MOCK TEST PAPER - 10 (T-II) 2013 (SOLUTION)

1. (B) $\left[\frac{1}{1\times2}+\frac{1}{2\times3}+\frac{1}{3\times4}+....+\frac{1}{99\times100}\right]$

$\therefore Tn = \frac{1}{n(n+1)} = \frac{1}{(n)} - \frac{1}{(n+1)}$

[By partial fraction]

$Sn = \left[1-\frac{1}{2}\right] + \left[\frac{1}{2}-\frac{1}{3}\right] + ... + \left[\frac{1}{99}-\frac{1}{100}\right]$

$\therefore Sn = \left[1-\frac{1}{100}\right]$ = [first term + last term]

$= \frac{99}{100}$ **Ans.**

2. (A) $-0.2, (-0.2)^2, (-0.2)^3$ and $(-0.2)^4$
$= -0.2, 0.04, -0.008$ and 0.0016
= lowest value = **–0.2 Ans.**

3. (D) Square root of $\frac{[0.75]^3}{[1-0.75]} + [0.75 + (0.75)^2 + 1]$

$= \frac{(0.75)^3 + (1-0.75)[0.75 + (0.75)^2 + 1]}{[1-0.75]}$

$= \frac{(0.75)^3 + 1^3 - (0.75)^3}{1-0.75} = \frac{1}{0.25}$ = **4 Ans.**

4. (C) $\sqrt[3]{(13.608)^2 - (13.392)^2}$

$= \sqrt[3]{(13.608+13.392)(13.608-13.392)}$

$= \sqrt[3]{(27.000)(0.216)}$

$= 3 \times 0.6$ = **1.8 Ans.**

5. (*) Let the present age of Mr. Suman
$= 10x + y$ yrs.
age of his wife $= 10y + x$ yrs.
ATQ,

$\frac{1}{11}(10x + y + 10y + x) = (10x + y) - (10y + x)$

$\Rightarrow \frac{1}{11}(11x + 11y) = 9x - 9y$

$\Rightarrow x + y = 9x - 9y$

$\Rightarrow -8x = -10y$

$\Rightarrow \frac{x}{y} = \frac{10}{8} = \frac{5}{4}$

$\therefore x : y$ = **5 : 4 Ans.**

6. (A) 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 9
Sum of the digits of 111, 111, 111 = 9 which is divisble by 3.
Also, 111, 111, 111 is not divisible by 11.
[difference of the sum of the digits at odd place and even places is not a multiple of 11]
$\therefore$ **The given number is divisible by 3 and 37 only. Ans.**

7. (A) Let the 4 numbers are A, B, C and D.
According to question:-
(A + 3) = (B – 3) = (C × 3) = (D ÷ 3)
Let (A + 3) = (B – 2) = (C × 3) = (D ÷ 3) = k (say)

then, A= $(k-3)$, B = $(k+3)$; C = $\left(\frac{k}{3}\right)$, D = $3k$

Also:- A + B + C + D = 64

$\Rightarrow (k-3) + (k+3) + \left(\frac{k}{3}\right) + (3k) = 64$

$\Rightarrow 5K + \frac{K}{3} = 64$

$\Rightarrow 16\,k = 64 \times 3$

$k = 12$

1st number = $(k-3) = 9$ = A
2nd number = $(k+3) = 15$ = B
3rd number = $\left(\frac{k}{3}\right) = 4$ = C
4th number = $3k = 36$ = D

8. (D) One part of the no. is the square of 6.
$\Rightarrow$ 36 must be present in the number and among the options given, none of the options fulfills this criteria.
So, **None of these. Ans.**

9. (C) Let the numbers be A and B.

then $\frac{1}{5}$ of A = $\frac{5}{8}$ of B

$\therefore \frac{A}{B} = \frac{5}{8} \times \frac{5}{8} = \frac{25}{8}$

Now:-
Let A = $25x$, B = $8x$
According to question:-
(A + 35) = (B × 4)
or, $(25x + 35) = 8x + 4$
$\therefore x = 5$
$\therefore$ 2nd number = 8x = 8 × 5 = **40 Ans.**

10. (A) Total age of the 4 members of the family, 10yrs ago = 24 × 4 = 96 yrs.
Present age of 4 members = 96 + 40
= 136 yrs
Total age of the 7 members presently
= 22 × 7 = 154 yrs.
Age of [twins + youngest – child]
= 154 – 136 = 18 yrs.
Let the age of the one of the twins = x yrs.
$\therefore$ age of the youngest = $(x - 3)$ yrs
Then:-

$2x + (x - 3) = 18$

or, $3x = 21$

$\therefore \quad x = 7$

$\therefore$ Age of childrens = 7, 7,4 yrs. Ans

11. (B) Average of 10 numbers = 40.2

$\therefore$ sum of 10 numbers = 40.2 × 10 = 402

As per Question,

$$\text{Actual Average} = \frac{402 - 18 + (31 - 13)}{10}$$

$$= \frac{402 - 18 + 18}{10}$$

$$= \mathbf{40.2\ Ans.}$$

12. (A) Let the bank makes a transaction of Rs. x crores.

According to question:-

$(20 - 16.5)\%$ of x = 10.5 crore

$$\frac{3.5}{100} \times x = 10.5$$

$$\therefore \quad x = \frac{10.5 \times 100}{3.5}$$

$$= \mathbf{300\ crore\ Ans.}$$

13. (*)

14. (D) No. of alphabets in word DIRECTOR = 8

no. of vowels = 3

$\therefore$ Total number of arrangements when all the three vowels arrange together:-

= 6! + 3!

= 720 × 6 = **4320 Ans.**

15. (D) Total CP of [25 kg + 35 kg] rice

= Rs. (25 × 16.50 + 35 × 24.50)

= Rs. (412.50 + 857.50)

= Rs. 1270

SP @ 25% profit = Rs. [1270 × 1.25]

= Rs. 1587.5

$\therefore$ Required rate $= \frac{1587.5}{60}$

= **Rs. 26.45 per kg Ans.**

16. (A)

	Wine	:	Water	=	Total
Initially by option (A)	3	:	1		4
$\frac{1}{3}$ process	$\left(-\frac{3}{3}\right)$	:	$\left(-\frac{1}{3}+\frac{4}{3}\right)$		$\frac{4}{3}$
Final ratio	$\left(3-\frac{3}{3}\right)$	:	$\left(1-\frac{1}{3}+\frac{4}{3}\right)$		
=	2	:	2		
=	**1**	:	**1 Ans.**		

17. (C) Ist term $a = -4$

Common difference d = 4

Let the n^{th} term of the A.P. = 48

then, $48 = a + (n - 1)d$

or, $48 = -4 + (n - 1)(4)$

or, $48 = -4 + 4n - 4$

or, $\therefore \quad n =$ **14 Ans.**

18. (C) The total amount = Rs. [1000 + 140]

= Rs. 1140

Let the 1st installment = Rs. x

According to question,

$$1140 = \frac{12}{2}[2x + (12 - 1)(-10)]$$

$$\frac{1140}{6} = [2x - 110]$$

$$190 = 2x - 110$$

$$x = \frac{190 + 110}{2} = 150$$

Ist installment = **Rs. 150 Ans.**

19. (A) Initial amount of mixture = 8l

Oxygen	Nitrogen
= 16%	= 84%
= 1.28 l	= 6.72 l

Using by option A, total amount released = 2l

So, After first release oxygen

= 1.28l –16% of 2l

After second release, oxygen

= 9.96l – 0.24 l = 0.72 l

(which is 9% of 8l)

20. (B) Population of literates = 50% of 296000

= 0.50 × 296000

= 148000

No. of males literates = 70% of 166000

= 0.7 × 166000

= 116200

No. of female literates = 148000 – 116200

= **31800 Ans.**

21. (A) Let Ram and Shyam weights are

= 4x and 5x respectively

Now:-

Their previous weight (sum):-

$$\frac{82.8}{115} \times 100 = 72 \text{ kg}$$

According to question:-

$\Rightarrow 5x + 4x = 72$

$\therefore \quad x = 8$

$\therefore$ Ram's weight = 8 × 4 = 32 kg

Shyam's weight = 5 × 4 = 40 kg

Their increased weight = 82.8 – 72

= 10.8 kg

Ram's weight = 32 × 10%

= 3.2 kg

Shyam's increased weight

= [10.8 – 3.2]

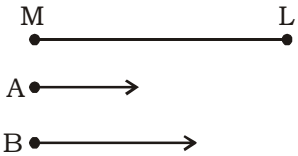
= 7.6 kg

$\therefore$ % increase $= \frac{7.6}{40} \times 100 =$ **19% Ans.**

22. (D) Let all (175) children were to get x sweets.
According to Question:-
$140(x+4) = 175x$
or, $560 = 175x - 140x$
or, $x = \frac{560}{35} = 17$
$\therefore$ Sweets to be distributed:-
$16 \times 175 =$ **2800 Ans.**

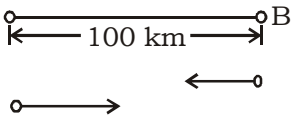
23. (A) Let amount invested in scheme A = Rs. x
then in B = Rs. $(27000 - x)$
For scheme A, CI = 16.

24. (B) For 1st year:-
[5000 + 50% of 5000] = Rs. 5250
tax = 20% of interest $= \frac{20}{100} \times 250 = 50$
At the end of 1st year
= Rs. [5250 – 50]
= RS. 5200 invested
Similarly,
For 2nd year:-
$\left[5200 + \frac{5}{100} \times 5200 - 52\right]$ = Rs. 5408
For 3rd year:-
$\left[5408 \times \frac{105}{100}\right]$ = Rs. 5678.40
At the end of 3rd year
= Rs. [5678.40 – tax]
= Rs. [5678.40 – 54.08]
= Rs. 5624.32 Ans

25. (D)


Given that:-
Speed of A = 60 km/hr
Distance travelled in 3 hr = 60 × 3
= 180 km
At 2 : 00 pm:-
Speed of B = 72 km/hr
Time difference = 3 hrs
Relative velocity = [72 – 60] = 12 km/hr
Now:-
Time - gap (meeting)
$= \frac{180}{12} = 15$ hr after they meet
$\Rightarrow$ They will meet at 2 pm + 15 hour = 5 am

26. (B) Let downstream speed = $(u + v)$ mile/hr
upstream speed= $(u - v)$ mile/hr
As per question:-
$$\frac{36}{(u-v)} - \frac{36}{(u+v)} = 1\frac{1}{2}$$
or, $36\left[\frac{u+v-u+v}{u^2-v^2}\right] = \frac{3}{2}$
or, $12[2v] = \frac{u^2-v^2}{2}$
or, $48v = u^2 - v^2$
or, $v^2 + 48v - 100 = 0$
$v =$ **2 mile / hr Ans.**

27. (A)


Let the speed of A = u km/hr
speed of B = v km/hr
As per question:-
$\frac{100}{(u+v)} = 1$ hr
$(v + u) = 100$ ..... (i)
Again from question:-
$\frac{100}{(u-v)} = 5$,
$5v - 5u = 100$ ..... (ii)
From equation (i) and (ii):-
$10v = 600$
$v =$ **60 m/hr Ans.**

28. (A) Ratio of CP = 1 : 2 : 4
Ratio of No. of articles sold = $\frac{2}{2} : \frac{5}{10} : \frac{2}{8}$
Ratio of % profit = 10% : 20% : 25%
SP = 1 × 1.1 5×1.2 4×1.25
total SP = 1.1 6 5
= 12.1
So, Net % profit $= \frac{12.1-10}{10} \times 10$
= 21%

29. (C) Given that:-
Invested ratio of A : B : C = 5 : 7 : 6
After 6-months:-
Invested ratio of A : B : C = 60 : 84 : 54
Now,
Share of profit of C $= \frac{9}{33} \times 33000$
= **Rs. 9000 Ans.**

30. (A) According to question:-
Sohan = 25000 × (36 months)
= Rs. 900000
Aditya = [15000 × 30 + 15000 × 24]
= Rs. 810000

$\therefore$ Profit share of Aditya

$$= \frac{\text{Sohan}}{\text{Sohan} + \text{Mohan}} \times 247000$$

$$= \frac{9}{19} \times 247000$$

$$= \textbf{1,17,000 Ans.}$$

31. (A) 25 men and 15 women complete a piece of work in 12 days.

$\therefore$ work of 8 days $= \frac{1}{12} \times 8 = \frac{2}{3}$

Remaining work $= 1 - \frac{2}{3} = \frac{1}{3}$

Now:-

$\frac{1}{3}$ piece of work completed by 25 men in 6 days.

$\therefore$ 1 work can be completed by 25 men in 18 days.

Now:-

$\therefore$ Total work done by women

$$= \frac{1}{12} - \frac{1}{18} = \frac{3-12}{36}$$

$$= \frac{1}{36} = \textbf{36 days Ans.}$$

32. (B) 12 men takes 18 days to complete 1 work.

$\therefore$ 12 men will take 1 day to complete $\frac{1}{18}$ work

$\therefore$ 1 man will take 1 day to complete $\frac{1}{18 \times 12}$ work

$\therefore$ 10 men will complete the job in

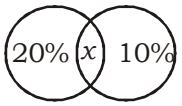
$$= \frac{10}{18 \times 12} + \frac{9}{12 \times 24}$$

$$= \frac{5}{108} + \frac{4}{144}$$

$$= \frac{20+12}{432} = \frac{32}{432}$$

$\therefore$ 10 men will take $\frac{432}{32} = \frac{27}{2} = 13\frac{1}{2}$ days to complete a job.

33. (B) Let the Family have both, car and phone = x%



According to question:-

$20 + 15 + x = 35$ [given]

$\therefore$ $x = 5\%$

Now,

5% comprises 2000 family.

$\therefore$ 100% = 2000 × 20 = **40000 Ans.**

34. (C) Let no. of students of type A = 100

According to question:-

$$\frac{80}{100} \text{ of } \frac{40}{100} \text{ of } 100 = 32$$

Now:-

% remaining no. of boys = (100 – 32)%
= 68%

35. (D) Let the sale is above Rs. 10000 = Rs. x

According to question:-

95% of 10000 + 96% of x = Rs. 31100

$$\Rightarrow \frac{95}{100} \times 10000 + \frac{96}{100} \times x = 31100$$

$$\Rightarrow 0.95 \times 10000 + 0.96 \times x = 31100$$

$$\Rightarrow 0.96x = 31100 - 9500$$

$$\therefore \quad x = \frac{21600}{0.96} = \text{Rs. } 22500$$

$\therefore$ Total sales worth

= Rs.[10000 + 22500]

= **Rs.[32500] Ans**

36. (C) Man : Day : Time = work

117 33 8 = $\frac{4}{7}$

x 13 9 = $\frac{3}{7}$

$$\therefore \quad x = \frac{117 \times 33 \times 8 \times 3}{13 \times 9 \times 4} = \frac{92664}{468} = 198$$

$\therefore$ Required no. = 198 – 117 = **81Ans.**

37. (C) Ratio of the amount of water filled in the cistern $= 1^2 : \frac{16}{9} : 4$

$= 9 : 16 : 36$

$\because$ 36 cubic unit of water is filled by the pipe of largest diameter in 61 minutes.

1 cubic unit of water is filled by the pipe of largest diamter in $61 \times \frac{36}{61}$

61 cubic unit of water is filled by the pipe largest diameter in $\frac{61 \times 36}{61}$

= **36 minutes Ans.**

38. (C) Time taken by pipe B (to empty) is less than the time taken by pipe A (to fill)

$\Rightarrow$ Rate of empty > Rate of filling

Now, Time required to empty the $\frac{2}{5}$th of the tank already filled when both the pipe A and B are opened together.

$$= \frac{2}{5} \times \left(\frac{10 \times 6}{10 - 6} \text{minutes}\right)$$

= **6 minutes Ans**

39. (D) **Logical solution**:-
Let the initial no. of total passengers = x
⇒ Initial ratio of male to female passengers = 3 : 1 (Given)
⇒ Initital no. of total passengers (x) must be completely divisible by 4.
($\because$ 3 + 1 = 4)
..... condition (i)
Also, change in the number of initial passengers = (–16 + 6) = –10
& Finally no. of male to female passengers = 2 : 1
⇒ Final no. of total passengers (i.e. x – 10) must be completely divisible by 3.
($\because$ 2 + 1 = 3)
..... condition (ii)
And among the options given only option (D) = 64 fullfills both the criteria.
⇒ **correct option will be option (D). Ans.**

40. (A) 1st : 2nd : 3rd
Ratio of fares= 8 : 6 : 3

New ratio = $8 \times \frac{5}{6} : 6 \times \frac{11}{12} : 3$

= $\frac{20}{3} : \frac{11}{2} : 3$

Ratio of passenger = 9 : 12 : 26

Collection from 1st class:-

$$\frac{60}{60+66+78} \times 1088 = \frac{65280}{204}$$

= **Rs. 320 Ans.**

41. (A) Given that:-
Average age of 11 yrs players = 28 yrs
$\therefore$ Total age of players = 11 × 28 = 308 yrs
Now:-
Total ages of three groups
= [3 × 25 + 3 × 28 + 3 × 30] = 249 yrs
Difference in their ages = (308 – 249)
= 59 yrs.
This will be the average of captain age and younger player age.
Now:-
As per question,
= 59 – 11 = 48 = sum of their ages

$\therefore$ AV = $\frac{48}{2}$ = 24

$\therefore$ Captain age = 24 + 11 = **35 yrs Ans.**

42. (D) Let the number of wickets taken till last match = n
$\therefore$ Total runs @ 24.85 run/wicket = [24.85]n
Total run after current match = 24.85n + 52
Total number of wicket = (n + 5)
According to question:-

$$\frac{(24.85)n+52}{n+5} = 24.85 - 0.85$$

or, $24.85n + 52 = 24 \times (n + 5)$
or, $24.85n - 24n = 120 - 52$

$\therefore n = \frac{68}{0.85}$ = **80 Ans.**

43. (B) Let the CP of product = Rs. x

$\therefore$ SP = $\frac{80}{100}x$ [after discounted 20%]

Again discount of 6.25%, then new selling price

SP = $\frac{83.75}{100} \times \frac{80}{100} \times x$

According to question:-

$$x - \frac{83.75}{100} \times \frac{80}{100} \times x = 37.5$$

or, $(x - 0.75x) = 37.5$

or, $\therefore x = \frac{37.5}{0.25}$ = Rs. 150 Ans.

44. (B) Let CP of 1st horse = Rs. x

Selling price of 1st horse = Rs. $\frac{90}{100}x$

$\therefore$ Selling price of 2nd horse

= $\left[1710 - \frac{90}{100}x\right]$ = [1710 – 0.9x]

According to question:-
$x = 1710 - 0.9x$
or, $1.9x = 1710$
$x = 900$
$\therefore$ Selling price of 2nd horse will be
= [1710 – 900] = [810]
$\therefore$ Total gain = [900 – 810] = **Rs. 90 Ans.**

45. (D) Sum of first n natural numbers is $\frac{1}{5}$ times of the sum of their square.

Sum of natural no. = $\frac{n(n+1)}{2}$

Sum of square of n natural numbers

= $\frac{n(n+1)(2n+1)}{6}$

According to question:-

$$\frac{n(n+1)}{2} = \frac{1}{5} \times \frac{n(n+1)(2n+1)}{6}$$

or, $(2n + 1) = 15$
or, $2n = 14 \Rightarrow n$ = **7 Ans.**

46. (C) 44, 42, 40, ...
First term, a = 44
Common difference, d = –2
$\therefore t_n = 44 + (n - 1)(-2)$ [$t_n = a + (n - 1)d$]

$= 44 + (-2n) + 2$
$= 46 - 2n$

Here, $t_n = 0$
$0 = 46 - 2n$
$\therefore \quad n = 23$

$\therefore$ Sum $= \frac{n}{2}[2a + (n-1)d]$

$= \frac{23}{2}[2 \times 44 + (22)(-2)] = \frac{23}{2}[84 - 44]$

$= 23 \times 22 =$ **506 Ans.**

47. (D) If $a + b + c = 0$

then, $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = ?$

$\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$

$\frac{a^3 + b^3 + c^3}{abc} = \frac{3abc}{abc} =$ **3 Ans.**

[$\because$ If $a + b + c = 0$, then
$a^3 + b^3 + c^3 - 3abc = 0$]

48. (C) If $x = 2 + \sqrt{3}$, then $(x^2 + x^{-2}) = ?$

Now, $x^2 = (2 + \sqrt{3})^2$

$= 4 + 3 + 4\sqrt{3} = 7 + 4\sqrt{3}$

Now, $x^{-2} = \frac{1}{x^2} = 7 - 4\sqrt{3}$

[conjugate of x^2]

Now, $(x^2 + x^{-2}) = (7 + 4\sqrt{3})(7 - 4\sqrt{3})$

= **14 Ans.**

49. (B) Given that

$\frac{1}{x+1} + \frac{2}{y+2} + \frac{1009}{z+1009} = 1$ .... (i)

Assume values of x, y, z
which satisfies the above equation
$x = 2, y = 4, z = 2 \times 1009$

Thus $\frac{1}{2+1} + \frac{2}{4+2} + \frac{1009}{2 \times 1009 + 1009} = 1$

or, $\frac{1}{3} + \frac{2}{6} + \frac{1009}{1009(2+1)} = 1$

Thus, $= \frac{2}{2+1} + \frac{4}{4+2} + \frac{2 \times 1009}{2 \times 1009 + 1009}$

$= \frac{2}{3} + \frac{2}{3} + \frac{2 \times 1009}{1009(2+1)} = 3 \times \frac{2}{3} =$ **2 Ans**

50. (D) $x + \frac{1}{x} = P$

Squaring both side:-

$\left(x + \frac{1}{x}\right)^2 = P^2$

$x^2 + \frac{1}{x^2} + 2 = P^2$

$x^2 + \frac{1}{x^2} = P^2 - 2$

cubic both sides

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

or, $x^6 + \frac{1}{x^6} + 3(P^2 - 2) = P^6 - 8 - 6P^2 + 12P$

or, $x^6 + \frac{1}{x^6} =$ **$P^6 - 9P^2 + 12P - 2$ Ans.**

51. (A) $\sqrt{\frac{x}{x+3}} - \sqrt{\frac{x+3}{x}} = \frac{-3}{2}$

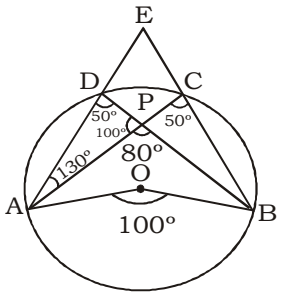
or, $\frac{x - x - 3}{\sqrt{x}.\sqrt{x+3}} = \frac{-3}{2}$

or, $2 = \sqrt{x}(\sqrt{x+3})$

Squaring:-

$x^2 + 3x - 4 = 0$
$(x-1)(x+4) = 0$
$\therefore \quad x =$ **1, –4 Ans**

52. (B)



Given that:-

$\angle AOB = 100°$
$\therefore \quad \angle ADB = 50°$
$\angle ACB = 50°$

[$\therefore$ angle on minor sections]

Now,

$\angle DAP = 30°$ (Given)

Now,

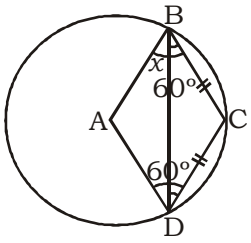
In ΔADP:-

$\angle A + \angle D + \angle P = 180°$
$\therefore \quad \angle P = 180° - 30° - 50°$
$\angle P = 100°$

Now,

$\angle APB = 180° - 100° =$ **80° Ans.**

53. (D)



Given that :-

AB = BC = CD

and AB = AC = [Radius]

Now,

AB = AC = BC [All sides equal]

it means ΔABC are equilateral triangle.

$\therefore \angle B = 60°$

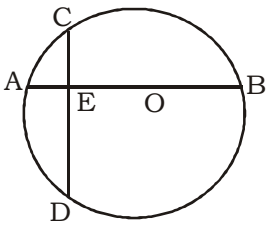
Now, $\Delta ABD \cong \Delta BDC$

[By SSS congruency]

Then, line BD will be angle bisector of $\angle B$.

$\therefore \angle x =$ **30°Ans.**

54. (B)



Given that,

AB = 10 cm

$\therefore$ AO = [5 cm] = radius

AE = 2 cm

$\therefore$ EO = 3 cm

Construction – join OD:-

Now, in ΔOED:-

$OD^2 = OE^2 + DE^2$ [Pythagoras theorem]

or, $25 - 9 = ED^2$

$\therefore$ ED = **4 cm Ans**

55. (C) Given that,

$\angle SQL = 50°$ and $\angle OQL = 90°$

$\therefore \angle OQS = 180° - 90° - 50°$

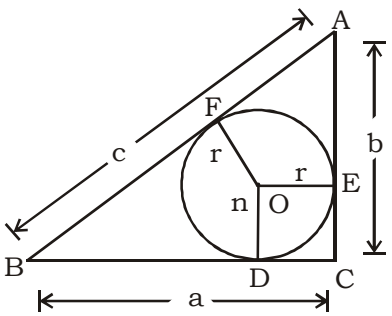
$= 40°$

Similarly,

$\angle ORS = 30°$

$\therefore \angle QSR = 30° + 40° = 70°$

56. (A)



AB = AF + FB .... (1)

Now:-

AF = AE = $(b - r)$

BF = BD = $(a - r)$

and AB = C

substitute the value of following in equation (1)

$C = (b - r) + (a - r)$

$\therefore r = \dfrac{a+b-c}{2}$ **Ans.**

57. (A) $20^2 + 21^2 + 22^2 + \ldots\ldots + 29^2$

$\Rightarrow [1^2 + 2^2 + 3^2 + \ldots + 29^2] - [1^2 + 2^2 + \ldots 19^2]$

$= \dfrac{29(29+1)(29\times2+1)}{6} - \dfrac{19(19+1)(19\times2+1)}{6}$

$= \dfrac{29\times30\times59}{6} - \dfrac{19\times20\times39}{6} =$ **6085 cm² Ans**

58. (B) Rectangle having:-

l = 6 unit

b = 5 unit

Area = $l \times b = 6 \times 5 = 30$ sq. unit

New rectangle having:-

l = 7

b = 4

Area = $l \times b = 7 \times 4 = 28$

Ratio = $\dfrac{30}{28}$ = **15 : 14 Ans.**

59. (C) Volume = $\dfrac{4}{3}\pi[R_1^3 + R_2^3 + R_3^3]$

$= \dfrac{4}{3} \times 3.14\ [1 + 8 + 27]$

$= \dfrac{4}{3} \times 3.14 \times 36 = 150.72$

25% Reduced = $\dfrac{75}{100} \times 150.72 = 113.04$

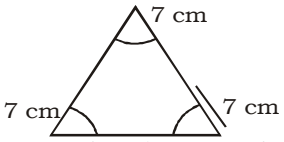
According to question:-

$\dfrac{4}{3}\pi R^3 = 113.04$

$R^3 = 27$

$\therefore R = 3$

60. (C)

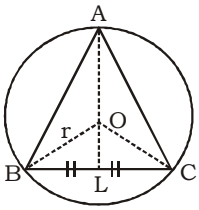


Area of region gazed

$= \dfrac{\angle A + \angle B + \angle C}{360°}(\pi R^2) = \dfrac{180°}{360°}\left[\dfrac{22}{7} \times 7 \times 7\right]$

= 77 sq. units

61. (B)



Equilateral Δ of side = $6\sqrt{3}$ cm

$\therefore$ Height = $\frac{\sqrt{3}}{2} \times 6\sqrt{3}$ cm = 9 cm

Now,

In ΔOLC:- $OB^2 = BL^2 + OL^2$

or, $r^2 = (9 - r)^2 + \left(\frac{6\sqrt{3}}{2}\right)^2$

On solving :-

$18r = 108$

$r = \frac{108}{18} =$ **6 cm Ans.**

62. (D) Let the Radius of sphere = R cm

According to question:-

$4\pi(R + 2)^2 - 4\pi R^2 = 704$

or, $4\pi[R^2 + 4 + 4R - R^2] = 704$

or, $4\pi[4R + 4] = 704$

or, $16 \times \frac{22}{7}[1 + R] = 704$

$\therefore (R + 1) = \frac{704 \times 7}{16 \times 22} = 14$

$(R + 1) = 14$

R = **13 cm Ans.**

63. (B) $\sin(n+1)A\sin(n+2)A + \cos(n+1)A + \cos(n+2)A$

Here n is variable:-

Put $n = 0$

sin A . sin 2A + cos A . cos 2A

cos(A – 2A) = cos(–2A) = **cos A Ans.**

64. (B) Given that:-

tan A – tan B = x, and

cot A – cot B = y, then cot(A – B) = ?

$\Rightarrow \cot(A - B) = \frac{1}{\tan(A - B)} = \frac{1 + \tan A \tan B}{\tan A - \tan B}$

$\cot(A - B) = \frac{1 + \tan A \tan B}{x}$ .... (1)

Now,

$\frac{1}{\tan A} + \frac{1}{\tan B} = y$

$\Rightarrow \frac{\tan A - \tan B}{\tan A . \tan B} = y$

$\Rightarrow \frac{-x}{\tan A . \tan B} = \frac{y}{1}$

$\therefore \tan A . \tan B = \frac{-x}{y}$ .... (2)

From (1) and (2)

$\cot(A - B) = \frac{1 - \frac{x}{y}}{x}$

$\cot(A - B) = \frac{1}{x} - \frac{1}{y}$ **Ans.**

65. (A) Given that:-

$\sin\alpha + \sin\beta = a$ and .... (i)

$\cos\alpha + \cos\beta = b$ .... (ii)

Squaring and adding them:-

$a^2 + b^2 = \sin^2\alpha + \sin^2\beta + 2\sin\alpha.\sin\beta + \cos^2\alpha + \cos^2\beta + 2\cos\alpha\cos\beta$

$= 2 + 2[\sin\alpha\sin\beta + \cos\alpha\cos\beta]$

$a^2 + b^2 = 2 + 2\cos(\alpha + \beta)$

$\therefore \cos(\alpha + \beta) = \frac{a^2 + b^2 - 2}{2}$

Again, squaring and substracting them:- [equation (i) and (ii)]

$b^2 - a^2 = \cos^2\alpha - \sin^2\alpha + \cos^2\beta - \sin^2\beta + 2[\cos\alpha\cos\beta - \sin\alpha\sin\beta]$

$= \cos 2\alpha + \cos 2\beta + 2\cos(\alpha + \beta)$

$= 2\cos(\alpha + \beta)\cos(\alpha - \beta) + 2\cos(\alpha + \beta)$

$= 2\cos(\alpha + \beta)[\cos(\alpha - \beta) + 1]$

$= 2\cos(\alpha + \beta)\left[\frac{a^2 + b^2 - 2}{2} + 1\right]$

$= 2\cos(\alpha + \beta)\left[\frac{a^2 + b^2}{2}\right]$

$\therefore \cos(\alpha + \beta) = \frac{b^2 - a^2}{a^2 + b^2}$ **Ans.**

66. (B) $2\cos\left(\frac{\pi}{13}\right)\cos\left(\frac{9\pi}{13}\right) + \cos\left(\frac{3\pi}{13}\right) + \cos\left(\frac{5\pi}{13}\right)$

or, $2\cos\left(\frac{\pi}{13}\right)\cos\left(\frac{9\pi}{13}\right) + 2\cos\left(\frac{\frac{3\pi}{13} + \frac{5\pi}{13}}{2}\right)$

$+ \cos\left(\frac{\frac{5\pi}{13} - \frac{3\pi}{13}}{2}\right)$

or, $2\cos\left(\frac{\pi}{13}\right)\cos\left(\pi-\frac{4\pi}{13}\right)+2\cos\left(\frac{4\pi}{13}\right)\cos\left(\frac{\pi}{13}\right)$

or, $-2\cos\left(\frac{\pi}{13}\right)\cos\left(\frac{4\pi}{13}\right)+2\cos\left(\frac{4\pi}{13}\right)\cos\left(\frac{\pi}{13}\right)$

= **0 Ans.**

67. (C) $\frac{\cos\theta}{1+\sin\theta} = \frac{\sin\left(\frac{\pi}{2}-\theta\right)}{1+\cos\left(\frac{\pi}{2}-\theta\right)}$

$$= \frac{2\sin\left(\frac{\pi}{2}-\frac{\theta}{2}\right)\cos\left(\frac{\pi}{4}-\frac{\theta}{2}\right)}{2\cos^2\left(\frac{\pi}{4}-\frac{\theta}{2}\right)}$$

$$= \tan\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$$ **Ans.**

68. (B) Given that:-

$x^2 + Px - 4 = 0$[–4]

Putting $x = -4$ in above equation:-

$(-4)^2 - 4P - 4 = 0$

or, $16 - 4 = 4P$

$P = 3$

Now:-

$x^2 + Px + q = 0$ [Equal roots]

Discriminant = 0

$P^2 - 4q = 0$ [$D = b^2 - 4ac$]

or, $4q = p^2$

or, $q = \frac{p^2}{4} = \frac{9}{4}$ **Ans.**

69. (D) $\frac{x}{2a} = \frac{2b}{a+b}$

Apply C & D,

$$\frac{x+2a}{x-2a} = \frac{a+3b}{b-a} \quad \text{..... (1)}$$

Again,

$$\frac{x}{2b} = \frac{2a}{a+b}$$

Apply C & D,

$$\frac{x+2b}{x-2b} = \frac{3a+b}{a-b} \quad \text{..... (2)}$$

Now,

$$\frac{x+2a}{x+2b}+\frac{x+2b}{x-2b} = \frac{a+3b}{x-2b}+\frac{3a+b}{a-b}$$

$$= \frac{-a-3b+3a+b}{a-b}$$

$$= \frac{2a-2b}{a-b} = 2$$

70. (C) Given that:-

$$x\left[3-\frac{2}{x}\right] = \frac{3}{x},\ x \neq 0$$

$$\Rightarrow 3x-2 = \frac{3}{x}$$

$$\Rightarrow 3x-\frac{3}{x} = 2$$

Squarring:-

$$\Rightarrow 9x^2 + \frac{9}{x^2} - 18 = 4$$

$$\Rightarrow 9\left[x^2+\frac{1}{x^2}\right] = 22$$

$$\Rightarrow \left[x^2+\frac{1}{x^2}\right] = \frac{22}{9} = 2\frac{4}{9}$$ **Ans.**

71. (A) Given that:-

If P = 101

Then:-

$$\sqrt[3]{P(P^2-3P+3)-1}$$

$$= \sqrt[3]{P^3-3P^2+3P-1}$$

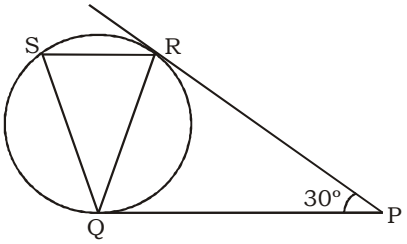
$$= \sqrt[3]{(P-1)} = \sqrt{(101-1)^3} = \textbf{100 Ans.}$$

72. (C) $a^2 + b^2 + \frac{1}{a^2}+\frac{1}{b^4} = 4$

It will be only possible when, $a = 1$ and $b = 1$.

$\therefore a^2 + b^2 = 1^2 + 1^2 =$ **2 Ans.**

73. (A)



Given that:-

$\angle RPQ = 30°$ and RS | | PQ

Now, In ΔPQR:-

PR = PQ, $\angle P = 30°$

Let $\angle R = x°$

$\therefore\ x° + x° + 30° = 180°$

$x = 75°$

Now:-

$\angle RQP = \angle QRS = 75°$ [Alternate angle]

In ΔRQS:-

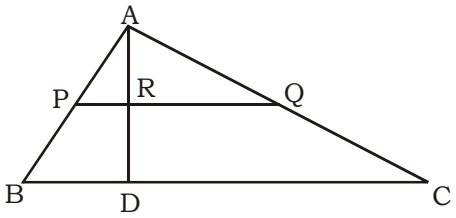
$\angle R = \angle S = 75°$

$\angle R + \angle S + \angle Q = 180°$

$\angle Q + 150° = 180°$

$\therefore\ \angle Q = 30°$

74. (B)



Given that:-

AP = 3 cm, AR = 4.5 cm

AQ = 6 cm, AB = 5 cm, AC = 10 cm

Now,

$\Delta APR \sim \Delta ABD$ [By AAA similarity]

$\therefore \quad \frac{AP}{PB} = \frac{AR}{RD}$

or, $\frac{AP}{PB} + 1 = \frac{AR}{RD} + 1$

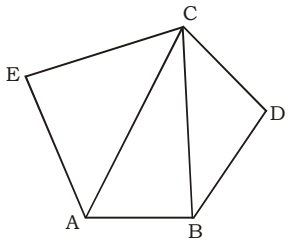
or, $\frac{AP+PB}{PB} = \frac{AR+RD}{RD}$

or, $\frac{5}{2} = \frac{AD}{AD-AR}$

On further solving:-

AD = 7.5 cm

75. (D)



Let the side of right isoceles triangle = a unit

Now,

In ΔBCD [equilateral triangle]

Height = $\frac{\sqrt{3}}{2}a$

Area (ΔBCD) $= \frac{1}{2} \times b \times h = \frac{1}{2} \times a \times \frac{\sqrt{3}}{2}a$

$= \frac{\sqrt{3}}{4}a^2$ sq. unit. ...(i)

In equilateral (ΔAEC):-

Side = $\sqrt{a^2+a^2} = a\sqrt{2}$ unit

Height = $\frac{\sqrt{3}}{2} \times a \times \sqrt{2} = \frac{\sqrt{6}}{2}a$

Area (ΔAEC) $= \frac{1}{2} \times b \times h$

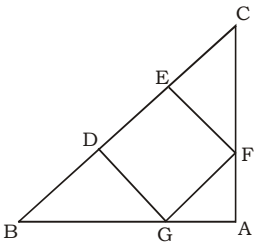
$= \frac{1}{2} \times a\sqrt{2} \times \frac{\sqrt{6}}{2}a$

$= \frac{\sqrt{12}}{4}a^2 = \frac{2\sqrt{3}}{4}$ ...(ii)

Now,

$$\frac{ar(\Delta BCD)}{ar(\Delta AEC)} = \frac{\frac{\sqrt{3}}{4}a^2}{\frac{2\sqrt{3}}{4}a^2} = \frac{1}{2} = \textbf{1 : 2 Ans.}$$

76. (B)



$\because \Delta BDG \sim \Delta FEC$

$\Rightarrow \frac{BG}{CF} = \frac{BD}{EF} = \frac{DG}{EC}$

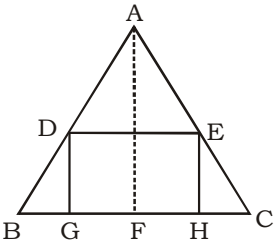
$\Rightarrow \frac{16}{EF} = \frac{DG}{9}$

$\Rightarrow \frac{16}{EF} = \frac{EF}{9}$

$\Rightarrow EF^2 = 144$

$\Rightarrow EF = \textbf{12 cm = DE Ans}$

77.(B)



$\Delta DGB \sim \Delta BAF$

$\Rightarrow \frac{BG}{BF} = \frac{DG}{AF}$

$\frac{BG}{6} = \frac{6}{24}$

$BG = \frac{36}{24} = 1.5$ cm

Similarly, HC = 1.5 cm

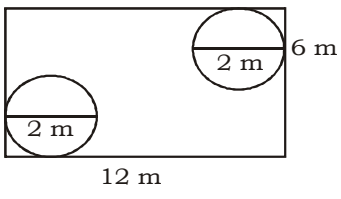
$\Rightarrow$ GH = 12 – (1.5 + 1.5) = 9 cm

Area of rectangle GHEF

= GH × EH

= 9 × 6 = **54 cm²**

78. (*)



Area of the two apertures of 2 m diameter.

$= 2 \times \frac{22}{7} \times (1)^2 = \frac{44}{7}$ sq. m.

Area of an aperture of diameter 1 m

$= \frac{22}{7} \times \frac{1}{2} \times \frac{1}{2} = \frac{11}{14}$ m^2

Area of the remaining portion of the plate

$= 6 \times 12 - \left(\frac{44}{7} + \frac{11}{14}\right)$ sq. m.

$= 72 - \left(\frac{88+11}{14}\right)$ sq. m.

$= \frac{1008-99}{14} = \frac{909}{14}$

= 64.928 sq.m. = **65 sq. m. Ans.**

79. (C) Side of the cube $= \sqrt[3]{343} = 7$ cm

Height of the cone = 7 cm

radius $= \frac{7}{2}$ cm

Volume of the cone

$= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7$

$= \frac{539}{6} = 89.8\overline{3}$ cm = **90 cm² (approx.)**

80. (B) Distance between two poles = 5 m

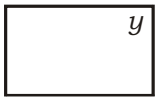
Distance between 48 poles = 5 × 48

= 240 m

Side of the square field $= \frac{240}{4} = 60$ m

its area = 60 × 60 = **3600 m² Ans.**

81. (C)



Let x & y be the length and breadth of the rectangular plot.

its area = $x \times y = xy$ sq. unit

New area $= \frac{156x}{100} \times \frac{126y}{100}$

$= 1.8xy$ sq. unit

$= 1.8(xy)$ sq. unit

New area increases 1. 8 times Ans.

82. (D) Length of rectangle = l unit

Breadth of rectangle = b unit

Area = $l \times b$ unit

Now:-

$A = 15b$ .... (1)

$l - b = 10$

$l = (10 + b)$

According to question:-

$A = l \times b$

$= (10 + b) \times b = 15b$ [from (1)]

$\therefore \quad b =$ **5 Ans.**

83. (A) r = 21 m

Speed of the water = 5 km/h

$= \frac{5 \times 1000}{60}$ m/min

Volume of the water in the pipe

$= \frac{22}{7} \times 21 \times 21 \times \frac{5 \times 1000}{60}$

$= 11 \times 21 \times 500$ m^3 = 115500 m^3

= 115500 × 1000 l = **1155 lakhs litre Ans.**

84. (D) Volume of the wood

= outer volume – inner volume

= 21.75 × 60.75 × 30.75 – 21 × 60 × 30

= 40630.3594 – 37800 cm^3

= 2830.3594 cm3

Weight of the wood = 2830.3594 × 0.9 gm

= **2547.32 gm Ans.**

85. (*) Volume of the silver ball $= \frac{4}{3} \pi \times 6^3$ mm^3

Volume of the gold ball $= \frac{2}{3} \times \frac{4}{3} \pi \times 6^3$ mm^3

$\frac{4}{3} \pi \times R^3 = \frac{4}{3} \pi \times \frac{2}{3} \times 216$

$R^3 = 2 \times 72$

$R = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 3 \times 3}$

$= 2\sqrt[3]{18}$ mm

Diameter = $2 \times 2\sqrt[3]{18} = 4\sqrt[3]{18}$ mm

86. (D) $\cos^2\theta = \frac{1 - \tan^2\theta}{1 + \tan^2\theta}$

$\Rightarrow \quad \frac{1 - (2\tan^2\phi + 1)}{1 + 2\tan^2\phi + 1} \qquad \left[\because \tan^2\theta = 2\tan^2\phi + 1\right]$

$= \frac{-2\tan^2\phi}{2 + 2\tan^2\phi} = -\frac{\tan^2\phi}{\sec^2\phi}$

$\Rightarrow \quad \cos^2\theta = -\sin^2\phi$

$\Rightarrow \quad \cos^2\theta + \sin^2\phi = 0$

87. (C) sin2A + sin2B – sin2C

= 2sin(A + B) cos(A – B) – 2sin C cos C

= 2sin(π – C) cos(A – B) –2sin C cos C

= 2sin C[cos(A – B) – cos C]

= 2sin C[cos(A – B) + cos(A + B)]

= 2sin C.2cos A.cos B

= **4cos A.cos B.sin C Ans.**

88. (A) $2\cos^2\theta - 1 + 2\cos\theta$

$= 2\left[\cos^2\theta - \frac{1}{2} + \cos\theta\right]$

$= 2\left[\left(\cos\theta+\frac{1}{2}\right)^2-\frac{3}{4}\right]$

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

so $2\left(\cos\theta+\frac{1}{2}\right)^2-\frac{3}{2}$

so $> -\frac{3}{2}$

89.(A) tanA + tanB + tanC = 6
and tanA tanB = 3
we know that
tanA+tanB+tanC = tanA.tanB.tanC

$\Rightarrow$ so $\tan C = \frac{6}{3} = 2$

so tanA . tanB will be 1 and 3 and all are the values of acute angles $\left(\frac{\pi}{4} < A < \frac{\pi}{2}\right)$

90.(A) Given

$\sin\alpha .\sin\beta - \cos\alpha .\cos\beta + 1 = 0$

$\cos(\alpha+\beta) = -1$

$(\alpha+\beta) = (2n+1)\ \pi$

$\Rightarrow \quad 1+\cos\alpha\ \tan\beta = 1+\frac{\cos\alpha}{\sin\alpha}.\frac{\sin\beta}{\cos\beta}$

$= \frac{\sin\alpha\ \sin\beta + \cos\alpha\ \cos\beta}{\sin\alpha\ .\ \cos\beta}$

$= \frac{\sin\ (\alpha+\beta)}{\sin\alpha\cos\beta}$

$\Rightarrow \quad \cot\alpha\ \tan\beta = -1$

91. (A) % of Boys in U School = 85%

$\therefore$ No of boys = $\frac{85}{100} \times 1000 = 850$

% of boys in R School = 75%

No. of boys = $\frac{75}{100} \times 2000 = 1500$

Total no. of boys in school R and U
= 1500 + 850 = 2350

Total % of boys = $\frac{2350}{3000} \times 100 =$ **78.55 Ans**

92. (B) Percentage of boys = 60% [in T. School]

$\therefore$ No. of boys = $\frac{60}{100} \times 1000 =$ **6000 Ans.**

93. (*) Required % = $\frac{2000}{2500} \times 100\% = 80\%$

94. (C) % of boys in P School = 60%

$\therefore$ No. of boys = $\frac{60}{100} \times 2500 = 1500$

No. of boys in Q School = $\frac{55}{100} \times 3000 = 1650$

$\therefore$ Average = $\frac{1500+1650}{2} =$ **1575 Ans.**

95. (C) % of girls in P School = 40% of 2500
% of girls in Q School = 45% of 3000

$\therefore \quad \frac{P}{Q} = \frac{\frac{40}{100}\times 2500}{\frac{45}{100}\times 3000} =$ **20 : 27 Ans.**

96. (B) Appeared in interview form others =12%
Qualified from Engineering = 16%

Ratio = $\frac{\frac{12}{100}\times 25780}{\frac{11}{100}\times 7390} =$ **3094 : 813 Ans.**

97. (B) Appeared candidate from others and managments = 24%

$\therefore$ No. of candidate = $\frac{24}{100} \times 25780$ ....(1)

Appared candidate from Engg. = 16%

No. of candidate = $\frac{16}{100} \times 25780$

% of candidate with respect to Engg.

candidates = $\frac{24}{16} \times 100 =$ **150 Ans.**

98. (D) Engineering selected = 11%
Agriculture selected = 7%
Difference = 4%

$\therefore$ No. of candidates = $\frac{4}{100} \times 7390 = 295.78$
= **296 Ans.**

99.(C) **Management**

$= \frac{12}{100} \times 25780 - \frac{20}{100} \times 7390$
$= 3093.60 - 1478.00 = 1615.6$

Engineering

$= \frac{16}{100} \times 25780 - \frac{11}{100} \times 7390$
$= 4124.80 - 812.90 = 3311.9$

Science $= \frac{28}{100} \times 25780 - \frac{32}{100} \times 7390$
$= 7218.40 - 2364.80 = 4853.6$

Agriculture

$= \frac{14}{100} \times 25780 - \frac{7}{100} \times 7390$
$= 3609.20 - 517.30 = 3091.9$

Required discipline is science. Ans.

100. (A) % selected candidates from Commerce and Agriculture discipline together
= (16 + 7) = 23%

Total no. of candidates = $\frac{23}{100} \times 7390$
= **1701.08 Ans.**

MOCK TEST PAPER - 10 (T-II) 2013 (ANSWER KEY)

ANSWER SHEET

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