in the past few months. Let's start with the oil price, which has rocketed to more than $65 a barrel, more than double its level 18 months ago. The accepted wisdom is that we shouldn't worry our little heads about that, because the incentives are there for business to build new production and refining capacity, which will effortlessly bring demand and supply back into balance and bring crude prices back to S25 a barrel. As Tommy Cooper used to say, 'just like that'.

Then there is the result of the French referendum on the European Constitution, seen as thick-headed luddites railing vainly against the modern world. What the French needed to realise, the argument went, was that there was no alternative to the reforms that would make the country more flexible, more competitive, more dynamic. Just the sort of reforms that allowed Gate Gourmet to sack hundreds of its staff at Heathrow after the sort of ultimatum that used to be handed out by Victorian mill owners. An alternative way of looking at the French non" is that our neighbours translate "flexibility" as "you're fired".

Finally, take a squinl at the United States. Just like Britain a century ago, a period of unquestioned superiority is drawing to a close. China is still a long way from matching America's wealth, but it is growing at a stupendous rate and economic strength brings geo-political clout. Already, there is evidence of a new scramble for Africa as Washington and Beijing compete for oil stocks. Moreover, beneath the surface of the US economy, all is not well. Growth looks healthy enough, but the competition from China and elsewhere has meant the world's biggest economy now imports far more than it exports. The US is living beyond its means, but in this time of studied complacency a current account deficit worth 6 percent of gross domestic product is seen as a sign of strength, not weakness.

In this new Edwardian summer, comfort is taken from the fact that dearer oil has not had the savage inflationary consequences of 1973-74, when a fourfold increase in the cost of crude brought an abrupt end to a postwar boom that had gone on uninterrupted for a quarter of a century. True, the cost of living has been affected by higher transport costs, but we are talking of inflation at 2.3 per cent and not 27 per cent. Yet the idea that higher oil prices are of little consequence is fanciful. If people are paying more to fill up their cars it leaves them with less to spend on everything else, but there is a reluctance to consume less. In the 1970s unions were strong and able to negotiate large, compensatory pay deals that served to intensify inflationary pressure. In 2005, that avenue is pretty much closed off, but the abolition of all the controls on credit that existed in the 1970s means that households are invited to borrow more rather than consume less. The knock-on effects of higher oil prices are thus felt in different ways - through high levels of indebtedness, in inflated asset prices, and in balance of payments deficits.

There are those who point out, rightly, that modern industrial capitalism has proved mightily resilient these past 250 years, and that a sign of the enduring strength of the system has been the way it apparently shrugged off everything - a stock market crash, 9/11, rising oil prices - that have been thrown at it in the half decade since the millennium. Even so, there are at least three reasons for concern. First, we have been here before. In terms of political economy, the first era of globalisation mirrored our own. There was a belief in unfettered capital flows, in free trade, and in the power of the market. It was a time of massive income inequality and unprecedented migration. Eventually, though, there was a backlash, manifested in a struggle between free traders and protectionists, and in rising labour militancy.

Second, the world is traditionally at its most fragile at times when the global balance of power is in flux. By the end of the nineteenth century, Britain's role as the hegemonic power was being challenged by the rise of the United States, Germany, and Japan while the Ottoman and Hapsburg empires were clearly in rapid decline, Looking ahead from 2005, it is clear that over the next two or three decades, both China and India - which together account for half the world's population - will flex their muscles.

Finally, there is the question of what rising oil prices tell us. The emergence of China and India means global demand for crude is likely to remain high at a time when experts say production is about to top out. If supply constraints start to bite, any declines in the price are likely to be short-term cyclical affairs punctuating a long upward trend.

41. By the expression 'Edwardian Summer', the author refers to a period in which there is
    (1) unparalleled luxury and opulence.
    (2) a sense of complacency among people because of all-round prosperity.
    (3) a culmination of all-round economic prosperity.
    (4) an imminent danger lurking behind economic prosperity.
Sol. **Ans.(4)**

42. What, according to the author, has resulted in a widespread belief in the resilience of modern capitalism?
    (1) Growth in the economies of Western countries despite shocks in the form of increase in levels of indebtedness and inflated asset prices.
    (2) Increase in the prosperity of Western countries and China despite rising oil prices.
    (3) Continued growth of Western economies despite a rise in terrorism, an increase in oil prices and other similar shocks.
    (4) The success of continued reforms aimed at making Western economies more dynamic, competitive and efficient.
Sol. Option three is correct as it figures in the sixth para. Other options are not appropriate. **Ans.(3)**

43. Which of the following best represents the key argument made by the author?
    (1) The rise in oil prices, the flux in the global balance of power and historical precedents should make us question our belief that the global economic prosperity would continue.
    (2) The belief that modern industrial capitalism is highly resilient and capable of overcoming shocks will be belied soon.
    (3) Widespread prosperity leads to neglect of early signs of underlying economic weakness, manifested in higher oil prices and a flux in the global balance of power.
    (4) A crisis is imminent in the West given the growth of countries like China and India and the increase in oil prices.
Sol. Option three represents the best, as it is evident from the first three paragraphs. **Ans.(3)**

44. What can be inferred about the author's view when he states, 'As Tommy Cooper used to say "just like that'"?
    (1) Industry has incentive to build new production and refining capacity and therefore oil prices would reduce.
    (2) There would be a correction in the price levels of oil once new production capacity is added.
    (3) The decline in oil prices is likely to be short-term in nature.
    (4) It is not necessary that oil prices would go down to earlier levels.
Sol. Option four is the best as it is clearly explained in the second paragraphs. **Ans.(4)**

PASSAGE II

While complex in the extreme, Derrida's work has proven to be a particularly influential approach to the analysis of the ways in which language structures our understanding of ourselves and the world we inhabit, an approach he termed deconstruction. In its simplest formulation, deconstruction can be taken to refer to a methodological strategy which seeks to uncover layers of hidden meaning in a text that have been denied or suppressed. The term 'text', in this respect, does not refer simply to a written form of communication, however. Rather, texts are something we all produce and reproduce constantly in our everyday social relations, be they spoken, written or embedded in the construction of material artifacts. At the heart of Derrida's deconstructive approach is his critique of what he perceives to be the totalitarian impulse of the Enlightenment pursuit to bring all that exists in the world under the domain of a representative language, a pursuit he refers to as logocentrism. Logocentrism is the search for a rational language that is able to know and represent the world and all its aspects perfectly and accurately. Its totalitarian dimension, for Derrida at least, lies primarily in its tendency to marginalize or dismiss all that does not neatly comply with its particular linguistic representations, a tendency that, throughout history, has all too frequently been manifested in the form of authoritarian institutions. Thus logocentrism has, in its search for the truth of absolute representation, subsumed difference and oppressed that which it designates as its alien 'other'. For Derrida, western civilization has been built upon such a systematic assault on alien cultures and ways of life, typically in the name of reason and progress.

In response to logocentrism, deconstruction posits the idea that the mechanism by which this process of marginalization and the ordering of truth occurs is through establishing systems of binary opposition. Oppositional linguistic dualisms, such as rational/irrational, culture/nature and good/bad are not, however, construed as equal partners as they are in, say, the semiological structuralism of Saussure. Rather, they exist, for Derrida, in a series of hierarchical relationships with the first term normally occupying a superior position. Derrida defines the relationship between such oppositional terms using the neologism differance. This refers to the realization that in any statement, oppositional terms differ from each other (for instance, the difference between rationality and irrationality is constructed through oppositional usage), and at the same time, a hierarchical relationship is maintained by the deference of one term to the other (in the positing of rationality over irrationality, for instance). It is this latter point which is perhaps the key to understanding Derrida's approach to deconstruction,

For the fact that at any given time one term must defer to its oppositional 'other', means that the two terms are constantly in a state of interdependence. The presence of one is dependent upon the absence or 'absent-presence' of the 'other', such as in the case of good and evil, whereby to understand the nature of one, we must constantly relate it to the absent term in order to grasp its meaning. That is, to do good, we must understand that our act is not evil for without that comparison the term becomes meaningless. Put simply, deconstruction represents an attempt to demonstrate the absent-presence of this oppositional 'other', to show that what we say or write is in itself not expressive simply of what is present, but also of what is absent. Thus, deconstruction seeks to reveal the interdependence of apparently dichotomous terms and their meanings relative to their textual context; that is, within the linguistic power relations which structure dichotomous terms hierarchically. In Derrida's own words, a deconstructive reading "must always aim at a certain relationship, unperceived by the writer, between what he commands and what he does not command of the patterns of a language that he uses. . . .[It] attempts to make the not-seen accessible to sight."

Meaning, then, is never fixed or stable, whatever the intention of the author of a text. For Derrida, language is a system of relations that are dynamic, in that all meanings we ascribe to the world are dependent not only on what we believe to be present but also on what is absent. Thus, any act of interpretation must refer not only to what the author of a text intends, but also to what is absent from his or her intention. This insight leads, once again, to Derrida's further rejection of the idea of the definitive authority of the intentional agent or subject. The subject is decentred; it is conceived as the outcome of relations of differance. As author of its own biography, the subject thus becomes the ideological fiction of modernity and its logocentric philosophy, one that depends upon the formation of hierarchical dualisms, which repress and deny the presence of the absent 'other'. No meaning can, therefore, ever be definitive, but is merely an outcome of a particular interpretation.

45. According to the passage, Derrida believes that
   (1) Reality can be construed only through the use of rational analysis.
   (2) Language limits our construction of reality.
   (3) A universal language will facilitate a common understanding of reality.
   (4) We need to uncover the hidden meaning in a system of relations expressed by language.
Sol. Paragraph 1st (Middle part) talks about the Derrida's deconstructive approach. **Ans.(4)**

46. To Derrida, 'logocentrism' does not imply
   (1) A totalitarian impulse.
   (2) A domain of representative language.
   (3) Interdependence of the meanings of dichotomous terms.
   (4) A strategy that seeks to suppress hidden meanings in a text.
Sol. Refer to paragraph 1 options 1, 2 & 4 are provided throughout the paragraph. **Ans.(3)**

47. According to the passage, Derrida believes that the system of binary opposition
   (1) represents a prioritization or hierarchy.
   (2) reconciles contradictions and dualities.
   (3) weakens the process of marginalization and ordering of truth.
   (4) deconstructs reality.
Sol. Paragraph 2 talks about the system of binary opposition. **Ans.(1)**

48. Derrida rejects the idea of 'definitive authority of the subject' because
   (1) interpretation of the text may not make the unseen visible
   (2) the meaning of the text is based on binary opposites.
   (3) the implicit power relationship is often ignored.
   (4) any act of interpretation must refer to what the author intends.
Sol. **Ans.(1)**

Directions for Questions 49 to 52: Each of the following questions has a paragraph from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most appropriate way.

49. The audiences for crosswords and sudoku, understandably, overlap greatly, but there are differences, too. A crossword attracts a more literary person, while sudoku appeals to a keenly logical mind. Some crossword enthusiasts turn up their noses at sudoku because they feel it lacks depth. A good crossword requires vocabulary, knowledge, mental flexibility and sometimes even a sense of humor to complete. It touches numerous areas of life and provides an "Aha!" or two along the way.
   (1) Sudoku, on the other hand, is just a logical exercise, each one similar to the last.
   (2) Sudoku, incidentally, is growing faster in popularity than crosswords, even among the literati.
   (3) Sudoku, on the other hand, can be attempted and enjoyed even by children.
   (4) Sudoku, however, is not exciting in any sense of the term.
Sol. The whole passage talks about Crosswords and Sudoku. The second last line of the passage talks about the simulator created by the crosswords as it includes the element of vocabulary knowledge, mental flexibility and sometimes humor. Therefore the last line must logically establish the superiority of Crosswords over Sudoku. Options 2, 3 & 4 do not talk about the same. **Ans.(1)**

CAT 2005 Analysis

50. Most firms consider expert individuals to be too elitist, temperamental, egocentric, and difficult to work with. Force such people to collaborate on a high-stakes project and they just might come to fisticuffs. Even the very notion of managing such a group seems unimaginable. So most organizations fall into default mode, setting up project teams of people who get along nicely.

    (1) The result, however, is disastrous.

    (2) The result is mediocrity.

    (3) The result is creation of experts who then become elitists.

    (4) Naturally, they drive innovations.

Sol. It is an analogy of the type if X happens, Y happens, and if Y doesn't happen i.e. XY or $\overline{YX}$.

    Thus if an individual is an expert as considered by firms, be won't get along with people nicely, apropos if a person is a group person, is getting along with people he will not be an expert, i.e he will be mediocre.

    Except option (2), none of the options follow that analogy hence can be eliminated.

    This makes (2) as the suitable choice. **Ans.(2)**

51. Federer's fifth grand slam win prompted a reporter to ask whether he was the best ever. Federer is certainly not lacking in confidence, but he wasn't about to proclaim himself the best ever. "The best player of this generation, yes", he said, "But nowhere close to ever. Just look at the records that some guys have. I'm a minnow,"

    (1) His win against Agassi, a genius from the previous generation, contradicts that.

    (2) Sampras, the king of an earlier generation, was as humble.

    (3) He is more than a minnow to his contemporaries.

    (4) The difference between 'the best of this generation' and 'the best ever' is a matter of perception.

Sol. **Ans.(2)**

52. Thus the end of knowledge and the closing of the frontier that it symbolizes is not a looming crisis at all, but merely one of many embarrassing fits of hubris in civilization's long industry. In the end, it will pass away and be forgotten. Ours is not the first generation to struggle to understand the organizational laws of the frontier, deceive itself that it has succeeded, and go to its grave having failed.

    (1) One would be wise to be humble.

    (2) But we might be the first generation to actually reach the frontier.

    (3) But we might be the first generation to deal with the crisis,

    (4) However, this time the success is not illusory.

Sol. The passage says "ours is …. failed" that means others might also have struggled earlier or have faced such crisis earlier. This makes option 3 invalid for it negates the above clause. Apropos though we might not be the first generation to struggle but we might be the first one to actually succeed. This makes option 2 as the suitable choice. Option 1 is irrelevant with respect to context. Option 4 is invalidated for success earlier was also not illusory; it was real but we the one who "deceive itself …. succeeded". Hence (2) is the best choice. **Ans.(2)**

Directions for Questions 53 to 56: Each question consists of four sentences on a topic. Some sentences are grammatically incorrect or inappropriate. Select the option that indicates the grammatically correct and appropriate sentence(s).

53. A. When virtuoso teams begin their work, individuals are in and group consensus is out.

    B. As project progresses, however, the individual stars harness themselves to the product of the group.

    C. Sooner or later, the members break through their own egocentrism and become a plurality with single-minded focus on the goal.

    D. In short, they morph into a powerful team with a shared identity.

    (1) A & C   (2) A & D   (3) B & D   (4) A, C & D

Sol. In option B the usage individual stars ………. the group is wrong because individuals can't harness themselves rather something like energy etc. is harnessed. In option C the words own and egocentrism can't be used together. Hence options A & D are correct and thus 2 is the best answer. **Ans.(2)**

54. A. Large reductions in the ozone layer, which sits about 15-30 km above the Earth, take place each-winter over the polar regions, especially the Antarctic, as low temperatures allow the formation of stratospheric clouds that assist chemical reactions breaking down ozone.

    B. Industrial chemicals containing chlorine and bromine have been blamed for thinning the layer because they attack the ozone molecules, making them to break apart.

    C. Many an offending chemicals have now been banned.

    D. It will still take several decades before these substances have disappeared from the atmosphere.

    (1) D   (2) B & D   (3) A & D   (4) A & C

Sol. Choice B is eliminated because of the usage "Chlorine …. Blamed" as chemicals can't be blamed. Choice C is eliminated as chemicals can't be offending. Hence 3 is the best answer. **Ans.(3)**

55. A. The balance of power will shift to the East as China and India evolve.

    B. Rarely the economic ascent of two still relatively poor nations has been watched with such a mixture of awe, opportunism, and trepidation.

    C. Postwar era witnessed economic miracles in Japan and South Korea, but neither was populous enough to power worldwide growth or change the game in a complete spectrum of industries.

    D. China and India, by contrast, possess the weight and dynamism to transform the 21st-century global economy.

    (1) A, B & C   (2) A & D   (3) C   (4) C & D

Sol. Option B should be as 'rarely has ....'. Option C should begin with the article 'the'. **Ans.(2)**

56. A. People have good reason to care about the welfare of animals.

    B. Ever since Enlightenment, their treatment has been seen as a measure of mankind's humanity.

    C. It is no coincidence that William Wilberforce and Sir Thomas Foxwell Buxton, two leaders of the movement to abolish the slave trade, helped found the Royal Society for the Prevention of Cruelty to Animals in 1820s.

    D. An increasing number of people go further: mankind has a duty not to cause pain to animals that have the capacity to suffer.

    (1) A & D   (2) B   (3) A & C   (4) C & D

Sol. Choice B is eliminated because the usage mankind's is unnecessary. Choice C is eliminated because "to abolish the slave trade" should be used in the end after 1820s rather than after "two leaders of the movement". Hence 1st is the right option. **Ans.(1)**

Directions for Questions 57 to 60: Each of the following questions has a paragraph with one italicized word that does not make sense. Choose the most appropriate replacement for that word from the options given below the paragraph.

57. Intelligent design derives from an early 19th-century explanation of the natural world given by an English clergyman, William Paley. Paley was the populariser of the famous watchmaker analogy. Proponents of intelligent design are *crupping* Paley's argument with a new gloss from molecular biology.

    (1) destroying   (2) testing   (3) resurrecting   (4) questioning

Sol. The clue is "with a new gloss", line (3). Gloss as a verb means to make over something more attractive and appealing than it actually is. In this context option (1) destroying (ruining, annulling), option (2) testing (activity of testing something to find out more information) and option (4) questioning (doubting, non-conforming) would be inappropriate to use. Hence option (3) 'resurrecting' (causing something to appear again after it has ended or disappeared) fits contextually. Thus option (3) is the best answer. **Ans.(3)**

58. Women squat, heads covered, beside huge piles of limp fodder and *blunk* oil lamps, and just about all the cows in the three towns converge upon this spot. Sinners, supplicants and yes, even scallywags hand over a few coins for a crack at redemption and a handful of grass.

    (1) shining   (2) bright   (3) sputtering   (4) effulgent

Sol. Line (1) uses conjunction 'and' hence as per the law of parallel agreement, tone preceding 'and' should be similar to one succeeding it. This way option (1) 'shining' and option (2) 'bright' and effulgent (shining, bright) are eliminated for they contrast the negative tone - 'limp fodder' (useless or dry dull". Thus option (3) 'sputtering' (which means burning or working in an uneven way, or improper way & making a series of popping sounds) fits the contest. Hence option (3) is the best choice. **Ans.(3)**

59. It is *klang* to a sensitive traveler who walks through this great town, when he sees the streets, the roads, and cabin doors crowded with beggars, mostly women, followed by three, four, or six children, all in rags and importuning every passenger for alms.

    (1) amusing   (2) irritating   (3) disgusting   (4) distressing

Sol. Option (1) "among" is a positive word that means something that makes one smile or laugh. This contradicts the negative tone of the passage because a "sensitive traveler" after seeing the sorry state of beggars, children, women et al will not be amused option (1) which means something that makes you smile, laugh, or 'irritated' option (2) which means annoyed at someone's misdeeds or disgusted option (3) which means a string same of disapproval or dislike at something. He could only feel distressed, option (4), which means state of extreme sorrow, suffering or worry. Hence (4) is the most suitable answer. **Ans.(4)**

60. Or there is the most *fingummy* diplomatic note on record: when Philip of Macedon wrote to the Spartans that, if he came within their borders, he would leave not one stone of their city, they wrote back the one word - "If"

    (1) witty   (2) rude   (3) simple   (4) terse

Sol. In option (2), a 'rude' remark cannot be a diplomatic one for it is a tactless, straightforward, stringent remark. Similarly a 'simple' remark that means plain, unequivocal remark cannot be a diplomatic in nature.

Option (1) is eliminated for the usage "The most witty" diplomatic .... is grammatically incorrect. It should be wittiest diplomatic...Also a witty remark contains an element of humour and the statement "If he came within .... their city" doesn't contain a single element of humour and hence can be ruled out.

Hence the only choice left is 'terse', which means laconic and pointing, and the statement "if he came .... their city" best captures that essence. Hence option (4), which is the most suitable answer. **Ans.(4)**


Sub-section III-A: Number of Questions = 10

Note: Questions 61 to 70 carry one mark each.

Answer Questions 61 to 64 on the basis of the information given below:

A management institute was established on January 1, 2000 with 3, 4, 5, and 6 faculty members in the Marketing, Organisational Behaviour (OB), Finance, and Operations Management (OM) areas respectively, to start with. No faculty member retired or joined the institute in the first three months of the year 2000. In the next four years, the institute recruited one faculty member in each of the four areas. AH these new faculty members, who joined the institute subsequently over the years, were 25 years old at the time of their joining the institute. All of them joined the institute on April 1. During these four years, one of the faculty members retired at the age of 60. The following diagram gives the area-wise average age (in terms of number of completed years) of faculty members as on April 1 of 2000, 2001, 2002, and 2003.
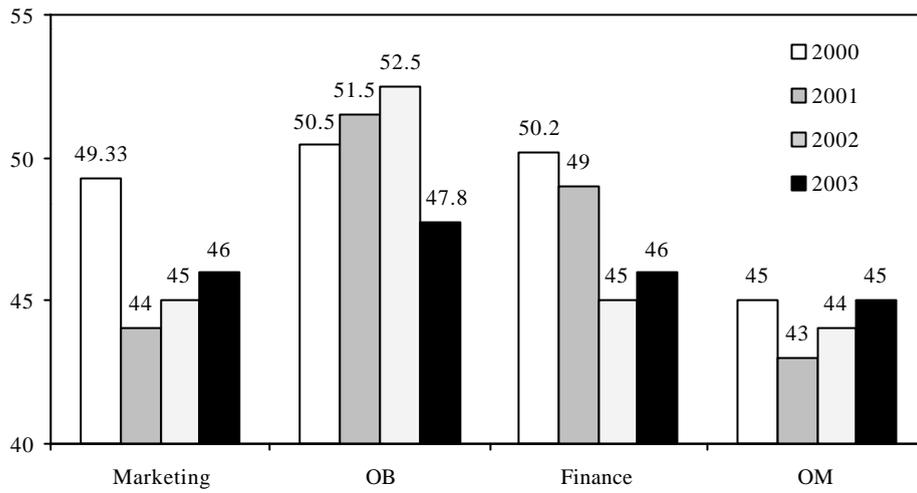
61. From which area did the faculty member retire?
    (1) Finance   (2) Marketing   (3) OB   (4) OM
Sol. Finance
    In the year 2001 the average age has fallen to 49 from the predictable 51.2. Suppose a 60 year old man retired this year there will be a decline of

    $\left|\dfrac{60-51.2}{4}\right|$ yrs i.e. (22) yrs

    (Note that the members have decreased to 4). **Ans.(1)**

62. Professors Naresh and Devesh, two faculty members in the Marketing area, who have been with the Institute since its inception, share a birthday, which falls on 20th November. One was born in 1947 and the other one in 1950. On April 1 2005, what was the age of the third faculty member who has been in the same area since inception?
    (1) 47   (2) 50   (3) 51   (4) 52
Sol. As in 2003 the total age of the 4 faculties (3 initially + 1 new recruitment in 2001) is 184.
    Two faculties born in 1947 and 1950 have an age of 55 and 52 in 2003.
    Also the age of new faculty in 2003 is 27.
    Therefore, age of 3rd faculty is 184 – 55 – 52 – 27 = 50 yrs. in 2003.
    So, the age of third faculty on April 1, 2005 is 52 yrs. Hence **Ans.(4)**

63. In which year did the new faculty member join the Finance area?
    (1) 2000   (2) 2001   (3) 2002   (4) 2003
Sol. In 2002 if there is an new join the age instead of predictable 50 years would decline by

    $\left|\dfrac{50-25}{5-1+1}\right|$ yrs = 5 yrs

    Remember one retired and one new person has joined
    ∴ the average age becomes 45 years in 2002. **Ans.(3)**

64. What was the age of the new faculty member, who joined the OM area, as on April 1, 2003?

(1) 25   (2) 26   (3) 27   (4) 28

Sol. The new member is clearly joining OM in 2001. Then he was 25 year old so in 2003 he must be 27 year old. **Ans.(3)**

Answer Questions 65 to 67 on the basis of the information given below:

The table below reports annual statistics related to rice production in select states of India for a particular year.

State	Total Area (in million hectares)	% of Area Under Rice Cultivation	Production (in million tons)	Population (in millions)
Himachal Pradesh	6	20	1.2	6
Kerala	4	60	4.8	32
Rajasthan	34	20	6.8	56
Bihar	10	60	12	83
Karnataka	19	50	19	53
Haryana	4	80	19.2	21
West Bengal	9	80	21.6	80
Gujarat	20	60	24	51
Punjab	5	80	24	24
Madhya Pradesh	31	40	24.8	60
Tamilnadu	13	70	27.3	62
Maharashtra	31	50	48	97
Uttar Pradesh	24	70	67.2	166
Andhra Pradesh	28	80	112	76

65. Which two states account for the highest productivity of rice (tons produced per hectare of rice cultivation)?

(1) Haryana and Punjab   (2) Punjab and Andhra Pradesh

(3) Andhra Pradesh and Haryana   (4) Uttar Pradesh and Haryana

Sol. Productivity of rice for:

$$\text{Haryana} = \frac{19.2 \times 10^6}{4 \times 0.8 \times 10^6} = 6$$

$$\text{Punjab} = \frac{24 \times 10^6}{5 \times 0.8 \times 10^6} = 6$$

$$\text{Andhara Pradesh} = \frac{112 \times 10^6}{28 \times 0.8 \times 10^6} = 5$$

$$\text{Uttar Pradesh} = \frac{67.2 \times 10^6}{24 \times 0.7 \times 10^6} = 4$$. Hence **Ans.(1)**

66. How many states have a per capita production of rice (defined as total rice production divided by its population) greater than Gujarat?

(1) 3   (2) 4   (3) 5   (4) 6

Sol. Per capital production of rice for Gujarat

$$= \frac{24 \times 10^6}{51 \times 10^6} = \frac{24}{51} = .47$$

The states having per capita Production greater than Gujarat are

Haryana, Punjab, Maharastra and Andhra Pradesh. Hence **Ans.(2)**

67. An intensive rice producing state is defined as one whose annual rice production per million of population is at least 400,000 tons. How many states are intensive rice producing states?

(1) 5   (2) 6   (3) 7   (4) 8

Sol. The intensive rice producing states are

Haryana, Gujarat, Punjab, Madhya Pradesh, Tamilnadu, Maharashtra, Uttar Pradesh, Andhra Pradesh. Hence **Ans.(4)**

Answer Questions 68 to 70 on the basis of the information given below:

The table below reports the gender, designation and age-group of the employees in an organization. It also provides information on their commitment to projects coming up in the months of January (Jan), February (Feb), March (Mar) and April (Apr), as well as their interest in attending workshops on: Business Opportunities (BO), Communication Skills (CS), and E-Governance (EG).

Sl. No.	Name	Gender	Designation	Age group	Committed to projects during	Interested in workshop on
1	Anshul	M	Mgr	Y	Jan. Mar	CS, EG
2	Bushkant	M	Dir	I	Feb, Mar	BO, EG
3	Charu	F	Mgr	I	Jan, Feb	BO, CS
4	Dinesh	M	Exe	O	Jan, Apr	BO, CS, EG
5	Eashwaran	M	Dir	O	Feb, Apr	BO
6	Fatima	F	Mgr	Y	Jan, Mar	BO, CS
7	Gayatri	F	Exe	Y	Feb, Mar	EG
8	Hari	M	Mgr	I	Feb, Mar	BO, CS, EG
9	Indira	F	Dir	O	Feb, Apr	BO, EG
10	John	M	Dir	Y	Jan, Mar	BO
11	Kalindi	F	Exe	I	Jan. Apr	BO, CS, EG
12	Lavanya	F	Mgr	O	Feb, Apr	CS, EG
13	Mandeep	M	Mgr	O	Mar, Apr	BO, EG
14	Nandlal	M	Dir	I	Jan, Feb	BO, EG
15	Parul	F	Exe	Y	Feb, Apr	CS, EG
16	Rahul	M	Mgr	Y	Mar, Apr	CS, EG
17	Sunita	F	Dir	Y	Jan, Feb	BO, EG
18	Urvashi	F	Exe	I	Feb, Mar	EG
19	Yamini	F	Mgr	O	Mar, Apr	CS, EG
20	Zeena		F	Exe Y	Jan, Mar	BO, CS, EG

M=Male, F= Female; Exe=Executive, Mgr=Manager, Dir=Director; Y=Young, I=In-between, O=Old

For each workshop, exactly four employees are to be sent, of which at least two should be Females and at least one should be Young. No employee can be sent to a workshop in which he/she is not interested in. An employee cannot attend the workshop on

o   Communication Skills, if he/she is committed to internal projects in the month of January;

o   Business Opportunities, if he/she is committed to internal projects in the month of February;

o   E-governance, if he/she is committed to internal projects in the month of March.

68. Assuming that Parul and Hari are attending the workshop on Communication Skills (CS), then which of the following employees can possibly attend the CS workshop?
    (1)   Rahul and Yamini   (2)   Dinesh and Lavanya   (3)   Anshul and Yamini   (4)   Fatima and Zeena

Sol.   Check the options

      Rahul can attend - CS but not EG

      Yamini can attend - CS but not EG

      Hence option (1) is correct. **Ans.(1)**

69. How many Executives (Exe) cannot attend more than one workshop?
    (1)   2   (2)   3   (3)   15   (4)   16

Sol.   Only Parul, Urvashi, Zeena are executives who cannot attend more than one workshop. **Ans.(2)**

70. Which set of employees cannot attend any of the workshops?
    (1)   Anshul, Charu, Eashwaran and Lavanya   (2)   Anshul, Bushkant, Gayatri and Urvashi
    (3)   Charu, Urvashi, Bushkant and Mandeep   (4)   Anshul, Gayatri, Eashwaran and Mandeep

Sol.   Anshul cannot attend any workshop

      Bhushan cannot attend any workshop

      With these two we can mark option 2. **Ans.(2)**

Note: Questions 71 to 90 carry two marks each.

Answer Questions 71 to 74 on the basis of the information given below:

In the table below is the listing of players, seeded from highest (#1) to lowest (#32), who are due to play in an Association of Tennis Players (ATP) tournament for women. This tournament has four knockout rounds before the final, i.e., first round, second round, quarterfinals, and semi-finals. In the first round, the highest seeded player plays the lowest seeded player (seed # 32) which is designated match No. 1 of first round; the 2nd seeded player plays the 31st seeded player which is designated match No. 2 of the first round, and so on. Thus, for instance, match No. 16 of first round is to be played between 16lh seeded player and the 17th seeded player. In the second round, the winner of match No. 1 of-first round plays the winner of match No. 16 of first round and is designated match No. I of second round. Similarly, the winner of match No, 2 of first round plays the winner of match No. 15 of first round, and is designated match No. 2 of second round. Thus, for instance, match No. 8 of the second round is to be played between the winner of match No. 8 of first round and the winner of match No. 9 of first round. The same pattern is followed for later rounds as well.

Seed #	Name of Player	Seed #	Name of Player	Seed #	Name of Player
1	Maria Sharapova	12	Mary Pierce	23	Silvia Farina Elia
2	Lindsay Davenport	13	Anastasia Myskina	24	Tatiana Golovin
3	Amelie Mauresmo	14	Alicia Molik	25	Shinobu Asagoe
4	Kim Clijsters	15	Nathalie Dechy	26	Francesca Schiavone
5	Svetlana Kuznetsova	16	Elena Bovina	27	Nicole Vaidisova
6	Elena Dementieva	17	Jelena Jankovic	28	Gisela Dulko
7	Justine Henin	18	Ana Ivanovic	29	Flavia Pennetta
8	Serena Williams	19	Vera Zvonareva	30	Anna Chakvetadze
9	Nadia Petrova	20	Elena Likhovtseva	31	Ai Sugiyama
10	Venus Williams	21	Daniela Hantuchova	32	Anna-lena Groenefeld
11	Patty Schnyder	22	Dinara Safina		

71. If there are no upsets (a lower seeded player beating a higher seeded player) in the first round, and only match Nos. 6, 7, and 8 of the second round result in upsets, then who would meet Lindsay Davenport in quarter finals, in case Davenport reaches quarter finals?

(1) Justine Henin (2) Nadia Petrova (3) Patty Schnyder (4) Venus Williams

Sol. If there are no upsets in the first round, all top 16 rankers will reach the second round. As only 6, 7, 8 match results in upsets, all top five rankers will reach the quarter final & from match 6, 7 and 8 i.e. (matches between rank 6 and 11, rank 7 and 10, rank 8 and 9), players ranked 11, 10 and 9 will reach the quarter final.

In quarter final match would be

Rank 1 Vs 11

Rank 2 Vs 10

Rank 3 Vs 9

Rank 4 Vs 5

Hence, Lindsay Davenport (Rank 2) will play with Venus Williams (Rank 10). **Ans.(4)**

72. If Elena Dementieva and Serena Williams lose in the second round, while Justine Henin and Nadia Petrova make it to the semi-finals, then who would play Maria Sharapova in the quarterfinals, in the event Sharapova reaches quarterfinals?

(1) Dinara Safina (2) Justine Henin (3) Nadia Petrova (4) Patty Schnyder

Sol. If Elen Dementieva and Serena Williams will reach second round, they will play with the winner of matches (Rank 11 Vs 22) and (Rank 9 Vs 24) respectively. As Nadia Petrova reached the semifinals, it means she won in the second round and quarterfinals. As Maria Sharapova will play against the winner of (Nadia Petrovea Vs Serena Williams) match and Serena Williams lost in that game, so Maria Sharapova played with Nadia Petrova in the quarterfinals. **Ans.(3)**

73. If, in the first round, all even numbered matches (and none of the odd numbered ones) result in upsets, and there are no upsets in the second round, then who could be the lowest seeded player facing Maria Sharapova in semi-finals?

    (1)   Anastasia Myskina   (2)   Flavia Pennetta   (3)   Nadia Petrova   (4)   Svetlana Kuznetsova

Sol. According to the given conditions the players who reached the second round according to their ranks and matches are:

1, 31, 3, 29, 5, 27, 7, 25, 9, 23, 11, 21, 13, 19, 15, 17.

Hence in the second round the match will be:

Match 1 - Rank 1 Vs Rank 17

Match 2 - Rank 31 Vs Rank 15

Match 3 - Rank 3 Vs Rank 19

Match 4 - Rank 29 Vs Rank 13

Match 5 - Rank 5 Vs Rank 21

Match 6 - Rank 27 Vs Rank 11

Match 7 - Rank 7 Vs Rank 23

Match 8 - Rank 25 Vs Rank 9

As there are no upsets in second round also $\Rightarrow$ the winners of round 2 are 1, 15, 3, 13, 5, 11, 7, 9

Hence, the matches in quarterfinal are:

Match 1 - Rank 1 Vs Rank 9

Match 2 - Rank 15 Vs Rank 7

Match 3 - Rank 3 Vs Rank 11

Match 4 - Rank 13 Vs Rank 5

So, Maria Sharapova (Rank 1) will play with either rank 13 or rank 5 player in the semi final. Hence, **Ans.(1)**

74. If the top eight seeds make it to the quarterfinals, then who, amongst the players listed below, would definitely not play against Maria Sharapova in the final, in case Sharapova reaches the final?

    (1)   Amelie Mauresmo   (2)   Elena Dementieva   (3)   Kim Clijsters   (4)   Lindsay Davenport

Sol. As top eight seeded teams reach the quarterfinals, the matches in quarterfinals will be:

Match 1 - Rank 1 Vs 8

Match 2 - Rank 2 Vs 7

Match 3 - Rank 3 Vs 6

Match 4 - Rank 4 Vs 5

If Sharapova reaches the semi finals then the match will be between:

Match 1 - Sharapova Vs Winner of 4 Vs 5

Match 2 - (Winner of 2 Vs 7) Vs (Winner of 3 Vs 6)

In the finals Sharapova will play with the winner of Match 2 of semi finals. Hence, Option 3 i.e. Kim Clijsters (Rank 4) cannot play with her in finals. Hence, Ans. (3)

Answer Questions 75 to 78 on the basis of the information given below:

Venkat, a stockbroker, invested a part of his money in the stock of four companies - A, B, C and D. Each of these companies belonged to different industries, viz., Cement, Information Technology (IT), Auto, and Steel, in no particular order. At the time of investment, the price of each stock was Rs.100. Venkat purchased only one stock of each of these companies. He was expecting returns of 20%, 10%, 30%, and 40% from the stock of companies A, B, C and D, respectively. Returns arc defined as the change in the value of the stock after one year, expressed as a percentage of the initial value. During the year, two of these companies announced extraordinarily good results. One of these two companies belonged to the Cement or the IT industry, while the other one belonged to either the Steel or the Auto industry. As a result, the returns on the stocks of these two companies were higher than the initially expected returns. For the company belonging to the Cement or the IT industry with extraordinarily good results, the returns were twice that of the initially expected returns. For the company belonging to the Steel or the Auto industry, the returns on announcement of extraordinarily good results were only one and a half times that of the initially expected returns. For the remaining two companies, which did not announce extraordinarily good results, the returns realized during the year were the same as initially expected.

75. What is the minimum average return Venkat would have earned during the year?

    (1)   30%   (2) $31^{1/4}$%   (3) $32^{1/2}$%   (4)   Cannot be determined

Sol.

Company	A	B	C	D
Expected Returns	20%	10%	30%	40%

In all possible configurations complying with existing conditions a minimum average return will be 30%

By $\dfrac{10 \times 2 + 20 \times 1.5 + 30 + 40}{4} = 30\%$. **Ans.(1)**

76. If Venkat earned a 35% return on average during the year, then which of these statements would necessarily be true?
   I.   Company A belonged either to Auto or to Steel Industry.
   II.   Company B did not announce extraordinarily good results.
   III. Company A announced extraordinarily good results.
   IV.   Company D did not announce extraordinarily good results.
   (1)   I and II only   (2)   II and III only   (3)   III and IV only   (4)   II and IV only

Sol. Conditions II & III under focus of questions return the answer (2). **Ans.(2)**

77. If Venkat earned a 38.75% return on average during the year, then which of these statement(s) would necessarily be true?
   I.   Company C belonged either to Auto or to Steel Industry.
   II.   Company D belonged either to Auto or to Steel Industry.
   III. Company A announced extraordinarily good results.
   IV.   Company B did not announce extraordinarily good results.
   (1)   I and II only   (2)   II and III only   (3)   I and IV only   (4)   II and IV only

Sol. Again I & IV comply to give returns 38.75%. **Ans.(3)**

78. If Company C belonged to the Cement or the IT industry and did announce extraordinarily good results, then which of these statement(s) would necessarily be true?
   I.   Venkat earned not more than 36.25% return on average.
   II.   Venkat earned not less than 33.75% return on average.
   III. If Venkat earned 33.75% return on average, Company A announced extraordinarily good results.
   IV.   If Venkat earned 33.75% return on average, Company B belonged either to Auto or to Steel Industry.
   (1)   I and II only   (2)   II and IV only   (3)   II and III only   (4)   III and IV only

Sol. II & IV follows. **Ans.(2)**

Answer Questions 79 to 82 on the basis of the information given below:

The year is 2089. Beijing, London, New York, and Paris are in contention lo host the 2096 Olympics. The eventual winner is determined through several rounds of voting by members of the IOC with each member representing a different city. All the four cities in contention are also represented in IOC.

o   In any round of voting, the city receiving the lowest number of votes in that round gets eliminated. The survivor after the last round of voting gets to host the event.

o   A member is allowed to east votes for at most two different cities in all rounds of voting combined. (Hence, a member becomes ineligible to cast a vote in a given round if both the cities (s)he voted for in earlier rounds are out of contention in that round of voting.)

o   A member is also ineligible to cast a vote in a round if the city (s)he represents is in contention in that round of voting.

o   As long as the member is eligible, (s)he must vote and vote for only one candidate city in any round of voting.

The following incomplete table shows the information on cities that received the maximum and minimum votes in different rounds, the number of votes cast in their favour, and the total votes that were cast in those rounds.

Round	Total votes cast	Maximum votes cast		Eliminated	
		City	No. of votes	City	No. of Votes
1		London	30	New York	12
2	83	Paris	32	Beijing	21
3	75				

It is also known that
o   All those who voted for London and Paris in round 1, continued to vote for the same cities in subsequent rounds as long as these cities were in contention. 75% of those who voted for Beijing in round 1, voted for Beijing in round 2 as well.
o   Those who voted for New York in round 1, voted either for Beijing or Paris in round 2.
o   The difference in votes cast for the two contending cities in the last round was 1.
o   50% of those who voted for Beijing in round 1, voted for Paris in round 3.

79. What percentage of members from among those who voted for New York in round I, voted for Beijing in round 2?
   (1)   33.33   (2)   50   (3)   66.67   4. 75

80. What is the number of votes cast for Paris in round 1?
   (1)   16   (2)   18   (3)   22   (4)   24

81. What percentage of members from among those who voted for Beijing in round 2 and were eligible to vote in round 3, voted for London?

   (1) 33.33   (2) 38.10   (3) 50   (4) 66.67

82. Which of the following statements must be true?

   a.   IOC member from New York must have voted for Paris in round 2.

   b.   IOC member from Beijing voted for London in round 3.

   (1) Only a   (2) Only b   (3) Both a and b   (4) Neither a nor b

Sol.

Round	Newyork	London	Paris	Beijing	Total
1	12	30	24	16	82
2	×	30	(24+4+3+1)=32	(12+9)=21	83
3	×	(30+8)=38	(32+4+1)=37	×	75

Round 1:

   82 people should have voted in first round as New York representative didn't vote and in round 3, 74 out of 75 must have voted in round 2 as Beijing representative did vote in round 1 and 2.

   ⇒ 83-74 : 9 people got eliminated from round 2 to round 3 as they have voted for New York or Beijing in round 1 and round 2.

   ∴ 12 people voted for Beijing in round 2 which formed 75% of voters for same in round 1.

   ∴ No. of votes for Beijing in round 1 = 16.

Round 2:

   In round 2 for Paris out of 32 votes 24 continued to vote for Paris from round 1.

   3 votes were given to Paris by those who voted for New York in round 1.

   4 votes were given to Paris by the 4 voters who gave their vote to Beijing in round 1 and 1 vote should be from the New York representative.

   ∴ Total votes = 24 + 3 + 4 + 1 = 32 votes.

Round 3:

   Beijing eliminated.

   50% of those voted for Beijing in round 1 cast their votes to Paris in round 3.

   4 out of 8 people have already casted their votes to Paris in round 2, so 4 more will cast their votes now and only when the Beijing representative casts his/her vote to Paris it can attain a value of 37.

   ∴ Paris should have = 32 + 4 + 1 = 37 votes and London should have 38 votes.

79. **Ans.(4)**   80. **Ans.(4)**   81. **Ans.(4)**   82. **Ans.(1)**

Answer Questions 83 to 86 on the basis of the information given below:

The table below presents the revenue (in million rupees) of four firms in three states. These firms, Honest Ltd., Aggressive Ltd., Truthful Ltd. and Profitable Ltd. arc disguised in the table as A, B, C and D, in no particular order.

States	Firm A	Firm B	Firm C	Firm D
UP	49	82	80	55
Bihar	69	72	70	65
MP	72	63	72	65

Further, it is known that:

   o In the state of MP, Truthful Ltd. has the highest market share.

   o Aggressive Ltd.'s aggregate revenue differs from Honest Ltd.'s by Rs.5 million.

83. What can be said regarding the following two statements?

   Statement 1: Profitable Ltd. has the lowest share in MP market.

   Statement 2: Honest Ltd.'s total revenue is more than Profitable Ltd.

   1.   If Statement 1 is true then Statement 2 is necessarily true.

   (2)   If Statement 1 is true then Statement 2 is necessarily false.

   (3)   Both Statement 1 and Statement 2 are true.

   (4)   Neither Statement 1 nor Statement 2 is true.

Sol. If profitable limited has lowest share in MP market then it must be the firm B then honest Ltd. will be either a or D so statement 2 is wrong **Ans.(2)**

84. What can be said regarding the following two statements?

Statement 1: Aggressive Ltd.'s lowest revenues are from MP.

Statement 2: Honest Ltd.'s lowest revenues are from Bihar.

(1) If Statement 2 is true then Statement 1 is necessarily false.

(2) If Statement 1 is false then Statement 2 is necessarily true.

(3) If Statement 1 is true then Statement 2 is necessarily true.

(4) None of the above.

Sol. If firm B is aggressive Ltd. then C must be honest Ltd and its lowest revenues is from Bihar. **Ans.(3)**

85. What can be said regarding the following two statements?

Statement 1: Honest Ltd. has the highest share in the UP market.

Statement 2: Aggressive Ltd. has the highest share in the Bihar market.

(1) Both statements could be true.   (2) At least one of the statements must be true.

(3) At most one of the statements is true.   (4) None of the above

Sol. If honest Ltd.'s has the highest share in UP market then this firm must be either B or C. If B is honest Ltd. then C must be aggressive Ltd. and Vice-versa in both the cases at most one of statement is true. **Ans.(3)**

86. If Profitable Ltd.'s lowest revenue is from UP, then which of the following is true?

(1) Truthful Ltd.'s lowest revenues are from MP.

(2) Truthful Ltd.'s lowest revenues are from Bihar.

(3) Truthful Ltd.'s lowest revenues are from UP.

(4) No definite conclusion is possible.

Sol. If profitable Ltd's lowest revenue is from U.P. then this firm is either A or D. In each case the other one is Truthful Ltd., in both case. The lowest revenue is from U.P. **Ans.(3)**

Answer Questions 87 to 90 on the basis of the information given below:

Help Distress (HD) is an NGO involved in providing assistance to people suffering from natural disasters. Currently, it has 37 volunteers. They are involved in three projects: Tsunami Relief (TR) in Tamil Nadu, Flood Relief (FR) in Maharashtra, and Earthquake Relief (ER) in Gujarat. Each volunteer working with Help Distress has to be involved in at least one relief work project.

o   A Maximum number of volunteers are involved in the FR project. Among them, the number of volunteers involved in FR project alone is equal to the volunteers having additional involvement in the ER project.

o   The number of volunteers involved in the ER project alone is double the number of volunteers involved in all the three projects.

o   17 volunteers are involved in the TR project.

o   The number of volunteers involved in the TR project alone is one less than the number of volunteers involved in ER project alone.

o   Ten volunteers involved in the TR project are also involved in at least one more project.

87. Based on the information given above, the minimum number of volunteers involved in both FR and TR projects, but not in the ER project is:

(1) 1   (2) 3   (3) 4   (4) 5

88. Which of the following additional information would enable to find the exact number of volunteers involved in various projects?

(1) Twenty volunteers are involved in FR.

(2) Four volunteers are involved in all the three projects.

(3) Twenty three volunteers are involved in exactly one project.

(4) No need for any additional information.

89. After some time, the volunteers who were involved in all the three projects were asked to withdraw from one project. As a result, one of the volunteers opted out of the TR project, and one opted out of the ER project, while the remaining ones involved in all the three projects opted out of the FR project. Which of the following statements, then, necessarily follows?

(1) The lowest number of volunteers is now in TR project.

(2) More volunteers are now in FR project as compared to ER project.

(3) More volunteers are now in TR project as compared to ER project.

(4) None of the above.

90. After the withdrawal of volunteers, as indicated in Question 89, some new volunteers joined the NGO. Each one of them was allotted only one project in a manner such that, the number of volunteers working in one project alone for each of the three projects became identical. At that point, it was also found that the number of volunteers involved in FR and ER projects was the same as the number of volunteers involved in TR and ER projects. Which of the projects now has the highest number of volunteers?

(1) ER (2) FR (3) T R (4) Cannot be determined

Sol. **For Q.87 to Q.90**

$a + b + y = 10$

$2y - 1 = 7$

$y = 4$

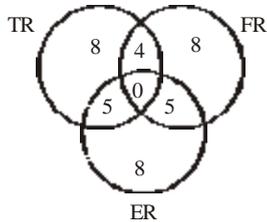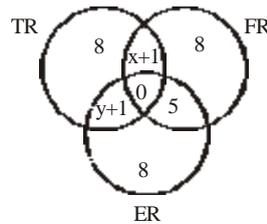$x - 4 + x = 37 - 25$

$2x = 12 + 4$

$x = 8$

$a + b = 6$
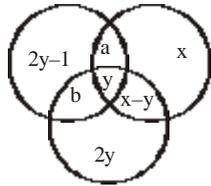
F:R has to be max then

From $a + b = 6$

Case 1: $a = 4$, $b = 2$

Case 2: $a = 5$, $b = 1$.

87. So minimum $a = 4$. **Ans.(3)**

88. First option gives value of $a = 4$. Ans.(1)

89. One of T.R. shift to (F.R & E.R.)

One of E.R. shift to (T.R. & F.R.)

Two of F.R. shift to (T.R. & E.R.)

After that if you add values of different sections.

F.R. has more. **Ans.(2)**

90. After the with drawl of the volunteers the figure will look like where $y + x = 6$ 1 and $y + 2 = 5$

$Y = 3$

Putting $y = 3$ in 1 $x = 3$

The figure now will be

Ans.(1)