

# Mock CAT – 2

## Answers and Explanations

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|     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |
|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 1   | a | 2   | a | 3   | c | 4   | d | 5   | d | 6   | a | 7   | b | 8   | c | 9   | d | 10  | a |
| 11  | d | 12  | a | 13  | c | 14  | d | 15  | a | 16  | c | 17  | a | 18  | c | 19  | c | 20  | a |
| 21  | b | 22  | a | 23  | c | 24  | c | 25  | a | 26  | c | 27  | b | 28  | b | 29  | c | 30  | c |
| 31  | b | 32  | a | 33  | c | 34  | a | 35  | c | 36  | c | 37  | b | 38  | c | 39  | b | 40  | d |
| 41  | c | 42  | b | 43  | c | 44  | a | 45  | b | 46  | b | 47  | c | 48  | c | 49  | c | 50  | a |
| 51  | a | 52  | b | 53  | c | 54  | c | 55  | d | 56  | a | 57  | a | 58  | d | 59  | a | 60  | c |
| 61  | c | 62  | c | 63  | c | 64  | b | 65  | d | 66  | a | 67  | b | 68  | b | 69  | c | 70  | c |
| 71  | c | 72  | b | 73  | d | 74  | d | 75  | a | 76  | b | 77  | c | 78  | a | 79  | a | 80  | d |
| 81  | c | 82  | c | 83  | d | 84  | d | 85  | b | 86  | d | 87  | c | 88  | a | 89  | c | 90  | d |
| 91  | d | 92  | c | 93  | c | 94  | b | 95  | b | 96  | d | 97  | a | 98  | b | 99  | d | 100 | c |
| 101 | a | 102 | a | 103 | d | 104 | a | 105 | d | 106 | b | 107 | b | 108 | c | 109 | c | 110 | d |
| 111 | a | 112 | b | 113 | b | 114 | c | 115 | c | 116 | d | 117 | d | 118 | b | 119 | a | 120 | d |
| 121 | b | 122 | b | 123 | a | 124 | b | 125 | d | 126 | d | 127 | a | 128 | b | 129 | a | 130 | a |
| 131 | b | 132 | a | 133 | a | 134 | c | 135 | d | 136 | c | 137 | d | 138 | a | 139 | c | 140 | c |
| 141 | b | 142 | c | 143 | a | 144 | b | 145 | d | 146 | a | 147 | c | 148 | c | 149 | d | 150 | c |

### Scoring table

| Section      | Question number | Total questions | Total attempted | Total correct | Total wrong | Net score | Time taken |
|--------------|-----------------|-----------------|-----------------|---------------|-------------|-----------|------------|
| QA           | 1 to 50         | 50              |                 |               |             |           |            |
| EU + RC      | 51 to 100       | 50              |                 |               |             |           |            |
| DI + DS + AR | 101 to 150      | 50              |                 |               |             |           |            |
| Total        |                 | 150             |                 |               |             |           |            |

1. a Consider that the N is the three-digit number, xyz in decimal system and is abcd when written in base 7 (once you are clear of the explanation, you will see that it works for any number of digits). Thus we will have  $100x + 10y + z = 343a + 49b + 7c + d$ . Now the LHS is even as z is even (N is an even number in decimal system). Thus, the RHS also has to be even. The RHS can be written  $342a + 48b + 6c + (a + b + c + d)$ . For this to be even,  $(a + b + c + d)$ , i.e. the sum of digits when N is written in base 7 has to be even.

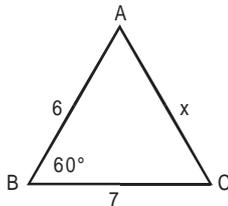
2. a Considering  $X = 1$ , there is just one box with 7 balls and thus total number of balls is 7. When X is put as 1 in the options, only options (a) and (d) evaluate to 7. When  $X = 2$ , the total number of balls is  $7 + 9 = 16$ . Substituting  $X = 2$  in options (a) and (d), only option (a) evaluates to 16. Thus answer will be option (a).

Theory: The difference in balls in successive boxes is 2, 3, 4, 5, ... This should have given the clue how to proceed. Consider a box number 0 with 6 balls. Then the difference in successive boxes will be 1, 2, 3, 4, ... Thus the number of balls in  $i^{\text{th}}$  box will be  $6 + \sum n$ ,

i.e.  $6 + \frac{n(n+1)}{2}$ . Total number of balls in X boxes will be

$$\begin{aligned} \sum_{n=1}^X 6 + \frac{n(n+1)}{2} &= 6X + \frac{1}{2} \sum_{n=1}^X n^2 + n \\ &= 6X + \frac{1}{2} \left( \frac{X(X+1)(2X+1)}{6} + \frac{X(X+1)}{2} \right) \\ &= 6X + \frac{1}{2} \left( \frac{2X^3 + 6X^2 + 4X}{6} \right) \\ &= 6X + \frac{X^3 + 3X^2 + 2X}{6} = \frac{X}{6} (X^2 + 3X + 38) \end{aligned}$$

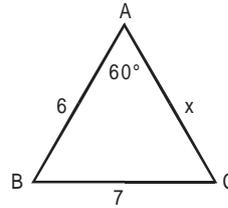
3. c Case I:



When the unknown side faces  $60^\circ$  angle. From cosine rule

$$\begin{aligned} \cos 60^\circ &= \frac{6^2 + 7^2 - x^2}{2 \times 6 \times 7} \\ \text{or } x &= \sqrt{43} \end{aligned}$$

Case II:



When the side of length 7 faces  $60^\circ$  angle. From cosine rule

$$\cos 60^\circ = \frac{6^2 + x^2 - 7^2}{2 \times 6 \times x}$$

$$\text{or } x^2 - 6x - 13 = 0$$

$$\text{or } x = 3 \pm \sqrt{22}$$

x cannot be equal to

$$3 - \sqrt{22}$$

so  $x = 3 + \sqrt{22}$ , solving in the similar way we realise that  $60^\circ$  angle cannot be opposite to the side of length 6 cm.

4. d Let  $a = x$ ,  $\frac{b}{3} = y$  and  $\frac{c}{4} = z$ . Thus  $b = 3y$  and  $c = 4z$  and  $a + b + c = x + 3y + 4z$ .

Since  $a \times b^3 \times c^4 = 6912$ ,  $x \times (3y)^3 \times (4z)^4 = 6912$

i.e.  $27 \times 256 \times x \times y^3 \times z^4 = 6912$

i.e.  $x \times y^3 \times z^4 = 1$

i.e. product of x, y, y, y, z, z, z, z is a constant 1 and since all of them are positive numbers, the least sum of x, y, y, y, z, z, z, z will be when all of them are equal i.e. 1.

Thus least  $x + 3y + 4z =$  least value of  $a + b + c = 8$

5. d  $\log_v x = a$  or  $\log_x v = \frac{1}{a}$

Similarly,  $\log_x k = \frac{1}{b}$

$$\log_x v - \log_x k = \frac{1}{a} - \frac{1}{b}$$

$$\text{or } \log_x \left( \frac{v}{k} \right) = \frac{b-a}{ab}$$

$$\text{or } \log_{(v/k)} x = \frac{ab}{b-a}$$

6. a The question gives the ratios of the minutes covered by two watches. Thus the ratio of actual minutes and that covered by the table clock is  $60 : 55$ , i.e.  $12 : 11$ . The ratio of minutes covered by table clock and wall clock is  $60 : 55$ , i.e.  $12 : 11$  and that covered by wall clock and wrist watch is  $12 : 13$ . Thus ratio of minutes covered by wrist watch to the actual minutes elapsed is actual minutes to that covered by wrist watch is

$$\frac{11}{12} \times \frac{11}{12} \times \frac{13}{12}$$

When actually 120 min are past, the

wrist watch covers  $120 \times \frac{11}{12} \times \frac{11}{12} \times \frac{13}{12}$ , i.e.  $\frac{15730}{144}$   
 = 109.23 min, i.e. 1 hr, 49 min, 14 s.

7.b Speed of the train = 90 km/hr = 25 m/s

It will take  $\frac{1000}{25} = 40$  s to reach the crossing.

It will take  $\frac{1100}{25} = 44$  s to cross the crossing.

∴ The bus should not reach there between 40 and 44 s to avoid the accident.

Limits are  $\frac{700}{44}$  to  $\frac{700}{40}$

= 15.9 m/s to 17.5 m/s  
 = 57 km / hr. to 63 km / hr

**For questions 8 and 9:**

Here  $p^2 + q^2 + r^2 = (p + q + r)^2 - 2(pq + qr + rp)$

or  $s^2 = (s)^2 - 2(pq + qr + rp)$

or  $pq + qr + rp = 0 \dots (i)$

From (i) it can be concluded that exactly two of p, q and r are definitely zero and the third is s (which may also be zero). So, these are three solutions (0, 0, s), (0, s, 0) and (s, 0, 0).

And of course two different values are possible for p. There are  $p = 0$  and  $p = s$ .

8. c

9. d

10. a Take few examples and understand.

Absolutely no mathematics in it.

∴ Option (a).

$N_1$  boxes contain at least 1 ball

$N_2$  boxes contain at least 2 balls

$N_3$  boxes contain at least 3 balls

∴

$N_k$  boxes contain at least k balls

So  $(N_1 - N_2)$  boxes contain exactly one ball.

$(N_2 - N_3)$  boxes contain exactly 2 balls.

$(N_3 - N_4)$  boxes contain exactly 3 balls.

$(N_{k-1} - N_k)$  boxes contain exactly k - 1 balls.

$N_k$  boxes contain exactly k balls.

So total number of balls =  $(N_1 - N_2) + 2(N_2 - N_3) +$

$3(N_3 - N_4) + \dots + (k - 1)(N_{k-1} - N_k) + kN_k$

=  $N_1 + N_2 + N_3 + N_4 + \dots + N_k$

11. d The divisor  $k = 729 \times 10^8 = 3^6 \times 10^8$

The dividend  $M = 18! \times 10^5$

18! will have  $6 + 2 = 8$  powers of 3 and 3 powers of 10.

Thus 18! can be written as  $3^8 \times 10^3 \times n$  and  $18! \times 10^5 = 3^8 \times 10^8 \times n$

Thus the dividend is a multiple of the divisor and thus the remainder will be 0.

12. a The inner dimensions will be  $(10 - 2t)$ ,  $(9 - 2t)$  and  $(7 - 2t)$ . Thus the inner surface area will  $2 \times \{(10 - 2t)(9 - 2t) + (10 - 2t)(7 - 2t) + (9 - 2t)(7 - 2t)\} = 262$

This will boil down to a quadratic which can be solved and we will get two values of t. One should not solve the quadratic but make use of the options. Substituting  $t = 1$ , we see that it satisfies the above equation.

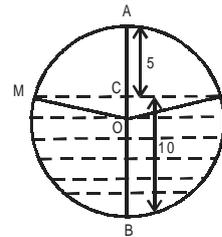
Obviously  $\frac{22}{3}$  is not worth considering as it is greater

than 7 and the thickness has to be less than the least outer dimension, i.e. 7.

13. c Both Nitin and Neha start at the same time and Nitin meets Neha in 15 min. Thus, Neha has been walking for 15 min and has covered some distance, say X. Had Neha not walked, Nitin would have taken 5 min more to drive this X distance. Thus for the same distance, X, Neha takes 15 min to walk and Nitin takes 5 min to drive. Thus, ratio of speeds 1 : 3, i.e. option (c)

14. d Let  $21P + 4 = A$  and  $14P + 3 = B$ . If A and B have a common factor, say k, then  $3B - 2A$  should also be a multiple of k. But  $3B - 2A = 42P + 9 - 42P - 8 = 1$ . Thus k can only take a value of 1 and A and B will have only 1 as the common factor.

15. a



Let 'O' be the centre of the sphere and MCN be the smooth surface of water.

We have  $MC = CN$  that is radius of the circle formed by the contact of water surface with the ball.

$MC \times CN = AC \times CB$

or  $MC^2 = 50$

or  $MC = 5\sqrt{2}$

∴ Circumference of the circle formed by the contact of the water surface with the ball is:

$$2 \times 5\sqrt{2}\pi = 10\sqrt{2}\pi$$

16. c For 2 cops, there are total of  $2! = 2$  ways of picking caps. One of this is that each picks his own cap and 1 way is such that both the cops pick a wrong cap. For 3 cops, there are a total of  $3! = 6$  ways of picking caps of which one way is such that each one picks own cap. The number of ways such that exactly one of them picks the right cap will be  $3 \times 1$  (3 for which cop pick the right cap and as seen earlier two cops can both pick the wrong caps in only 1 way). Thus there are  $6 - 1 - 3 = 2$  ways in which three cops can pick caps such that all of them pick wrong caps. For 4 cops, total number of ways of picking caps =  $4! = 24$ . Of this 1 way is such that all pick the right cap.

The number of ways such that exactly 1 picks right cap =  $4 \times 2 = 8$  (4 for which cop picks right cap and as seen earlier three cops can pick the caps such that all three pick wrong caps in 2 ways). The number of ways in which exactly 2 cops pick the right cap =  $4C2 \times 1 = 6$  ( $4C2$  for which two pick right cap and remaining two cops can each pick wrong caps in just 1 way). Thus the number of ways in which all four cops pick the wrong caps is  $24 - 1 - 8 - 6 = 9$  ways. With 5 cops, if exactly one has to pick right cap, all the remaining four pick the wrong cap. Thus the number of such ways =  $5 \times 9 = 45$  (5 for which cop picks the right cap and there are 9 ways in which 4 cops can pick caps such that all of them pick wrong caps)

17. a  $y = \sin x + \cos x$

$$y = \sqrt{2} \left[ \frac{1}{\sqrt{2}} \sin x + \frac{1}{\sqrt{2}} \cos x \right]$$

$$\sqrt{2} [\sin(x + 45)]$$

$\therefore$  Maximum value of  $\sin(x + 45)$  is 1

$\therefore$  Maximum of  $y = \sqrt{2}$ .

18. c Anyone who has left this question simply because of logs should kick himself once. In the equation given, y and z can be substituted for each other and the equation still remains valid. Thus look for a solution where y and z are equal. Only option (c) satisfies this.

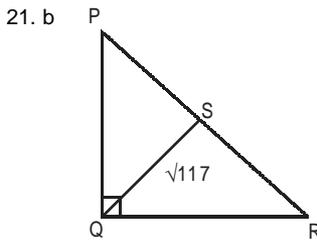
19. c B in solution P  $\rightarrow$  30%

B in solution Q  $\rightarrow$  30%

B in solution S  $\rightarrow$  30%

$\therefore$  P, Q and S can be added in any ratio. The percentage of B will always be 30%.

20. a A parallelogram inscribed in a circle has to be a rectangle. The diagonal of the rectangle will be the diameter of the circle and is of length 13 cm. Since one side of the rectangle is 12 cm and diagonal is 13 cm, the adjacent side has to be 5 cm and the area of the rectangle is  $12 \times 5 = 60$  sq. cm.



We have  $PQ + QR = 30$

$PR = 2QS = 2\sqrt{117}$  ( $\therefore$  Point S is the centre of circumcircle of  $\Delta PQR$ )

$$PQ^2 + QR^2 = PR^2$$

$$\text{or } (PQ + QR)^2 - 2PQ \cdot QR = 4 \times 117$$

$$\text{or } 900 - 2PQ \cdot QR = 468$$

$$\text{or } PQ \cdot QR = \frac{1}{2}(900 - 468) = 216$$

$$\text{Area of the } \Delta PQR = \frac{1}{2}PQ \times QR$$

$$= \frac{1}{2} \times 216 = 108$$

For questions 22 and 23.

$f^\infty(x)$  is nothing but digit-sum of number x.

22. a Here  $x = 123456^{654321}$ . 123456 is a multiple of 3 and hence  $123456^{654321}$  will be a multiple of 9. The digit sum of any multiple of 9 is always 9 and hence the answer is 9.

23. c Digit sum of  $7^1 = 7$

Digit sum of  $7^2 = 4$

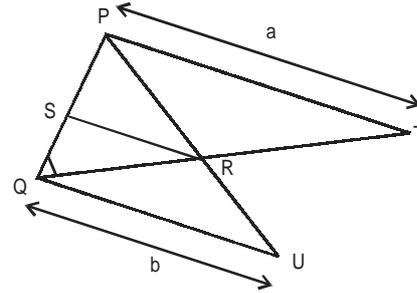
Digit sum of  $7^3 = 1$

Digit sum of  $7^4 = 7$

Digit sum of  $7^5 = 4$

$\therefore$  We observe that the digit sum of powers of 7 have a cyclicity of 3. Since 183 is a multiple of 3,  $7^{183}$  will have a digit sum of 1.

24. c



Given that  $PT \parallel SR \parallel QU$

$$PT = a, QU = b$$

$\Delta PTQ$  and  $\Delta SRQ$  are similar.

$\therefore$  We have

$$\frac{PQ}{PT} = \frac{SQ}{SR}$$

$$\text{or } \frac{PQ}{a} = \frac{SQ}{SR} \quad \dots (i)$$

$\Delta UQP$  and  $\Delta RSP$  are similar.

$\therefore$  We have

$$\frac{PQ}{QU} = \frac{PS}{SR}$$

$$\text{or } \frac{PQ}{b} = \frac{PS}{SR} \quad \dots (ii)$$

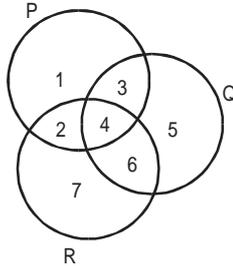
Combining (i) and (ii)

$$\frac{PQ}{a} + \frac{PQ}{b} = \frac{SQ + PS}{SR}$$

$$\text{or } PQ \left( \frac{1}{a} + \frac{1}{b} \right) = \frac{PQ}{SR} \quad [\text{As } SQ + PS = PQ]$$

$$PQ \left[ \frac{a+b}{ab} \right] = \frac{PQ}{SR} \text{ or } SR = \frac{ab}{a+b}$$

25. a



To solve the question of this type it is best done by assigning simple values to the set. Here we take

$$P = \{1, 2, 3, 4\}$$

$$Q = \{3, 4, 5, 6\}$$

$$R = \{2, 4, 6, 7\}$$

$$P - (Q - R) = \{1, 2, 4\}$$

which only option (a) gives.

26. c It is hardly a question folks!

$L_1$  is equal to  $6 - K_1$ ,

$L_2 = 6 - K_2$  and so on ...

$$L_1^2 + L_2^2 + \dots + L_7^2$$

$$= (6 - K_1)^2 + (6 - K_2)^2 + \dots + (6 - K_7)^2$$

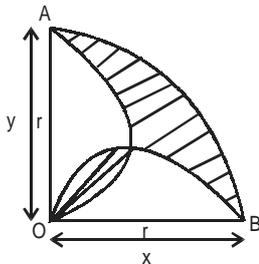
$$= K_1^2 + K_2^2 + K_3^2 + \dots + K_7^2 + 7 \times 36 - 12(K_1 + K_2 + K_3 + \dots + K_7)$$

$$= K_1^2 + K_2^2 + K_3^2 + \dots + K_7^2 + 7 \times 36 - 12 \times 21$$

$$\therefore [L_1 + L_2 + L_3 + \dots + L_7 = K_1 + K_2 + K_3 + \dots + K_7 = 21]$$

$$= K_1^2 + K_2^2 + K_3^2 + \dots + K_7^2$$

27. b



Let  $AO = OB = r$

$$\text{Area of quarter circle AOB} = \frac{\pi r^2}{4}$$

$$\text{Area of a semicircle is } \frac{1}{2} \pi \left( \frac{r}{2} \right)^2 = \frac{\pi r^2}{8}$$

Now area of quarter circle AOB = sum of the areas of semicircles  $- x + y$

$$\text{or } \frac{\pi r^2}{4} = \frac{\pi r^2}{8} + \frac{\pi r^2}{8} - x + y$$

$$\text{or } x = y$$

28. b  $1^2 + 2 \times 2^2 + 3^2 + 2 \times 4^2 + 5^2 + 2 \times 6^2 + 7^2 + 2 \times 8^2 + \dots$   
[Upto 100 terms]

$$= 1^2 + 2^2 + 3^2 + 4^2 + \dots + 100^2 + 2^2 + 4^2 + 6^2 + 8^2 + \dots + 100^2$$

$$= \frac{100(100+1)(200+1)}{6} + 4(1^2 + 2^2 + 3^2 + \dots + 50^2)$$

$$= \frac{100 \times 101 \times 201}{6} + 4 \frac{50(50+1)(100+1)}{6}$$

$$= 338350 + 171700 = 510050$$

29. c If we put  $n = 3$ , then the sum of first 3 terms should be equal to  $1^2 + 2 \times 2^2 + 3^2 = 18$   
For  $n = 3$  only option (c) gives 18.

30. c  $G(x) = (10 - x^{10})^{\frac{1}{10}}$

$$G\{G(x)\} = G^2(x) = \left\{ 10 - \left\{ (10 - x^{10})^{\frac{1}{10}} \right\}^{10} \right\}^{\frac{1}{10}}$$

$$= \left\{ 10 - (10 - x^{10}) \right\}^{\frac{1}{10}} = (10 - 10 + x^{10})^{\frac{1}{10}} = x$$

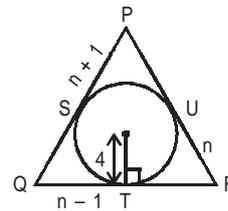
$$G^3(x) = (10 - x^{10})^{\frac{1}{10}}$$

Again  $G^4(x) = x$

$\therefore G^n(x)$  is always equal to  $x$ , whenever  $n$  is even.

$$\therefore G^{50}(2) = 2$$

31. b



Area of the incircle is  $\pi r^2 = 16\pi$ .

So area of the triangle has to be greater than  $16\pi$  which is 84 only.

**Alternative method:**

Let  $QT$  be  $n - 1$  so  $RU$  and  $PS$  will be  $n$  and  $n + 1$  respectively.

Now,

$$QS = QT = n - 1,$$

$$TR = RU = n \text{ and}$$

$$UP = PS = n + 1$$

$$QR = n - 1 + n = 2n - 1$$

$$RP = n + n + 1 = 2n + 1 \text{ and}$$

$$PQ = n + 1 + n - 1 = 2n$$

We know that for an incircle of radius  $r$ .

$A = r \times s$  where  $A = \text{Area}$ ,  $s = \text{Half of perimeter}$ .

Applying it, we get

$$\text{Area of the } \Delta PQR = \frac{2n-1+2n+1+2n}{2} \times 4 = 12n$$

For a scalene triangle area of the  $\Delta PQR$  is also given

$$\text{by } \sqrt{3n(3n-2n-1)(3n-2n+1)(3n-2n)}$$

$$= \sqrt{3n(n+1)(n-1)n}$$

$$= n\sqrt{3(n^2-1)}$$

$$\text{Now } 12n = n\sqrt{3(n^2-1)}$$

$$\text{or } 3(n^2-1) = 144$$

$$\text{or } n^2 - 1 = 48$$

$$\text{or } n^2 = 49$$

$$\text{or } n = 7$$

$$\therefore \text{Area of the } \Delta PQR \text{ is } 12n = 12 \times 7 = 84$$

32. a First of all 4 wives can be seated on 4 alternate chairs in  $(4-1)! = 6$  ways. Now the first husband will have two choices and rest of them will have exactly one choice each.  
 $\therefore$  Total number of ways =  $6 \times 2 = 12$

33. c We have

$$p^2 - q = q^2 - r = r^2 - p$$

$$\text{or } p^2 - q^2 = q - r$$

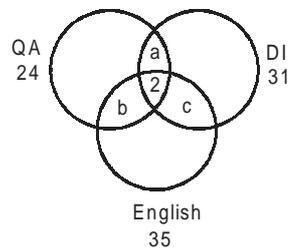
$$\text{or } (p+q)(p-q) = q-r$$

$$\text{or } p+q = \frac{q-r}{p-q}$$

$$\text{Similarly, } q+r = \frac{r-p}{q-r} \text{ and } r+p = \frac{p-q}{r-p}$$

$$\text{Now } (p+q)(q+r)(r+p) = \frac{q-r}{p-q} \cdot \frac{r-p}{q-r} \cdot \frac{p-q}{r-p} = 1$$

34. a



$$n(QA \cup DI) = n(QA) + n(DI) - n(QA \cap DI)$$

$$49 = 24 + 31 - n(QA \cap DI)$$

$$\text{or } n(QA \cap DI) = 6$$

$$\therefore n(QA \cap DI) = a + 2$$

$$\therefore a = 4$$

Similarly,  $b = 3$  and  $c = 5$

$$n(QA \cup DI \cup \text{English}) = 24 + 31 + 35 - (6 + 5 + 7) + 2 = 74$$

$\therefore$  Total number of students who failed in all the subjects =  $80 - 74 = 6$

35. c Let the first term of an AP be  $a$  and the common difference be  $d$ .

$$\therefore \text{Second term} = a + d.$$

$$\text{Now } \frac{\text{Sum of first 2 terms}}{\text{Sum of first term}} = \frac{2^2}{1^2} = 4$$

$$\text{or } \frac{a+a+d}{a} = 4$$

$$\text{or } 2a + d = 4a$$

$$\text{or } d = 2a$$

$$\text{Sixth term of an AP is } a + 5d = a + 10a = 11a = 77$$

$$\text{or } a = 7$$

$$\text{15th term of an AP is } a + 14d = a + 28a$$

$$= 29a = 203$$

**Alternative method:**

$$\frac{\frac{p}{2}(2a + (p-1)d)}{\frac{k}{2}(2a + (k-1)d)} = \frac{p^2}{k^2}$$

$$\Rightarrow \frac{2a + (p-1)d}{2a + (k-1)d} = \frac{p}{k}$$

$$\Rightarrow 2ak + kpd - kd = 2ap + kpd - pd$$

$$\Rightarrow 2ak - 2ap = kd - pd$$

$$\Rightarrow 2a = d$$

36. c  $\log_{pq} p + \log_{pq} q = 1$

$$\text{or } \log_{pq} q = 1 - 2 = -1$$

$$\text{Now } \log_{pq} \frac{4\sqrt{p}}{3\sqrt{q}} = \log_{pq} 4\sqrt{p} - \log_{pq} 3\sqrt{q}$$

$$= \frac{1}{4} \log_{pq} p - \frac{1}{3} \log_{pq} q = \frac{1}{4} \times 2 - \frac{1}{3} (-1)$$

$$= \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$$

37. b  $px^2 + qx + r = 0$  (Given that  $p > 0$ )

$$x = \frac{-q \pm \sqrt{q^2 - 4pr}}{2p}$$

$$\frac{-q - \sqrt{q^2 - 4pr}}{2p} < -2 \text{ or, } -q - \sqrt{q^2 - 4pr} < -4p$$

$$\text{or } 4p - q < \sqrt{q^2 - 4pr}$$

Now if  $q < 0$  the  $4p - q > 0$  and  $\sqrt{q^2 - 4pr}$  is also positive.

$$\therefore (4p - q)^2 < q^2 - 4pr$$

$$\text{or } 16p^2 - 8pq + q^2 < q^2 - 4pr$$

$$\text{or } 16p^2 - 8pq + 4pr < 0$$

$$\text{or } 4p - 2q + r < 0 \quad (\text{if } q < 0) \quad \dots \text{ (i)}$$

$$\text{Again } \frac{-q + \sqrt{q^2 - 4pr}}{2p} > 2 \quad \text{or } -q + \sqrt{q^2 - 4pr} > 4p$$

$$\text{or } 4p + q < \sqrt{q^2 - 4pr}$$

If  $q$  is non-negative,  $4p + q$  is positive and  $\sqrt{q^2 - 4pr}$  is also positive.

$$\text{Now } (4p + q)^2 < q^2 - 4pr$$

$$\text{or } 16p^2 + 8pq + q^2 < q^2 - 4pr$$

$$\text{or } 16p^2 + 8pq + 4pr < 0$$

$$\text{or } 4p + 2q + r < 0 \quad (\text{if } q \geq 0) \quad \dots \text{ (ii)}$$

Combining (i) and (ii), we have  
 $4p + 2|q| + r < 0$

**Note 1:** We cannot do squaring in an inequality if both sides are not positive.

**Note 2:** By taking the roots as 3 and -3, we get an equation  $x^2 - 9 = 0$  here  $p = 1$ ,  $q = 0$  and  $r = -9$ . We can now eliminate options (a) and (c).

38. c The average cost price of the mixture of the two varieties of wheat is

$$\frac{9 \times 5 + 13 \times 7}{5 + 7} = \frac{136}{12} = \frac{34}{3}$$

Since the mixture is sold at the CP and yet 30% profit is made, it means that adulterant equal to 30% of mixture is added. Since adulterant added is 18 kg, the

mixture of wheat is  $18 \times \frac{100}{30} = 60$  kg. Thus a total of

$60 + 18 = 78$  kg of adulterated mixture is sold at the

rate of Rs.  $\frac{34}{3}$  per kg, i.e. a realised amount of

$$78 \times \frac{34}{3} = \text{Rs. } 884$$

39. b Group A completes the entire race in 240 s. When group A finishes the race, the last runner of B has yet to cover 50 m and would take  $\frac{50 \times 18}{20 \times 5} = 9$  s more, i.e. group B completes the race in 249 s. After each member of group B increases their speed, group A will still take 240 s to finish the race. But group B would have finished the race earlier by the time

taken by last runner of group A to run 125 m i.e.

$$\frac{125 \times 18}{25 \times 5} = 18 \text{ s.}$$

Thus group B takes only  $240 - 18 = 222$  s.

Thus time taken by group B decreases from 249 s to

$$222 \text{ s. Thus ratio of new speed to old speed} = \frac{249}{222}.$$

Thus percentage increase in average speed

$$= \frac{27}{222} \times 100 = 12.15\%$$

40. d Each edge has 4 cubes. When it is painted for the first time, the two cubes at the end of each edge (at the vertices) will be removed and thus two cubes will be left on the edges with two faces already painted and one unpainted face will now be exposed of these two cubes. When repainted and those with three faces painted red are removed, one would be left with a cube of  $2 \times 2 \times 2$  cubes. When such a cube is painted, there will be no cube with two faces painted (all 8 cubes are at vertices and will have 3 faces painted)

41. c Statement I gives us

$$\pi r^2 + 2\pi rh = 5\pi m^2$$

Statement II gives us  $2r = h$

Here we have two equations and two unknown.

42. b We know that for a right-angled triangle, the sides  $a$ ,  $b$  and  $c$  are Pythagoras' triplets and  $a^2 + b^2 = c^2$ . From statement I,  $a^2 + b^2 + c^2 = 50$  and since  $a^2 + b^2 = c^2 \Rightarrow c^2 + c^2 = 50 \Rightarrow 2c^2 = 50 \Rightarrow c^2 = 25 \Rightarrow c = 5 \Rightarrow a = 3, b = 4$ . Hence a unique solution is obtained. From statement II,  $a + b + c = 12$  and  $a^2 + b^2 = c^2$ . The only possible solution is 3, 4, 5.

43. c The question has given the relative position of X and P. Statement I gives the relative position of Q and Y. Thus it is not enough to find relative position of P and Q. Statement II gives the relative position between X and Y. Thus this also independently does not give relative position between P and Q. However, using both we have relative positions of X and P, Y and Q and also of X and Y and thus relative positions of P and Q can be found.

44. a Statement I does not give the string release rate and angle.

Statement II gives angle and string release rate so that gain of height can be obtained as  $x \sin 60$

$$= 5 \times \frac{\sqrt{3}}{2} = \frac{5\sqrt{3}}{2}$$

So, only statement II can answer the questions sufficiently.

45. b The question statement itself gives information about drain 1. Both statements I and II individually give information about drain 2 and thus we can find the net effect of both drains opened together using either statement.



- (a) is limited as the relative factor is not stated in the paragraph.
53. c (c) is correct. The underlying message of the paragraph is the process by which character is shaped through one's experiences/interactions in the formative stages of life. (b) is not being very specific with respect to the paragraph. (d) is not explicitly stated in the paragraph. It is not the central idea either. The cause of depravity is also not stated in the paragraph.
54. c (c) is the answer as people are free to follow the interpretation of ethics that they are comfortable with, as can be derived from the paragraph. (a) and (b) express the two schools of thought separately. (d) is an idealistic situation; one which is a consequence rather than a summary.
55. d (d) is correct since it captures the essence of the paragraph *...primeval energies...still perceptible to many*. (a) is a very limited observation. (c) is not true as per information given in the passage. (b) is an assumption. It has not been explicitly stated in the paragraph.
56. a BD is a mandatory pair. B states a general fact and D questions it. 'Old' in D connects with 'older' in A. A answers the question asked in D. 'Particles' in C refers to the 'protons and neutrons' in A. So AC forms a pair. The durability mentioned in C is elaborated with the example of DNA in E. BDACE is thus the required sequence.
57. a C is the opening statement; it introduces the qualifications and experience of the person concerned. A and D describe why he can get a job. B connects to AD.
58. d D is the opening statement. A and B talk about those who can afford treatment. E, in contrast with AB, talks about those who cannot afford treatment. C further elaborates E and is also the last sentence because of 'so'.
59. a AC is a mandatory pair as both discuss the importance of knowledge workers in the face of global competition. B, D and E are connected to each other as they discuss means of keeping workers happy.
60. c EA is a mandatory pair; 'woman to sell anything' in E connects with 'feminine charms to sell itself' in A. B raises some ethical issues and C refers to them saying 'there is no scope for such ethical issues'. BC is therefore a mandatory pair. D discusses 'cashing in on the concept' mentioned in EABC. Therefore, the correct sequence is EABCD.
61. c A person is charged 'with' murder. In choice (d), according to parallelism it should be 'expressing and portraying their true feelings'.
62. c 'Not only' is misplaced here. The correct version is 'important not only to look'. The subject 'group' is singular, so the verb should be 'has'.
63. c 'To keep the wolf from the door' is the correct idiom. The word 'majority' is always used in the singular sense. No matter how big the majority is, it is still one figure. So the correct verb is 'believes'.
64. b To pick up 'from' the office is correct.
65. d Choice (b) could easily be rephrased as 'I am looking for a two-room house'. An amount of money makes a singular subject. Hence, 'Two dollars is' will be correct.
66. a 'The Force that Through the Green Fuse Drives the Flower' is a complicated poem. On the first reading, it may seem almost too difficult for a reader to understand. However, careful analysis will make much of the imagery clearer. Since the poem is about contrast, change, and paradox the first three lines contrast the creative and destructive forces that surround humans.
67. b 'Mine' in this line refers to the speaker's blood. It is turned to wax by the embalmer; it will flow no longer to sustain life, but become as solid as wax.
68. b Lines 19-20 in the poem tell us about the fact that the speaker cannot tell the wind about the nature of time or of the heavens. No other statement is true as per the poem.
69. c The poetry on the whole deals with creativity and destruction. That is the central theme of this poem.
70. c The first statement is true; others are not mentioned in the poem.
71. c Option (a) is ruled out since it assumes that Chinese and Indian societies are rigidly hierarchical and the contention that these societies cannot progress while simultaneously committing to democratic principles is incorrect as the passage does not mention the extent of progress in such societies. Option (b) is off the mark as demographic plurality being the cause of ambivalence between democracy and tradition is not established in the passage. Option (c) is the correct answer, given verbatim in paragraph 2 of the passage.
72. b Paragraph 3 of the passage, mentions a story that suggests new global economic challenges as the reason for the occurrence of the phenomena of ambivalence between democracy and tradition in countries like China and India. Other factors like cultural and psychological ones are secondary, though not necessarily conflicting. The use of the term 'epiphenomenon' is with respect to cultural and psychological forces. Thus, options (a) and (c) are ruled out and the correct answer is (b).

73. d Option (d) is correct; all the options are given in the passage.
74. d Option (b) is straightaway ruled out as countries participating in the global Olympiad have their own political style which reflects specific cultural traditions rather than an identical style common to all countries. The statements in options (a) and (c) are detailed in lines 5-7 of paragraph 2. Thus, the correct answer is (d).
75. a Option (b) is rejected straightaway as it merely states that stories have limited shelf lives and does not throw any light into the reasons for the stories not surviving long enough. In the second last line of paragraph 3, it is mentioned that global resurgence of religion and ethnicity has taken better care of such economic determinism than have their academic opponents. This suggests that option (c) is wrong and (a) is the right answer.
76. b The author is likely to agree with options (a), (c) and (d) as they are supported by the closing lines of paragraphs 2, 3 and 4 respectively. In lines 2-3 of paragraph 4, the author clearly mentions that ideas of science are completely inapplicable to the conduct of our lives or the interpretation of the world. Option (b) merely restates the same and hence is the right answer.
77. c Option (a) is ruled out as through technological advancement, one only comes to know about how things work, but learns nothing about meaning of life. In paragraph 3, it is mentioned that by not knowing thermodynamics, one does not miss anything and hence (d) is also wrong. The last line of paragraph 2 mentions that education allows one to live a life which is something above meaningless tragedy or inward disgrace, but does not indicate towards making human life intelligible. Hence, option (b) is also wrong. From lines 1-4 of paragraph 5, it is clear that it is humanities that the author thinks is the key towards making human life and the world intelligible. Thus, (c) is the right answer.
78. a Choice (a) is the most appropriate option.
79. a Options (c) and (d) are straightaway ruled out as neither of the reasons given in these are the purpose of the author to refer to the Second Law of Thermodynamics. (b) is also incorrect as the author's aim is not to establish the attitude of educated people on the illiteracy of scientists. From paragraph 4, it is clear that option (a) is the correct answer.
80. d Fred Hoyle has been mentioned in lines 4-6 of paragraph 1, Lord Snow in lines 1-5 of paragraph 3 and Ortega Gasset in the lines 8-10 of paragraph 2. Though Kierkegaard's name has been mentioned in line 7 of paragraph 2, no quotation in the passage can be attributed to him. Hence, (d) is the right answer.
81. c (c) is the most appropriate answer.
82. c Option (c) correctly encompasses the passage's topic, scope and point of view. Choice (a) omits some information and is too broad, while (b) makes an irrelevant implication. Choice (d) is too positive in tone.
83. d Option (d) is correct and is a direct paraphrase of the final sentence. Choice (a) ignores the hypothetical nature of the whole discussion, while (b) and (c) do not match the author's attitude or tone.
84. d Choice (d) is correct among a lot of jargon and buzzwords. Choice (a) contradicts the sentiments that begin paragraph 3, while (b) is irrelevant. Choice (c) is plausible, but not the most likely answer.
85. b Choice (b) correctly captures the author's unease. Choice (a) contains plausible adjectives but veers off the mark. The adjectives used in choices (c) and (d) are incorrect.
86. d Choice (d) is correct and well supports the author's sentiments. (a) opposes the author's view, while (b) and (c) are too detailed. Choices (b) and (c) also disagree somewhat with the author's view.
87. c The author is describing how a desert is formed. It is the description of the process of desertification.
88. a According to the passage, the author clearly mentions in the first paragraph itself that the ecological deterioration and desertification of Sahel is due to increasing size of livestock herds.
89. c Although the author will agree to both statements (c) and (d), but he is more vociferous in indicating statement (c) (refer to first paragraph, last line).
90. d In the second paragraph, the author discusses that there has been little agreement on how to make the concept of carrying capacity of the land operational.
91. d 'No single number can adequately... semi arid region'. So the answer is (d).
92. c The tone of passage remains aggressive from the first paragraph till the last one. In the first paragraph, the author states: "People blame ...", and in the second paragraph: "Such inconclusiveness ..., who decide to take no action ...". All these statements indicate the aggressive tone of the passage.
93. c In column one, A is very general so it may be difficult to arrive at the correct pair for A straightaway. It is better to start solving by working out the correct pair for C. You will easily arrive at CE as the correct match. Now you can work out DG and DF to come to the final answer.
94. b AG is a correct pair. This leaves us with options (b) and (c). CH is the other obvious pair that helps us eliminate one more option to arrive at the final answer.

95. b If one works out AE and AF, one will quickly arrive at AE. This also helps us eliminate BE. After eliminating AF and BE, we are left with options (a) and (b). Now we can work out BF and BG for the final answer.
96. d If we work out the pairs for A, we will arrive at AF. This will eliminate options (b) and (c). In options (a) and (d) we can arrive at the final answer by working out BE and BG.
97. a AF is the best pair using A. In options (a) and (c), if we work out BG and BE, we will arrive at the final answer. BG and not BE, is correct.
98. b A and B are extremely close, so it is better to start by working out the correct pair using C. You can easily arrive at CE. This eliminates options (c) and (d). In options (a) and (b), if we work out DG and DF, we will get DF as the correct answer.
99. d This question can be solved simply by working out the options for C. You can easily arrive at CH that will give you option (d) as the answer.
100. c To begin with, you can work out the options for either A or D. In either case, you will be able to eliminate options (a) and (b) and you will be left with options (c) and (d). If you compare BH and BF, BH is the correct pair.
101. a The required ratio =  $\frac{5.6\% \times 53\% \times 66.7}{33.4\% \times 47\% \times 66.7} = \frac{53}{6 \times 47}$ ,  
i.e. a little more than 1 : 5.
102. a The ratio of budgeted amount for Development by Defence and total budget of non-defence sectors is  $\frac{90.8\% \times 53\% \times 66.7}{47\% \times 66.7}$ , which is just greater than  $\frac{48}{47}$  and hence the answer will be just greater than 2%. You do not have to calculate anything as the options are very wide apart.
103. d In 2002, we do not know how the budget will be distributed across the sectors and aspects of research.
104. a Again the first thing to notice is that options are very wide apart.  
The required ratio will be  $\frac{2.1\% \times 53 + 31.2\% \times 47}{5.6\% \times 53 + 31.2\% \times 47}$ .  
Obviously, the denominator will be greater and in no case will it be seven times the numerator.  
Thus, the only answer is 1 : 1.11
105. d The question asks what percentage of the total revenue whereas the distribution of revenue across product groups is only given for Export Revenue. Thus, we do not know how much does CAD/CAM contribute to the Domestic Revenue.
106. b All you need to find here is that, if the total is 100, then Internet is 29.5. Hence, if total is 360, then Internet will be  $29.5 \times 3.6 = 108 - 1.8 = 106.2$
107. b Here we have to compare the ratios  $\frac{5184}{13386}$ ,  $\frac{2318}{6049}$ ,  
i.e. we have to compare 51.84% of 6049 and 23.18% of 13386.  
50% of 6049 is 3024.5; 1% of 6049 is 60.49; 0.8% of 6049 is 48.392; 0.05% of 6049 is 3.0245. Thus, 51.85% of 6049 is  $3024.5 + 60.49 + 48.392 + 3.02 = 3136.4$   
Similarly, 20% of 13386 is 2677.2; 3% of 13386 is 401.58; 0.1% of 13386 is 13.386, and 0.08% is 10.708 and thus 23.18% of 13386 is  $2677.2 + 401.58 + 13.38 + 10.70 = 3102.86$ . Thus, the first ratio is greater and thus OPM of 2000 is greater than that for 1999.
108. c The required percentage is  $\frac{14\% \times 13215}{\frac{2.21}{5981} \times 100\%}$   
 $= \frac{14\% \times 13215}{11962 + 1196} = \frac{14\% \times 13215}{13158}$ ,  
i.e. approximately 14%.
109. c If we follow a particular route to go from A to H, the activities other than on the route will take place simultaneously and will be completed before (A-C) as the duration is only 6 min. So if we consider the longest route from A to H, all other activities will be completed. As A-B-C-D-H is the longest route with a total duration of 34 min, the time taken to manufacture one unit will be 34 min. Therefore, the time required to manufacture 25 units will be 850 min or 14 hr 10 min.
110. d Time taken for 10 units of H =  $34 \times 10 = 340$  minutes  
After a 10 minutes break is given, then total time =  $340 + 10 = 350$  minutes  
Remaining time =  $600 - 350 = 250$  minutes  
Now in 250 minutes number of units that can be produced are  $\frac{250}{34} = 7$  units  
Remaining time =  $250 - (34 \times 7) = 12$  minutes  
Here 12 minutes that are used for manufacturing, we are not aware whether products produced are carried to next day on for further completion or not.  
So Data insufficient.
111. a If we change the duration in the given network, we will still have to consider the duration of the longest route from A to H as the time required to manufacture one unit. Even after the change in duration of the activities, the longest route is A-B-C-D-G-H with a total duration of 36 min. As the original time required to manufacture one unit was 34 min, the percentage increase in the time required to manufacture one unit is  $\frac{2}{34} = 5.88\% = 5.9\%$ .
112. b Power utilized by agriculture sector is nearly equal to 17%  
While power utilized by industrial and commercial sector is nearly equal to 64 %  
So the percentage is =  $\frac{17}{64} = 26.56$   
The nearest value to this is 28 from the given options.

113. b In 1980-81, the industrial sector accounted for nearly equal to 58 % of 120 kwh, while in 1984-85 it accounted for 56 % of 170.  
So the increase is  $0.56 \times 170 - 0.58 \times 120 = 25.6$  billion kwh.  
The nearest value to this is 25 from the given options.

114. c Agricultural sector in 1970-71 was 10(+)% of 60 billion kwh, while commercial sector in 1984-85 was  $\approx 6\%$  of 170 billion kwh. So the ratio is  $\frac{6 \times 170}{10 \times 60} = 1.7$

115. c These units constitute 30% of the 4(-)% contributed by others from a total of 170 billion kwh which is approximately 1.2% of 170  $\approx 2$  billion kwh. Paying at the rate of Rs. 1.25 per kwh, the revenue generated is  $(2 \times 1.25) = \text{Rs. } 2.5$  billion = Rs. 250 crore.

**For questions 116 to 119:**

Since C started with 66.66% of the money that B started with, the ratio of amounts of C and B would be in the ratio 2 : 3 and thus C started with Rs. 200 and B with Rs. 300. Since E started with money more than just one another person, E would have started with Rs. 200. Since A has more money than D, A would have started with Rs. 400 and D with Rs. 100. B and C started with Rs. 300 and Rs. 200 respectively, and B spent Rs. 15 more than C. Hence, the difference between the amounts remaining with B and C should be Rs. 85. Of the amounts remaining, only Rs. 95 and Rs. 10 satisfy this condition. Hence, B ended with Rs. 95 and C with Rs. 10. Since E spent Rs. 35, he ended with Rs. 165. Between A and D, D ended with more than A and hence D ended with Rs. 70 and A with Rs. 40.

Thus, the situation is:

| Name | Started with | Ended with | Spent |
|------|--------------|------------|-------|
| A    | 400          | 40         | 360   |
| B    | 300          | 95         | 205   |
| C    | 200          | 10         | 190   |
| D    | 100          | 70         | 30    |
| E    | 200          | 165        | 35    |

116. d

117. d

118. b

119. a

**For questions 120 to 123:**

Since the only clue given is that D does not own a supermarket, start with D's answer. If D owned the holiday resort, his sequence of answers would be F, T, F. Similarly, if he owned the palm grove or the sports centre his answers would be T, F, F; T, T, T respectively. Thus, D can only own the sports centre as in other cases there is more than one false answer given.

Similarly, if A owned the holiday resort, supermarket, or the palm grove his answers would have been T, F, T; F, T, F; F, T,

T respectively. Thus, A can either own the holiday resort or the palm grove.

If B was the owner of holiday resort, supermarket, palm grove, his answers would be T, T, F; F, F, T; F, F, F respectively. Thus, B can only own the holiday resort. Thus, from above, A can only own the palm grove and the supermarket will be owned by C. C's answers would thus be T, T, T.

120. d

121. b

122. b

123. a

**For questions 124 and 125:**

To balance the bottom left part of mobile must also equal 80 ft lb, so its weight must be 20 lb  
(4 ft  $\times$  20 lb = 80 ft lb)

$$x + y = 20$$

$$\text{and } 6x = 4y$$

$$\therefore y = 20 - x$$

$$\therefore 6x = 4(20 - x), x = 8 \text{ lb}, y = 12 \text{ lb}$$

Adding the total weights of LHS,

$$120 + 10 + 8 + 12 = 150 \text{ lb}$$

$$150 \text{ lb} \times 4 \text{ ft} = 600 \text{ ft lb}$$

$$10 \text{ ft} \times z \text{ lb} = 600 \text{ ft lb}$$

$$\Rightarrow z = 60 \text{ lb}$$

$$\therefore x = 8 \text{ lb}$$

$$z = 60 \text{ lb}$$

124. b

125. d

**For questions 126 to 130:** The net pay-off for company A (after including the cost of the strategy) is as follows:

| Pay-off to company A           |   |                                |       |       |
|--------------------------------|---|--------------------------------|-------|-------|
|                                |   | Strategy that company B adopts |       |       |
|                                |   | P                              | Q     | R     |
| Strategy that company A adopts | X | -4500                          | 4500  | -6500 |
|                                | Y | 2800                           | -8200 | 2500  |
|                                | Z | -7700                          | 3000  | -8000 |

The net pay-off for company B (after including the cost of the strategy) is as follows:

| Pay-off to company B           |   |                                |       |       |
|--------------------------------|---|--------------------------------|-------|-------|
|                                |   | Strategy that company B adopts |       |       |
|                                |   | P                              | Q     | R     |
| Strategy that company A adopts | X | 2600                           | -5200 | 3200  |
|                                | Y | -7200                          | 5000  | -8300 |
|                                | Z | 4800                           | -4700 | 3700  |

126. d We see that irrespective of which strategy A selects, B can respond with a strategy such that B makes a gain. Thus, A cannot ensure that it will make a gain in any circumstance.

127. a It is obvious from the table that whichever strategy A adopts, B can make a gain. Thus, A has to select a



strategy such that it minimizes the gain that B makes. If A chooses X, Y, or Z, B makes a net gain of 3200, 5000 or 4800 respectively. Thus, the answer will be strategy X.

128. b Can be read directly from the pay-off table for company B.
129. a The maximum gain that B and A can make can be read directly from the table as 5000 and 4500 respectively. Thus, the difference = 500.
130. a With strategy X selected, B will select strategy R and advantage = 3200 + 6500 = 9700  
With strategy Y selected, B will select strategy Q and advantage = 5000 + 8200 = 13200  
With strategy Z selected, B will select strategy P and advantage = 4800 + 7700 = 12500
131. b China's GDP in 1993 = 181 + 181 × 13.4 = \$205.25 billion and Indonesia's GDP in 1993 = 60 + 60 × 7.3 = \$64.38 billion  
So the difference in their GDP in 1993 = (205.25 - 64.38) = 140.87 ≈ \$140 billion
132. a The ratio of Merchandise Exports to GDP of Malaysia in 1992 =  $\frac{39.6}{50} = 0.792$  and the ratio of Merchandise Export to GDP of Malaysia in 1993 =  $\frac{46}{50 \times 1.083} = \frac{46}{54.1} = 0.851$   
So the ratio is increased in 1993 as compared to 1992.
133. a The ratios in 1992, 1993, 1996 would be  $\frac{32.5}{x}$ ,  $\frac{37}{1.084 \times x}$ ,  $\frac{66.1}{1.084 \times 1.086 \times 1.087 \times 1.081 \times x}$   
Obviously, the numerator has more than doubled but the denominator would not have doubled. Thus, the last ratio is the highest, i.e. in 1996 and least in 1992. If you are confused between 1992 and 1993, in 1993, the numerator surely increased by more than 8.04% and hence the ratio has increased.
134. c By options:  
Net score  
20104714 → 78.6  
95022950 → 80.7  
97021000 → 87  
98037220 → 85.6
135. d Avg (HW1) = 72.68  
Avg (HW2) = 81.21  
Avg (Mid-term) = 61.25  
Avg (Final) = 58.64
136. c By counting, the number of students = 9.
137. d 97020890 → 46.3    99050120 → 17  
95014260 → 41.2    20202820 → 44.9  
20202265 → 66.2  
20202851 → 47

**For questions 138 to 141:**

Denoting the positions as 1, 2, 3, 4, 5, 6, 7 from left to right in increasing order of heights (these are not heights), we know that Hrithik is in position 4. Also Amitabh - Dilip = 3. Thus, Amitabh cannot come in position 7 since then Dilip would have to come in position 4, which is already occupied. Also Amitabh has to be greater than 3 or else Dilip would be negative. Thus, only positions for Amitabh are 5 and 6. Assume one of them and proceed.

If Amitabh is in position 6: Dilip is in position 3.

Also Hrithik - Feroz = Chunky - Dilip.

Feroz being shorter than Hrithik can come in positions 1 or 2. If Feroz is in position 1, Chunky has to be in position 6. Not possible. Thus, Feroz can be only in position 2 and Chunky in position 5. Left positions are 1 and 7 and since Feroz is shorter than Govinda, Govinda is in position 7 and Fardeen in position 1.

If Amitabh is in position 5: Dilip is in position 2. Using the same logic as above, Feroz can be in position 1 or 3 and accordingly Chunky will be in position 5 or 3. Both of these is not possible. Thus, Amitabh cannot be in position 5.

Thus, final position:

Fardeen < Feroz < Dilip < Hrithik < Chunky < Amitabh < Govinda

138. a

139. c

140. c

141. b

**For questions 142 to 144:** According to the given information, we can draw the following table.

|                               | Men |   |   |   |   | Women |   |   |   |   |   |
|-------------------------------|-----|---|---|---|---|-------|---|---|---|---|---|
|                               | A   | B | C | D | E | L     | M | N | O | P | Q |
| Lecturer                      | ✓   | ✓ |   |   |   |       |   | ✓ |   |   |   |
| Engineer                      |     |   | ✓ | ✓ |   | ✓     | ✓ |   | ✓ |   |   |
| Doctor                        |     |   |   |   | ✓ |       |   |   |   | ✓ | ✓ |
| <b>With in the same group</b> |     |   |   |   |   |       |   |   |   |   |   |
| 1                             |     |   |   |   |   | ✓     |   |   |   |   | ✓ |
| 2                             | ✓   |   |   |   |   | ✓     |   |   |   |   | ✓ |
| 3                             |     |   |   |   | ✓ |       | ✓ |   |   |   |   |
| <b>Not in the same group</b>  |     |   |   |   |   |       |   |   |   |   |   |
| 1                             |     | x |   |   |   |       |   | x |   |   |   |
| 2                             |     | x |   | x |   |       |   |   |   |   |   |
| 3                             |     |   |   | x |   | x     |   |   |   |   |   |
| 4                             |     |   |   |   |   | x     |   |   | x |   |   |

142. c If all three doctors P, Q and E are selected, then A and L are selected with P and Q, M is selected with E. So members of the team are AELMPQ.

143. a If two male lecturers A and B are selected, then L and Q are selected with A, and P is selected with L. So members of the team are ABLPQ.
144. b If two doctors P and Q are selected, then L and A have to be selected. So P, Q and L are three women. So B has to be selected and the left one is only C. Hence, members of the team are ABCLPQ. If E and Q are considered as doctors, then the team will be ABELMQ (choice not given).

**For questions 145 and 146:**

From the two clues given, we have  $C < B < A$  and  $E < D$ . Since the two clues do not have any common person, we cannot come to a certain order. Thus, the questions have to be attempted by elimination.

145. d  $C < E < B < D < A$  eliminates option (a). There are many other ways also with B being in the middle.  
 $C < B < A < E < D$  eliminates (b).  
 $E < C < B < D < A$  eliminates option (c).  
 Option (d) is obviously not possible because if C is in the middle, A has to be at least two ranks ahead of C and would become the tallest.
146. a  $C < E < D < B < A$  makes option (a) possible. There is no need to check further options. Nevertheless, E is shorter than D and hence cannot be the tallest. If D is shorter than B, then all three, i.e. C, D and E are shorter than B, and A is taller than B, and hence A has to be the tallest. If C is taller than D, C also has to be taller than E, and since B is taller than C, B will be taller than E.
147. c From statement I, we cannot determine their weights. So statement I is not sufficient. From statement II, we cannot also determine their weights. So statement II is not sufficient. Combine both statements: two friends among A, B, C, D and E have their weights more than the average; A and E are neither the heaviest nor the lightest. From statement II, the maximum weight of C is 59 kg, if we take the minimum weight of A to be 41 kg (just greater than the weight of B, i.e. 40 kg). So D is greater than 60 kg. Hence, D is the heaviest.

148. c From statement I, we cannot determine the age of father because we get lot of values, i.e. 36, 45, 69, etc. From statement II also we cannot find the age of father. Combining both the statements, we get the following possibilities.  
 $36 = 11 + 9 + 16$ ,  $45 = 11 + 9 + 25$ ,  $69 = 11 + 9 + 49$   
 If mother's age is more than 40 years but less than father's age, the possible age of father is 45 years and others ages are 3, 5, 10 and 42.
149. d From statement I, we cannot find the first-prize winner. From statement II also we cannot find the first-prize winner.  
 Combining both the statements, we find that P gets third prize, but we cannot decide whether R gets first prize or Q gets first prize.
150. c From statement I, we cannot determine the person who sits between P and R. From statement II also we cannot determine. Combining both the statements, we find that Q sits between P and R.

