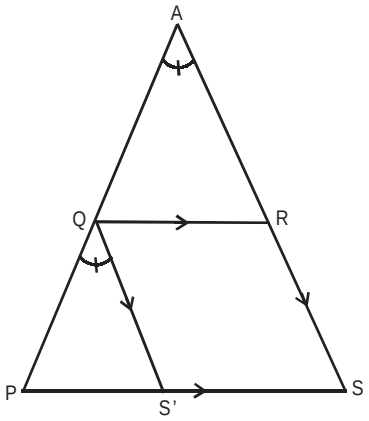
Answer Key XAT 2010

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

Solutions XAT 2010

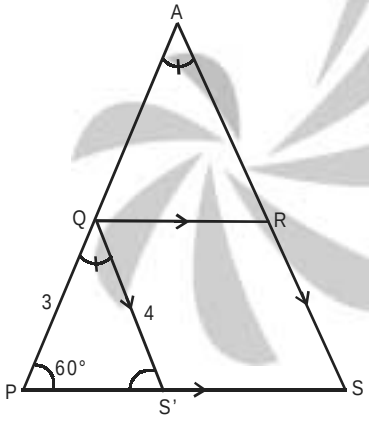
SECTION A: DATA INTERPRETATION AND QUANTITATIVE ABILITY

1. A The figure for the given question will look like as given below:



Here we need to find the value of $\angle PAS$.
Construction: Draw QS' parallel to RS.
Hence, $\angle PAS = \angle PQS'$

From Statement I:
QS' = RS = 4. $\angle QPS' = \angle QPS = 60°$.
In triangle PQS':
PQ = 3, QS' = 4 and $\angle QPS' = 60°$.
For the above values, triangle PQS' must be unique and hence so should be the value of $\angle PQS'$ and hence $\angle PAS$. Statement I is clearly sufficient.



The value of $\angle PAS$ can be found as given below:

$$\frac{\sin(\angle QPS')}{QS'} = \frac{\sin(\angle PS'Q)}{PQ}$$

$$\Rightarrow \sin(\angle PS'Q) = PQ.\frac{\sin(\angle QPS')}{QS'} = \frac{3\sqrt{3}}{8}$$

$$\Rightarrow \angle PS'Q = \sin^{-1}\frac{3\sqrt{3}}{8}$$

Also,

$$\angle PS'Q + \angle PQS' + \angle QPS' = 180°$$

$$\angle PQS' = 120° - \sin^{-1}\frac{3\sqrt{3}}{8}$$

Hence, $\angle PAS = 120° - \sin^{-1}\frac{3\sqrt{3}}{8}$.

Hence, statement I is sufficient to answer the question.

From Statement II:
Statement II only gives the value of PS and QR, the two parallel lines.
The value of PQ and SR are not given. Also no information is given on the separation between the two parallel lines. Hence, infinite such trapezoids PQRS are possible and subsequently a unique value of $\angle PAS$ cannot be found.
Statement II is insufficient to answer the question.

2. D $A_{n+1} = A_n^2 + 1$ for $n \geq O$
$n = 0, A_1 = A_0^2 + 1$
$n = 1, A_2 = A_1^2 + 1$
$n = 2, A_3 = A_2^2 + 1$
So if either of A_0 or A_1 is given to us we can find the values of A_{900} and A_{1000}, and hence the GCD.

3. C All the x-coordinates of points are in A.P.
Let 'd' be the common difference
$x_1 + d = 2$
$x_1 + 23d = 68$
$\Rightarrow$ 22d = 66 $\Rightarrow$ d = 3
$\therefore x_1 = -1$
Now, $31 = 68p + q$ and $-2 = 2p + q$

$$\Rightarrow p = \frac{1}{2}, q = -3$$

$\Rightarrow$ x-coordinate of A_8 is $x_1 + 7d$
$= -1 + 21 = 20$

$$\Rightarrow \text{y-coordinate of } A_8 = \frac{1}{2}\times 20 - 3 = 7.$$

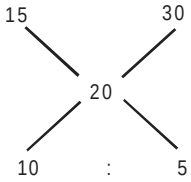
4. C The points $A_1\left(-1, \frac{-7}{2}\right)$, $A_2(2, -2)$ and $A_3\left(5, \frac{-1}{2}\right)$.
These are three points which are not in the first quadrant.

5. C $x^2 + 4xy + 6y^2 - 4y + 4$
$= x^2 + 4y^2 + 4xy + 2y^2 - 4y + 2 + 2$
$= (x + 2y)^2 + 2(y^2 - 2y + 1) + 2$

$$= \underbrace{(x+2y)^2}_{A} + \underbrace{2(y-1)^2}_{B} + 2$$

For minimum both the terms A and B should be zero
(y = 1, x = – 2)
So minimum value is 2.

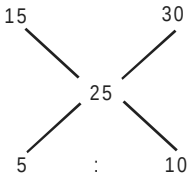
6. C Let the resultant acid solution be 20% concentration, then:



i.e. 2 : 1

$\Rightarrow$ So the solution required is 100 liters

And if the resultant acid solution is of 25% concentration, then:



i.e. 1 : 2

So the solution required is 400 liters.

Hence, we require more than 100 liters but less than 400 liters of the 30% acid solution.

7. B

	A	B	No.	Hrs/day/ machine	Total Hrs. per day available
Grinding	2 hr	3 hr	10	12	120
Polishing	3 hr	2 hr	15	10	150
Profit	Rs. 5	Rs. 7			

Let the quantity of A be 'a' and the quantity of B be 'b'.

$2a + 3b \leq 120$

$3a + 2b \leq 150$

Profit function = 5a + 7b

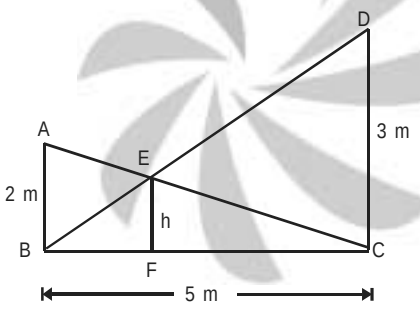
At (0, 40), P = 5 × 0 + 7 × 40 = Rs.280

At (42, 12), P = 5 × 42 + 7 × 12 = Rs.294

At (32, 0), P = 5 × 32 + 0 × 7 = Rs.160

Hence, the maximum profit made by the manufacturer is Rs.294.

8. A



In ΔBCD, we have

$$\frac{BF}{BC} = \frac{h}{3} \quad \text{...(i)}$$

In ΔCAB, we have

$$\frac{CF}{CB} = \frac{h}{2} \quad \text{...(ii)}$$

Adding (i) and (ii), we get

$$\frac{BF}{BC} + \frac{CF}{CB} = \frac{h}{3} + \frac{h}{2}$$

$$\Rightarrow \frac{BF + FC}{BC} = \frac{h}{3} + \frac{h}{2}$$

Now, BF + FC = BC

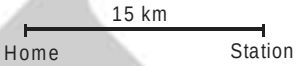
Hence, $\frac{h}{3} + \frac{h}{2} = 1 \Rightarrow h = 1.2$ meters.

9. B To find the minimum number of cartons we have to find the HCF of (96, 240, 336) which is 48.

So minimum number of cartons

$$= \frac{96}{48} + \frac{240}{48} + \frac{336}{48} = 2 + 5 + 7 = 14.$$

10. B Let the speeds (in m/sec) of Amarendra and Dharmendra be A and D respectively.



$$\frac{15 \times 1000}{A} = 25 \times 60 \Rightarrow A = 10 \text{ m/sec}$$

$$\frac{15000 - 2500}{D} = 25 \times 60 \Rightarrow D = \frac{25}{3} \text{ m/sec}$$

In 7 minutes, Dharmendra travelled

$$= \frac{25}{3} \times 7 \times 60 = 3500 \text{ m}$$

Total time taken by him $= \frac{15000}{\frac{25}{3}} = 1800$ sec

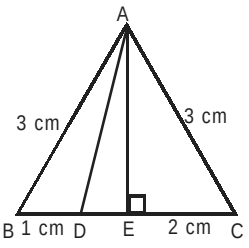
Time taken by him to travel from the point from where Amarendra started running = 1800 – 7 × 60

= 1380 sec.

Amarendra will take 25 × 60 = 1500 sec

$\therefore$ Dharmendra will reach 1500 – 1380 = 120 sec before Amarendra.

11. C



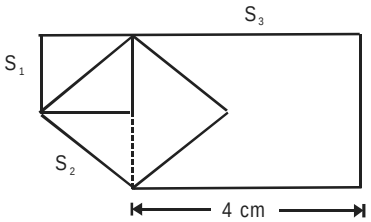
Drop AE $\perp$ BC; AE will bisect the base as ABC is an equilateral triangle.

So DE = 0.5 cm and $AE = \frac{\sqrt{3}}{2} \times 3 = \frac{3\sqrt{3}}{2}$ cm

Now $AD^2 = AE^2 + DE^2$

$$= \sqrt{\left(\frac{3\sqrt{3}}{2}\right)^2 + (0.5)^2} = \sqrt{7} \text{ cm.}$$

12. D



Side of the square S_3 is 4 cm

$\therefore$ Side of the square $S_2 = \frac{4}{\sqrt{2}}$ cm $= 2\sqrt{2}$ cm

$\therefore$ Side of square $S_1 = \frac{2\sqrt{2}}{\sqrt{2}} = 2$ cm

$\therefore$ Series become $2,\ 2\sqrt{2},\ 4,...$

Hence, the side of $S_n = 2.\left(\sqrt{2}\right)^{n-1} = 2^{1+\frac{n-1}{2}} = 2^{\frac{n+1}{2}}$.

13. B Since they are in G.P. Let the terms be a, ar, ar^2, ar^3, ar^4
$r > 1$ as the given numbers are integers in increasing order.
Let the required sum be A.

$$A = \frac{1}{\text{LCM}(a, ar)} + \frac{1}{\text{LCM}(ar, ar^2)} + \frac{1}{\text{LCM}(ar^2, ar^3)} + \frac{1}{\text{LCM}(ar^3, ar^4)}$$

$$= \frac{1}{ar} + \frac{1}{ar^2} + \frac{1}{ar^3} + \frac{1}{ar^4} = \frac{1}{ar}\left[1 + \frac{1}{r} + \frac{1}{r^2} + \frac{1}{r^3}\right]$$

$$= \frac{1}{ar} \times 1 \times \left(\frac{1-\left(\frac{1}{r}\right)^4}{1-\frac{1}{r}}\right) = \frac{1}{ar}\,\frac{r^4-1}{(r-1)r^3}$$

$$= \frac{(r^2+1)(r+1)(r-1)}{ar^4(r-1)} = \frac{(r^2+1)(r+1)}{ar^4}$$

Now for A to be the maximum value. Taking a = 1

$$A = \frac{(r^2+1)(r+1)}{r^4}$$

Now putting r = 2, 3,...
($r \neq 1$ since $a < b < c < d < e$)

For $r = 2$, then $A = \frac{5\times 3}{2^4} = \frac{15}{16}$

For $r = 3$, then $A = \frac{10\times 4}{81} = \frac{40}{81}$

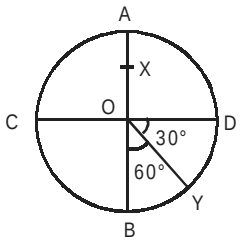
For $r = 4$, then $A = \frac{17\times 5}{256} = \frac{85}{256}$ and so on

Hence, maximum value $= \frac{15}{16}$.

14. B Volume of the tank = 150 × 120 × 100 = 1800000 cm^3
Remaining volume of the tank i.e. other than water
= 1800000 – 1281600 = 518400 cm^3
Hence, number of bricks that can be put in the tank

$$= \frac{518400}{0.9\times 20\times 6\times 4} = 1200.$$

15. D



$\widehat{DY} = \frac{30}{360} \times 2 \times 3.14 \times 2 = 1.046$

$\widehat{YB} \approx 2.09$
XODY $\approx$ 4.04
XOBY $\approx$ 5.09
For XODY = 4.04 and XOBY = 5.09
Hence, only option (D) satisfies.

16. C Words starting with C are 4! = 24

Words starting with H are $\frac{4!}{2!} = 12$

Words starting with J are $\frac{4!}{2!} = 12$

So the 49th word is LCCHJ and the 50th word is LCCJH.

17. B Probability of damaged packet in all packaging runs = 0.6 × 2x + 0.4 × x
where 'x' is the probability when packaging at normal speed.
$\Rightarrow$ 0.112 = 0.6 × 2x + 0.4 × x
$\Rightarrow$ 0.112 = 1.2x + 0.4x
$\Rightarrow$ x = 0.07
Probability of non damaged packets at normal speed = 1 – 0.07 = 0.93.

18. C During, Oct-Dec 2008, we have
For Paharpur cement,
Revenue = 352 × x (where x is the number of bags)
Cost incurred = 0.9211 × 352 × x

$$\text{Profit Rate} = \frac{352x - 0.9211\times 352x}{x} = (352\times 0.0789)$$

For Bahsin cement, Profit rate = (438 × 0.0579)

During Jan-March 2009 profit rate for:
Paharpur cement = (304 × 0.1244)

Bahsin cement = (440 × 0.0866)

During April-June 2009 profit rate for:
Paharpur cement = 340 × 0.0897

Bahsin cement = 430 × 0.1004

19. E **For Paharpur cement**
Revenue in Jan-Mar 2009 = 304 × 543278
Revenue in Apr – June 2009 = 340 × 698236
Profit rate for Jan-Mar 2009

$$= \frac{[(304 \times 543278) - (0.8756)(304 \times 543278)]}{543278} \quad \ldots(i)$$

Profit rate for Jan – Mar 2009
= 304(1 – 0.8756) = 37.575 …(ii)
Profit for Apr-June 2009 = 340 × 698236 – 0.9103 × 340 × 698236 …(iii)
Profit rate = (1 – 0.9103) × 340 = 30.498 …(iv)

For Bahsin cement

Revenue in Jan-Mar 2009 = 440 × 526532

Revenue in Apr-June 2009 = 430 × 499874

Profit in Jan-Mar 2009 = 440 × 526532 – 0.9134 × 440 × 526532 …(v)

Profit rate = 440 – 0.9134 × 440 = 38.104 …vi)

Profit in Apr-Jun 2009 = 430 × 499874 – 0.8996 × 499874 × 430 …(vii)

Profit rate = 430 – 0.8996 × 430 = 43.172 …(viii)

Checking through the profit rate we see that option (E) is the correct choice.

20. E $\text{Profit Revenue} = \frac{\text{Profit}}{\text{Sales Quantity}} = \frac{\text{Sales Revenue} - \text{Cost}}{\text{Sales Quantity}}$

$= \frac{\text{Price} \times \text{Sales Quantity} - \text{Cost}}{\text{Sales Quantity}}$

$= \text{Price} - \frac{\text{Cost}}{\text{Sales Quantity}}$

Cost = x% of Sales Revenue = x% of (Price × Sales Quantity)

∴ Profit Revenue = Price – x% of Price

= (1 – x%) of Price

⇒ Profit = Profit Revenue × Sales Quantity

= (1 – x%) Price × Sales Quantity

∴ Increase in profit

$= \left\{\frac{\begin{matrix}(1-x\%)\times \text{Price}\times 102.25\% \text{ of Sales Quantity} \\ -(1-y\%)\times \text{Price}'\times \text{Sales Quantity}\end{matrix}}{(1-y\%)\times \text{Price}'\times \text{Sales Quantity}}\right\}\times 100$

$= \left\{\frac{(1-0.9042)\times 322\times 1.0225-(1-0.9103)\times 340\times 1}{(1-0.9103)\times 340\times 1}\right\}\times 100$

$\approx \left(\frac{31.54-30.5}{30.5}\right)\times 100 \approx 3.42\%.$

For questions 21 to 23:

Let the coupon payment on bonds A, E, B, D and C be a – 2d, a – d, a, a + d and a + 2d respectively.

Given that a – 2d = 2d ⇒ a = 4d.

Price of bond A = 2 × Price of bond B

$\Rightarrow 2\times 4d = \frac{2d}{1+r}+\frac{2d}{(1+r)^2}+\frac{1000}{(1+r)^2}$ (Here r = 25%)

⇒ d = 125

∴ Coupon payments of A = Rs.250, B = Rs.500, C = Rs.750, D = Rs.625 and E = Rs.375.

The time of maturity of C can be either 2 or 3 years. Let it be 2 years.

$\therefore \text{Price of bond C} = \frac{750}{(1+r)}+\frac{750}{(1+r)^2}+\frac{1000}{(1+r)^2}$

$= \frac{750}{1.25}+\frac{750}{(1.25)^2}+\frac{1000}{(1.25)^2} = 1720 < 1800$ – a contradiction

∴ Time of maturity of bond C is 3 years and that of B and E is 2 years.

Let the face value of bond E be Rs.x, then the face value of B is Rs.2x.

Let the prices of bond B and E be Rs.1.75y and Rs.y respectively.

$\therefore 1.75y = \frac{2x}{(1.25)^2}+\frac{500}{1.25}+\frac{500}{(1.25)^2}$ ... (i)

and $y = \frac{x}{(1.25)^2}+\frac{375}{1.25}+\frac{375}{(1.25)^2}$ ... (ii)

Solving (i) and (ii), we get

x = 1406.25 and y = 1440

Further analysis leads to the following table:

	A	B	C	D	E
Time of maturity (T)	2	2	3	5	2
Coupon payment (C)	250	500	750	625	375
Face value (F)	1000	2812.5	1000		1406.25
Price (P)	1000	2520	1976		1440

21. A Face value of Bond E is Rs.1406.25.

22. C Since Madhubala has an amount of Rs.2500 to invest, so she must have invested only in bonds A and E or only C. As she intends to maximize her return, she has to invest in bond A and E.

∴ Return = Face values of bond A and E + Coupon payment for both the bonds

= 1000 + 1406.25 + 2 × 250 + 2 × 375

= Rs.3,656.25.

23. D Price of bond C is Rs.1,976.

24. A The unit digit can only be either 2, 3, 5 or 7.

Now if the product of all four digit is prime, then the digits other than the unit's digit has to be 1.

1 1 1 2

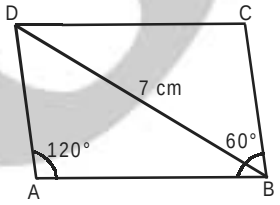
1 1 1 3

1 1 1 5

1 1 1 7

Only 4 numbers are possible.

25. C



Longer Diagonal, BD = 7 cm

Let AB = a and AD = b

∴ Area of parallelogram

$= \frac{1}{2}ab\sin 120°\times 2 = \frac{15\sqrt{3}}{2} \Rightarrow ab = 15$

Also, in ΔABD

$\cos 120° = -\frac{1}{2} = \frac{a^2+b^2-49}{2\times a\times b}$

$\Rightarrow -15 = a^2 + b^2 - 49$

$\Rightarrow a^2 + b^2 = 34 \quad [\because ab = 15 \Rightarrow b = \frac{15}{a}]$

$\Rightarrow a^2 + \frac{225}{a^2} = 34$

Let $a^2 = t$, then

$t^2 - 34t + 225 = 0$

$\Rightarrow t^2 - 25t - 9t + 225 = 0$

⇒ t = 9 or 25

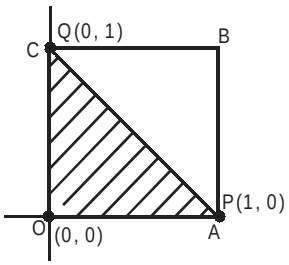
$\Rightarrow a^2 = 9$ or 25

⇒ a = 3 or 5

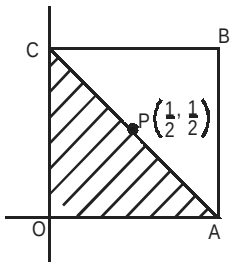
Then, b = 5 or 3

In both the cases the perimeter = 2 (a + b) = 2 (3 + 5) = 16 cm.

26. E



Consider the points P(1, 0) and Q(0, 1)
P^2 = (1, 0).(1, 0)
= (1.1, 0 + 0 – 0) = (1, 0)
Similarly, P^n = (1, 0) for n >> 1.
Similarly, Q^n = (0, 1) for n >> 1.
$\therefore P^n + Q^n$ = (1, 0) + (0, 1) = (1 + 0 – 0, 0.1) = (1, 0)



Now consider $P\left(\frac{1}{2}, \frac{1}{2}\right)$ and $Q\left(\frac{1}{2}, \frac{1}{2}\right)$

$$P^2 = \left(\frac{1}{2}, \frac{1}{2}\right).\left(\frac{1}{2}, \frac{1}{2}\right)$$

$$= \left(\left(\frac{1}{2}\right)^2, \frac{1}{2} + \frac{1}{2} - \left(\frac{1}{2}\right)^2\right) = \left(\frac{1}{4}, \frac{3}{4}\right)$$

$$P^3 = \left(\frac{1}{4}, \frac{3}{4}\right).\left(\frac{1}{2}, \frac{1}{2}\right) = \left(\frac{1}{8}, \frac{7}{8}\right)$$

$P^4 = \left(\frac{1}{16}, \frac{15}{16}\right)$ and so on.
$\therefore P^n$ = (0, 1) for n >> 1
Similarly, Q^n = (0, 1) for n >> 1
$\therefore P^n + Q^n$ = (0, 1) + (0, 1) = (0 + 0 – 0, 1.1) = (0, 1).
Hence, the correct option is (E).

27. E nP = P + P + P + ... n terms
Let P(1, 0) and Q(0, 1)
2P = P + P = (1, 0) + (1, 0) = (1 + 1 – 1, 0) = (1, 0)
3P = 2P + P = (1, 0) + (1, 0) = (1, 0)
In general, nP = (1, 0) for n >> 1
Similarly, nQ = (0, 1) for n >> 1
$\therefore$ nP + nQ = (1, 0) + (0, 1) = (1 + 0 – 0, 0) = (1, 0) for n >> 1
If P(0, 0) and Q(0, 0), then nP + nQ = (0, 0) for n >> 1
Hence, the correct option is (E).

28. C Total expenditure on carnations in January
= 47.4 × 70000 – 1136916 = 2181084
and total expenditure on carnations in March
= 49.5 × 70000 – 1137915 = 2327085

So percentage increase = $\frac{2327085 - 2181084}{2181084} \times 100 = 6.69\%$.

29. B Sales of roses in January = $\frac{1136916}{99} = 11484$

Sales of roses in July = $\frac{1188432}{144} = 8253$

$\therefore$ Percentage decrease

$= \frac{11484 - 8253}{11484} \times 100 = 28.13\%$

Hence, option (B) is the correct answer.

30. E Price of carnation in January

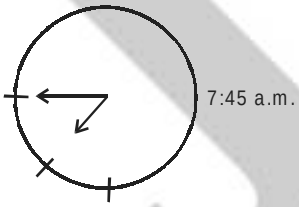
$= \frac{47.4 \times 70000 - 1136916}{13848} = \frac{2181084}{13848} = 157.5$

Price of carnation in December

$= \frac{56.4 \times 70000 - 977688}{18859} = 157.5$

So it did not change in December in comparison to January.

31. B



Minute hand covers, 360° in 60 minutes
In 1 minute it covers 6°

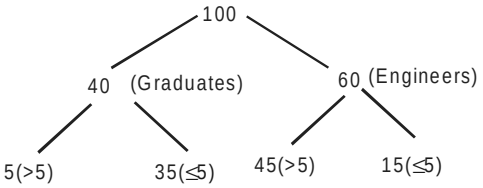
Hour hand covers $\frac{1}{2}°$ in 1 minute

There is a difference 2 minutes between 7:45 a.m. to 7.47 a.m.
In two minutes minute hand moves 6° × 2° = 12°

In two minutes hour hand moves = $\frac{1}{2}°$ × 2° = 1°

Hence, required difference = 12° – 1° = 11°.

32. E Let number of employees be 100.



So the proportion of general graduates employed by the organization who earn less than or equal to 5 lakh is $\frac{35}{40}$ or $\frac{7}{8}$.

33. B (1) = 2
(x + y) = (x) × (y)
(2) = (1 + 1) = (1) (1) = 2 × 2 = 4
(3) = (2 + 1) = (2) (1) = 4 × 2 = 8
(4) = (3 + 1) = (3) (1) = 8 × 2 = 16
So the series becomes

$$\sum_{x=1}^{n}(x) = (1) + (2) + (3) + \ldots + (n) = 2 + 4 + 8 + \ldots + 2^n$$

$2 + 2^2 + 2^3 + .. + 2^n = 1022$

$\Rightarrow \frac{2(2^n - 1)}{2 - 1} = 1022 \Rightarrow 2^n = 512 \Rightarrow n = 9.$

34. B A fair chance means that the probability of that event becomes more than 0.5.

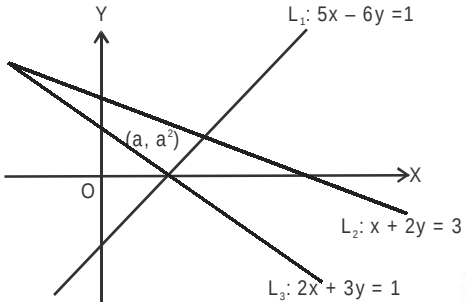
Let 'x' be the number of matches that India needs to play for having a fair chance of winning at least one match.

Therefore, $1-\left(\frac{5}{6}\right)^x > 0.5 \Rightarrow \left(\frac{5}{6}\right)^x < 0.5$

For $x = 4, \left(\frac{5}{6}\right)^x$ becomes less than 0.5.

Hence, India should play at least 4 matches.

35. C



For line L_1: 2x + 3y = 1, origin O and point (a, a^2) are on the opposite sides of the line, so their signs are opposite.

$L_1(0, 0) : 2.0 + 3.0 – 1 = –1 < 0$

$\therefore L_1(a, a^2) = 2a + 3a^2 – 1 > 0$

$\Rightarrow 3a^2 + 3a – a – 1 > 0$

$\Rightarrow (a + 1)(3a – 1) > 0$

$\Rightarrow a < –1 \text{ or } a > \frac{1}{3}$ ... (i)

For line L_2: x + 2y = 3, $L_2(0, 0)$ has same sign as $L_2(a, a^2)$

$L_2(0, 0) : 0 + 2.0 – 3 = –3 < 0$

$\therefore L_2(a, a^2) : a + 2a^2 – 3 < 0$

$\Rightarrow 2a^2 + 3a – a – 3 < 0$

$\Rightarrow (2a + 3)(a – 1) < 0$

$\Rightarrow -\frac{3}{2} < a < 1$ ... (ii)

For line L_3: 5x – 6y = 1, $L_3(0, 0)$ has same sign as $L_3(a, a^2)$

$L_3(0, 0): 5 \times 0 – 3 \times 0 – 1 = –1 < 0$

$\therefore L_3(a, a^2) = 5a – 6a^2 – 1 < 0 \Rightarrow 6a^2 – 1 < 0$

$\Rightarrow 6a^2 – 5a + 1 > 0$

$\Rightarrow (3a – 1)(2a – 1) > 0$

$\Rightarrow a < \frac{1}{3} \text{ or } a > \frac{1}{2}$ ... (iii)

From (i), (ii) and (iii), we get

$a \in \left(-\frac{3}{2}, -1\right) \cup \left(\frac{1}{2}, 1\right).$

36. E

	Book	CD	DVD
Profits	25%	40%	
Total Sale	52.50%	35%	12.50%
(Let Rs.200)	Rs. 105	Rs.70	Rs.25

$\text{Cost of Books} = \frac{105}{1.25} = \text{Rs.}84$ and

$\text{Cost of CD's} = \frac{70}{1.4} = \text{Rs.}50$

Total Profit = 20% (given)

$\text{Total cost} = \frac{200}{1.2} = \text{Rs.}\frac{500}{3}$

$\therefore \text{Cost of DVD} = \frac{500}{3} – 84 – 50 = \text{Rs.}\frac{98}{3}$

$\text{Hence, loss on DVD} = \frac{\frac{98}{3} – 25}{\frac{98}{3}} \times 100 \approx 23.4\%.$

37. B Now loss on DVD = 50%

	Book	CD	DVD
Profits	25%	40%	
Total Sale	52.50%	35%	12.50%
(Let Rs. 200)	Rs. 105	Rs. 70	Rs. 25

Referring to previous

$\text{Cost of DVD} = \frac{25}{0.50} = \text{Rs.}50$

$\therefore$ Total cost = 84 + 50 + 50 = Rs.184

Total sale = Rs.200

$\text{Profit} = \frac{200 – 184}{184} \times 100$

$= \frac{16}{184} \times 100 \approx 8.7\%$

38. D Expected profit of the company when brand ambassador is used (P_1):

$P_1 = (3.5 – 3.45)[10^5 \times 0.3 + 8 \times 10^4 \times 0.4 + 5 \times 10^4 \times 0.3]$ lakh

Expected profit of the company when brand ambassador is not used (P_2):

$P_2 = (3.5 – 3.45)[8 \times 10^4 \times 0.3 + 5 \times 10^4 \times 0.4 + 3 \times 10^4 \times 0.3]$ lakh

$\therefore$ Additional profit = $P_1 – P_2$ = Rs.12.0 crore.

$\Rightarrow$ Maximum that the company can afford to pay its brand ambassador

= Rs.12.0 crore.

39. C When profit of Rs.12.0 crores, then Profit/unit = Rs.5000

When profit is (12.0 – 9.0) = Rs.3 crore, then

$\text{profit/units} = \frac{5000 \times 3}{12} = \text{Rs.}1250$

$\Rightarrow$ With signing of contract and no increase in cost, company will have a profit of Rs.1250/unit

$\Rightarrow$ Maximum escalation in cost = Rs.1250

40. B Profit of Rs.1250/unit results in additional profit of Rs.3 crores.

Since the cost is going up by Rs.1000/unit

Therefore, profit/unit = Rs.1250 – Rs.1000 = Rs.250

$\therefore$ Addition/increase in profit

$= \text{Rs.}3 \text{ crores} \times \frac{250}{1250} = \text{Rs.}60 \text{ lakh.}$

SECTION B: ANALYTICAL REASONING AND DECISION MAKING

For questions 41 to 43: As per the information given in the question, the following cases are possible:

CASE I

Day	Lead Vocalist	Type	Name of the Band
Monday	Sid	Rock	Cactus
Tuesday	Meet	Rock	Dhoom
Wednesday	Rupam	Fusion	Fish
Thursday	Anjelina	Fusion	Enigma
Friday	Ali	Rock	Boom
Saturday	Bony	Fusion	Axis
Sunday			Bodhi

CASE II

Day	Lead Vocalist	Type	Name of the Band
Monday	Sid	Rock	Cactus
Tuesday	Meet	Rock	Axis
Wednesday	Rupam	Fusion	Fish
Thursday	Anjelina	Fusion	Enigma
Friday	Ali	Rock	Boom
Saturday	Bony	Fusion	Dhoom
Sunday			Bodhi

41. E

42. C

43. D

44. C Bola's desire to contribute to the society cannot be realized if he does not set-up business and earn money. At the same time, he has reservation against the possible damage caused by his enterprise to the environment. Option (C) provides the best way out as it resolves this conflict in the best possible manner.

45. D Option (A) can be eliminated as it won't pragmatic to stop developmental activities as the local people also enjoy the benefits of development. Option (B) can also be rejected as it goes against Bhola's idea of not damaging the environment. Option (C) can be eliminated. Eco-tourism, if controlled by the government keeping in mind the interest of stakeholders, may actually go against the larger interests of protecting the environment. Between options (D) and (E), option (D) is a better alternative as the kind of eco-tourism suggested here would involve synergetic efforts among NGOs, the government and the private players.

46. B Option (B) would be the most effective measure as it would encourage protection of the environment and discourage pollution of the environment at the same time.

47. D The best course of action that Guruji can suggest to Bhola to score a quick win would be best reflected by option (D). Statement D hints at pointing out the good work done by Bhola's government without pointing fingers at anyone. Option (C) is frivolous as it suggests accusing the opposition. Moreover, this measure might prove to be ineffective if the unemployment levels turn out to be more. Option (B) does not fully resolve the issue as it is only confined to the improvement in environment. Similarly, option (A) again accuses the opposition and does not resolve the stated concern. Hence, option (D) is correct.

For questions 48 to 52:
From information (1):
8 Across – Titli – Answer (Silence or Rosebud) as it must have seven letters.

Also, the answer given by one of the two men must have six letters (Barely or Burden)

From information (2):
Given that Bineet did not solve the clue to "Burden" and Easwar did not solve 4 down.

From information (3):
The answers to 15 across and 15 down have different number of letters.

From information (4):
Silence – Across and did not give an answer to the clue that was solved third.

From information (5):
Barely – first clue that was answered and Baadshah – not second. From information (1) we know that the answer given by Titli has seven letters and so was the answer given just before it. So, Titli was not the second person that gave the answer to the clue.
From information (6):
Sheela was either the second, third or the fourth to find the answer.
Titli's answer was followed by an answer given by a man.
Also, the number of letters in the answer given by Elsie has to be 8 or 7 and correspondingly the number of letters in the answers given by Bineet has to be 7 or 6.

Assume that the answer given by Bineet has 7 letters then the number of letters in the answer given by Easwar as well as Sheela has to be 6. In this case Sheela will become the first person to give the answer to the clue which is not possible.
Hence, the answer given by Bineet has 6 letters and that given by Elsie has 8.

Therefore, Bineet gave the answer Barely and was the first to give the answer.

First – Bineet – Barely – Down
Second – Sheela – Silence (As Silence was not the third word to be inserted) – Across
Third – Titli – Rosebud – 8 Across
Fourth – Easwar – Burden – Down
Fifth – Elsie – Baadshah – Across

Since Easwar did not solve 4 down, therefore he solved 15 down and Bineet solved 4 down.

So, the final table will look like:

Name	Answers	Numbers	Order
Bineet	Barely	4 down	First
Sheela	Silence	21 across/ 15 across	Second
Titli	Rosebud	8 across	Third
Easwar	Burden	15 down	Fourth
Elsie	Baadshah	15 across/ 21 across	Fifth

48. B 49. C 50. C 51. D 52. A

For questions 53 to 54:

53. A Given that Samuel is telling the truth, which means that there are exactly three suspects including Samuel who are telling the truth.
Option A is true as when Chaudhary, Dutta and Samuel are the three suspects telling the truth then each of the other suspects is not telling the truth.
Option B cannot be true as if Nagraj fudged the accounts, then Shrinivas and Jose are telling the truth along with Samuel. But it cannot be proved whether Datta is telling the truth or not.
Option C cannot be true as if Chaudhary and Jose are telling the truth, then there would be four suspects (Chaudhary, Jose, Shrinivas and Samuel) that are telling the truth, which is not possible.
Option D cannot be true as if Shrinivas and Datta are telling the truth, then Jose would also be telling the truth and there would be four suspects (Chaudhary, Jose, Shrinivas and Samuel) that are telling the truth, which is not possible.
Option E cannot be true as if Shrinivas fudged the accounts then it is not possible to exactly determine how many out of the nine suspects are telling the truth.

54. D,E Given that Panda is lying, which means that Samuel is speaking the truth and which implies that there are exactly three suspects who are speaking the truth i.e. Samuel, Chaudhary and Datta are telling the truth.
Option (A) can be true as Nagraj, Ganeshan and Ejaz can be lying simultaneously.
Option (B) Datta, Chaudhary are telling the truth i.e. Datta fudged the accounts. So option (B) can be true.
Option (C) Datta is telling the truth. So option (C) can be true.
Option (D) Jose, Shrinivas are lying. So option (D) cannot be true.
Option (E) Shrinivas is lying so, Nagraj did not fudge the accounts. So it cannot be true.

55. A The reasons for the Jet Airways not doing well is directly stated in these lines third paragraph fourth line which reads "consequently passenger load had fallen..... 70-75%." and eleventh line third paragraph. Which reads "According to the analyst.....and ATF prices.

56. D The daily loss of Air India as given in the passage is almost 10 crore. Jet Airline lost 3000 crore. So, the loss incurred by the Air India is 10 × 366 = 3660. So the loss for the Rest of the airlines is 10,000-(3660 + 3000) = 3340. Hence, option (D) is the correct answer.

57. B Even if the fuel constitutes 30% of the revenue, we are not sure how it will translate into load factor to reduce the operating costs. Hence, the data is insufficient to reach a decision.

58. B The question demands that Mr. Ranjan has to portray good image of himself as well as create a long lasting positive impact. For this, option (B) is the best choice. Providing adequate security protection will assuage the apprehensions of the players. Moreover, this will earn him the popularity of the followers of the game.

59. B The best rationale behind Ranjan's decision in favour of IRC would be option (B). If the World Cup is held in a country which has adopted the DTC guidelines and Racket Club doesn't comply with the DTC guidelines, then the team will not be allowed to participate in the World Cup.

60. D Option (D) is the only issue which has no relation with the apprehensions raised by the top three popular players. After all security arrangements at the stadium where Racket is played has nothing to do with the security threat perceived by the players if they disclose their whereabouts/schedule for three months in advance.

For questions 61 to 63:

61. D Option A: The given group of puppies cannot be in pen 2 as Blakely and Ashley cannot be together in pen 1.
Option B: The given group of puppies cannot be in pen 2 as Blakely and Ashlen cannot be together in pen 2.
Option C: The given group of puppies cannot be in pen 2 as if Daffy is not kept in pen 2, then Gabino is kept in pen 1 and in this case Gabino is put in pen 2.
Option D: The given group of puppies can be in pen 2.
Option E: The given group of puppies cannot be in pen 2 as if Daffy is not kept in pen 2, then Gabino is kept in pen 1 and in this case Gabino is put in pen 2.

62. B Given that Earl shares a pen with Fala.

Option A is not necessarily true as:
The puppies in pen 1 could be Earl, Fala and Blakely.
The puppies in pen 2 could be Gabino, Daffy, Ashlen and Custard.

Option B is necessarily true as Gabino and Daffy have to be together and given that Earl and Fala are also together. Also, Ashlen and Blakely have to be in different pens. So, Custard must be in pen 2, which has four puppies.

Option C is not necessarily true as:
The puppies in pen 1 could be Gabino, Daffy and Ashlen.
The puppies in pen 2 could be Earl, Fala, Custard and Blakely.

Option D is not necessarily true as:
The puppies in pen 1 could be Gabino, Daffy and Ashlen.
The puppies in pen 2 could be Earl, Fala, Custard and Blakely.

Option E is not necessarily true as:
The puppies in pen 1 could be Gabino, Daffy and Ahlen.
The puppies in pen 2 could be Earl, Fala, Custard and Blakely.

63. E Given that Earl and Fala are in different pens.

Option A can be true as:
The puppies in pen 2 could be Earl, Gabino, Daffy and Ashlen.
The puppies in pen 1 could be Fala, Custard and Blakely.

Option B can be true as:
The puppies in pen 2 could be Earl, Gabino, Daffy and Ashlen.
The puppies in pen 1 could be Fala, Custard and Blakely.

Option C can be true as:
The puppies in pen 2 could be Fala, Gabino, Daffy and Ashlen.
The puppies in pen 1 could be Earl, Custard and Blakely.

Option D can be true as:
The puppies in pen 2 could be Earl, Gabino, Daffy and Blakely
The puppies in pen 1 could be Fala, Custard and Ashlen.

Option E cannot be true as it means Custard is in pen 2 and Fala is in pen 1.
So, Earl is in pen 2 along with Custard. Daffy and Blakely have to be in different pens.
But Gabino and Daffy have to be together. Hence, this cannot be true.

For questions 64 to 68:
As per the information given in the question, the following data can be concluded:

Duty commenced at	Operator(s)	College	Location
	Indra	Barala	Hyderabad
12:00 hrs	Dogra and Falguni	Abhiman	Pune
04:00 hrs	Ballal	Khatanama	Mangalore
00:00 hrs	Abdulla and Henri	Gutakal	Jamshedpur
	Chandan, Eshita and Ganguli	Sutanama	Noida

Also, no operator joined at 20:00 hrs.

64. B 65. C 66. A

67. B Option A is definitely true as at least Ballal, Abdulla and Henri will be working between 04:00 hrs and 08:00 hrs.
Option B is definitely not true as Chandan, Eshita and Ganguli may start at 04:00 hrs and Indira might start at 16:00 hrs. So, there will be at most 6 persons (along with Ballal, Abdulla and Henri) who will be working between 04:00 hrs and 08:00 hrs.
Option C is definitely true as Chandan, Eshita and Ganguli may start at 12:00 hrs and Indira might start at 16:00 hrs. So, there will be at most 5 operators (along with Dogra and Falguni) who will be working between 12:00 hrs to 16:00 hrs.
Option D is definitely true as Indira as well as the team of Chandan, Eshita and Ganguli may start working at 16:00 hrs and so there will be at most 6 persons (along with Dogra and Falguni) who will be working between 16:00 hrs and 20:00 hrs.
Option E is definitely true as at least one operator must start working at 16:00 hrs to keep round the clock operation.

68. E Given that five operators are working between 16:00 hrs and 20:00 hrs. This is possible when Indira must have finished 8 hours of her duty before 12:00 hrs and therefore the team of Chandan, Eshita and Ganguli must start working at 16:00 hrs to keep the round the clock operation.

Option A is not necessarily true as there might be Indira who may have started at 04:00 hrs.
Option B is not necessarily true as Ballal works only from 04:00 hrs to 12:00 hrs.
Option C is not necessarily true as Abdulla and Henri must work simultaneously at any moment of time.
Option D is not necessarily true as the team of Chandan, Eshita and Ganguli must work simultaneously at any moment of time.
Option E must be true as Dogra and Falguni will finish working at 20:00 hrs and only the team of Chandan, Eshita and Ganguli will be working between 20:00 hrs to 00:00 hrs.

69. E As per the passage, since Dr. Puneet has already told Ms. Benita about the details of the disease. Thus options (A) and (D) can be ruled out. Option (B) also does not seem like likely advice from the doctor since he is certain of the disease and the passage does not indicate that he wants to further confirm his diagnosis. Option (C) is irrelevant since it denotes what would happen if the doctor did not embark on a course of action. Option (E) is the correct answer since it fits in with the doctor's diagnosis and also qualifies his closing statement, since he cannot be certain of the outcome of this course.

70. D Since the question does not give us any clear premise to define the ethical dimensions in this case, the answer would depend on the opinion of the one solving this question. However, from among the given options, option (D) seems to be the best answer since the only way in which one can argue convincingly against the actions of the arsonists is by questioning the legality of their activities.

SECTION C: VERBAL ABILITY AND LOGICAL REASONING

71. D The first statement of the passage is a general conclusion which is elucidated with the help of specific examples- 'Social roles may either conflict or cooperate…' and later substantiated by examples like 'saintly rake' and 'loving wife and mother'.

72. D The essence is best captured by (D) as the entire passage talks about how fashion become so because of the person who wears it, it is born out of the grace and manners of the person and is not a quality of the clothes themselves.

73. E The passage best supports e. It is brought out throughout the passage the author emphasizes it in the first 2 lines 'that is not fashion…….' And again reiterates it towards the end 'As soon as they drop it….'

74. A 'Proscribe' means to prohibit or ban, hence A captures the intended idea.

75. E 'Allusion' which means indirect reference, fits the first blank and 'elusion' which means evading goes best in the last blank. The correct phrase to use with the tone of the sentence is 'under the delusion', this leads us to option E.

76. A The argument states that to retain one's dignity without 'intruding upon another's liberty is impossible.' This is best captured by option (A). Hence, (a) is the correct answer.

77. D From the passage it is clear that the situation of human beings at the end of the 22nd century was caused by the creation of artificial intelligence by the human race. Thus. Option (D) is the correct answer.

78. C Statement C cannot be inferred from the passage. A is stated. B can be inferred- 'we do not know who struck first'. D is also stated. E can also be inferred as Morpheus talks about hacking into the matrix.

79. E The argument clearly states that 'buying in bulk makes super-markets a practical choice for budget-conscious consumers'; option E is the assumption because it has to be true for the conclusion to follow.

80. D Statement D is the best objective statement out of the given options, hence it reflects a scientific temperament.

81. A The phrase 'Some words are highly inflammable' introduces the main idea which is further substantiated by the specific example of the conflict regarding 'fusion'.

82. C This option best captures the purists' perspective as mentioned in the passage- 'it violates the purity of music'. Option A is more of a neutral stand-point.

83. B The author repeatedly states that while doing probability calculations 'we must not think of an individual, but of a certain class as a whole.' Thus statement 2 best captures the conclusion that can be drawn from the passage. Statement 3 can be ruled out since the passage does not talk about predicting any future events. Thus, option (B) - only 2 - is the correct answer.

84. A 'we can say nothing about the probability of death of an individual even if we know his condition of life and health in detail', this is exactly contrasted by statement A.

85. B Option (A) runs counter to what is stated in the passage. The author clearly states that probability can only be calculated on the basis of a group or class, hence B is the answer as it analyses the fight between boxers from two different clubs.

86. B The correct sequence is 2,3,5,4,1 as statement 2 qualifies as an opener as it introduces the idea. Statement takes it forward. 5,4,1 form a logical sequence as 'He' in 4 refers to ' the person' in 5. 1 continues the idea mentioned in 4 forward. The clue lies in paying attention to the words 'he does not' in 4 and linking them with 'He might make the opposite mistake'.

87. C 'communication medium' is the correct phrase to use here.

88. D Unaccompanied is the correct word to complete the sentence. 'Lonely', 'solitary' and 'single' do not communicate the intended meaning. 'Unguarded' would not fit in here as it is unidiomatic.

89. B The relationship between the words is that of refineness and coarseness. Although, Gourmet and Gourmand are synonyms, Gourmet has a higher discernment than that of a Gourmand. It is best mirrored in the option (B) which also defines a degree of coarseness. This is the best possible option one can choose out of the given options.

90. A The key to solving this question lies in the last 2 blanks. 'Expatiate' which here would mean to explain fits in the 3rd blank and 'expiate' which means to atone for one's mistake would fit the last blank.

91. C The argument in the passage is that since the existence of protons, neutrons and electrons has been experimentally confirmed further research on 'exotic' particles is irrelevant for the larger scientific discipline. Option (C) contradicts this claim by stating that knowledge of a particular phenomenon is essential before its wider application. Thus, option (C) weakens the argument in the passage.

92. D Only IV is logically consistent with the argument. It is clearly mentioned in the 3rd line of the argument. Statement I cannot be inferred. Statement II can also be negated as the author says that discoveries that came ***after*** the neutron, proton and electron are unnecessary. He does not comment about them as such.

93. A Going by the given definitions of fact, inference and judgement, Statement (ii) qualifies as a fact. Statement (iv) is a judgement as it is clearly an opinion, on the basis of this we can eliminate options C, D and E. Statement (iii) qualifies as an inference as it has a logical conclusion (government intervention in the form of an appeal) based on knowledge of facts (A court decision against the declared policy guideline).

94. B Statement I can be negated as both actions do not have the same source of motivation. Similarly, both examples do not illustrate the concept of moral worth. This negates statement II. Statement III clearly highlights that both the actions are done for reasons beyond the duty- action (i) is motivated by feeling of gratitude. Action (ii) is motivated by a desire for legitimacy.

95. A It is clearly contradicted by the lines in the passage '…the moral worth of any action relies……cannot be said good or bad in light of consequences'. Hence the correct answer is option (A).

96. D Option D best addresses the problem as it attempts to modify the pedagogy. None of the other options actually talk about the method of instruction which is the real issue discussed by the author.

97. B 'Added energy' is not claimed as a result of *Magix,* as it is an outcome of the sleep. All the rest are directly claimed as results of taking *Magix.*

98. E The two mandatory pairs – (3 and 5) and (2 and 1) can be easily identified. 'This ostensive teaching' in 5 is a clear reference to "ostensive teaching of words" in 3. Similarly, 2 puts up a question and 1 answers it. This leaves us to figure out the position of 4. 'if this does happen' in 4 connects best with '…a picture of the object comes before the child's mind…' in 1, leading us to the sequence 35214.

99. C The central idea of the passage is that films are not completely dependent on visual appeal. It goes on to substantiate this view by mentioning that successful films have been made from plays, where the emphasis is on words, and some have been shot only on a single set or location. The option that is most opposite to this idea is (C), 'Films are solely built upon visual and eye catching scenes.'

100. A 'high pitched' is the best usage.

101. D The conclusion states that channel owners broadcast more reality shows than other programmes as they are interested in increasing the revenues, hence D has to be a premise as it states that reality shows make more money.