SSC MAINS (MATHS) MOCK TEST-1 (SOLUTION)

1. (B) Order of surds are 4, 3, 2. LCM of 4, 3 and 2 is 12. So, convert each surd into a surd of order 12

$\sqrt[4]{10} = \sqrt[12]{(10)^3} = \sqrt[12]{1000}$

$\sqrt[3]{6} = \sqrt[12]{(6)^4} = \sqrt[12]{1296}$

$\sqrt{3} = \sqrt[12]{(3)^6} = \sqrt[12]{729}$

$\sqrt[3]{6} > \sqrt[4]{10} > \sqrt{3}$

2. (C) $x = \sqrt{72 - \sqrt{72 - \sqrt{72 - - - \infty}}}$

$\Rightarrow x^2 = 72 - \sqrt{72 - \sqrt{72 - - - \infty}}$

$\Rightarrow x^2 = 72 - x$

$\Rightarrow x^2 + x - 72 = 0$

$\Rightarrow x^2 + 9x - 8x - 72 = 0$

$\Rightarrow (x + 9)(x - 8) = 0$

$\Rightarrow x = 8, -9$

$y = \sqrt{20 - \sqrt{20 - \sqrt{20 - - - \infty}}}$

$\Rightarrow y^2 = 20 - \sqrt{20 - \sqrt{20 - - - \infty}}$

$\Rightarrow y^2 = 20 - y$

$\Rightarrow y^2 + y - 20 = 0$

$\Rightarrow (y + 5)(y - 4) = 0$

$\Rightarrow y = 4, -5$

Now $\frac{x}{y} = \frac{8}{4} = 2$

3.(A) Difference $= 13\frac{7}{66} - 4\frac{5}{66}$

$= (13 - 4) + \left(\frac{7}{66} - \frac{5}{66}\right)$

$= 9 + \frac{2}{66} = 9\frac{1}{33}$

Sum $= 13\frac{7}{66} + 4\frac{5}{66} = 17\frac{12}{66} = 17\frac{2}{11}$

$\therefore$ The required answer $= 17\frac{2}{11} - 9\frac{1}{33}$

$= 17\frac{6}{33} - 9\frac{1}{33}$

$= 8\frac{5}{33}$

Short cut

The required answer = 2 × smaller value

$= 2 \times 4\frac{5}{66}$

$= 8\frac{5}{33}$

4.(D) Let two digit number be $10x + y$

$\therefore x + y = 13$ _____ (1)

$10y + x = 10x + y - 45$

or, $x - y = \frac{45}{9} = 5$ _____(2)

From eqn (1) & (2)

$x = \frac{13 + 5}{2} = 9$

and $y = 4$

$\therefore$ The required number = 10 × 9 + 4 = 94

5.(B) The required remainder = $d_1 \times r_2 + r_1$

where, d_1 = the first divisor = 12

r_1 = the first remainder = 4

r_2 = the second remainder = 6

$\therefore$ The required remainder = 12 × 6 + 4

= 76

6.(B) LCM of 5 and 7 = 35

Now, divide 300 by 35 and the quotient obtained is the required number of numbers. 300 = 8 × 35 + 20

Thus, there are 8 numbers.

7.(A) Let the middle number be x.

According to question,

$x - 2 + x + x + 2 = 176 \times \frac{1}{4} - 14$

$\Rightarrow 3x = 44 - 14$

$\Rightarrow x = 10$

8.(D) The required answer = 13 + 23 – 5

= 31

9.(C) Let fraction be x/y

Now $\frac{x + 2}{y + 3} = \frac{7}{9}$

$\Rightarrow 9x + 18 = 7y + 21$

$\Rightarrow 9x - 7y = 3$ ____ (1)

and $\frac{x - 1}{y - 1} = \frac{4}{5}$

$\Rightarrow 5x - 5 = 4y - 4$

$\Rightarrow 5x - 4y = 1$ ___ (2)

Now, equation (1) × 4 – equation (2) × 7

$\Rightarrow x = 5$

and $y = 6$

$\therefore \frac{x}{y} = \frac{5}{6}$

10.(C) Let number be x.

$44^2 < x < 45^2$

$\Rightarrow 1936 < x < 2025$

Number will be between 1936 and 2025. Since one part of the number is the square of 6 it means one factor is 36

$\therefore$ LCM of 36 and 5 = 180

Number will be a multiple of 180 i.e. 180 × 11 = 1980
The only value which satisfies the condition is 1980.

11.(C) Let the three consecutive numbers be x, $x+1$ and $x+2$ respectively.
$\therefore$ Difference between first and third number = $x+2-x=2$

12.(A) Let numbers be x, y, z.

Then $\frac{x}{y}=\frac{2}{3}$ and $\frac{y}{z}=\frac{5}{3}$

$\Rightarrow y=\frac{3}{2}x \Rightarrow z=\frac{3}{5}y=\frac{3}{5}\times\frac{3}{2}x$

$\Rightarrow z=\frac{9}{10}x$

$\therefore x+y+z=68$

$\Rightarrow x+\frac{3}{2}x+\frac{9}{10}x=68$

$\Rightarrow \frac{10x+15x+9x}{10}=68$

$\Rightarrow 34x=68\times10$

$\Rightarrow x=20$

So, second number = $\frac{3}{2}x=\frac{3}{2}\times20=30$

13.(C) Number of one digit pages from 1 to 9 = 9
Number two digit pages from 10 to 99 = 90
Number of three digit pages from 100 to 200 = 101
$\therefore$ Total number of required figures
= (9 × 1) +(90 × 2) + (101 × 3) = 492

14.(A) Required number

$$= \text{LCM of } \frac{4}{5}, \frac{3}{10} \text{ and } \frac{12}{35}$$

$$= \frac{\text{LCM of } 4,3, \text{and } 12}{\text{HCF of } 5,10 \text{ and } 35}$$

$$= \frac{12}{5}=2\frac{2}{5}$$

15.(B) LCM of 6, 7, 8, 9 and 10 = 2520
The greatest number of six digits is 999999.
Dividing 999999 by 2520, we get 2079 as remainder. Hence the number divisible by 2520 is
999999 – 2079 = 997920
Since 6 – 4 =2, 7–5 = 2, 8 – 6 = 2, 9 – 7 =2, 10 – 8 = 2
the remainder in each case is less than the divisor by 2.
$\therefore$ The required number = 997920 – 2
= 997918

16.(D) LCM of 3,5,6,8, 10, 12, = 120
Required number = 120 K + 2 ; K is a positive integer.

$$13\overline{)120}\,(9$$
$$\underline{117}$$
$$3$$

120 K + 2 = (13 × 9 + 3) K + 2
= (13 × 9 × K) + (3K + 2)
For every value of K, (13 × 27 × K) is always divisible by 13.
Pulting value of K equal to 1, 2, 3, 4, --- etc. in succession, we find that number8.
Least value of K which will make (3K +2)divisible by13 is 8.
$\therefore$ The required number = 120 × 8 + 2
= 960 + 2
= 962

17.(B)

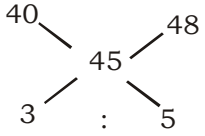
	1 ₹		50-P		25-P
Number of coins	1	:	1	:	1
Value	1	:	$\frac{1}{2}$	:	$\frac{1}{4}$

$=\frac{7}{4}\rightarrow 43.75$

$\therefore 1\rightarrow 25$

18.(B)

	Silver		Copper	
1st	$2_{\times20}$	:	$1_{\times20}$	$=3_{\times20}$
2nd	$4_{\times12}$	:	$1_{\times12}$	$=5_{\times12}$
Mix	$3_{\times15}$	:	$1_{\times15}$	$=4_{\times15}$

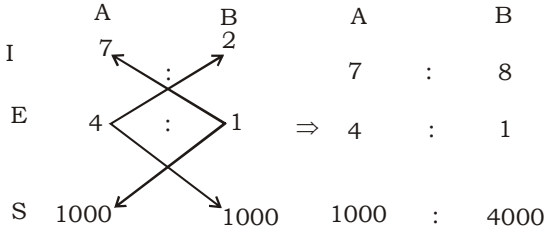


19.(C) 5 leaps of hound = 6 leaps of hare.

$\therefore$ 7 leaps of hound = $\frac{6}{5}\times7$ leaps of hare

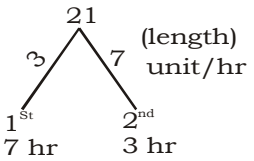
$\therefore$ rate of hound : rate of hare = $\frac{42}{5}:8$
= 21 : 20

20.(B)



(7 – 8) $\rightarrow$ (4000 – 1000)
1 $\rightarrow$ 3000
$\therefore$ A's income = 7 × 3000 = 21000
B's income = 2 × 3000 = 6000

21.(B)



Let after t time

$$\frac{21-3t}{21-7t} = \frac{3}{1}$$

$\Rightarrow 21 - 3t = 63 - 21t$

$\Rightarrow 21 - 3t = 63 - 21t$

$\Rightarrow \quad 18t = 42$

$\Rightarrow \quad t = \frac{42}{18}$ hrs

$\Rightarrow \quad t = 2$ hr 20 min

22.(A)

	Laxman		Gopal
Last year	3	:	4

	Last year		Present Year	
Laxman	4	:	5	$\Rightarrow$ 3 : 15/4
Gopal	2	:	3	$\Rightarrow$ 4 : 6

	Laxman		Gopal
Present year	$\frac{15}{4}$	:	6
$\Rightarrow$	5	:	8

Laxman's Salary = $\frac{5}{5+8} \times 4160$

= ₹1600

23. (A) B's profit = ₹ $\frac{235-45}{2}$ = ₹ 95

A's profit = ₹ 95 + 45 = ₹ 140

A's profit per month = ₹ $\frac{140}{3}$

B's profit per month = ₹ $\frac{95}{4}$

Their capitals are proportional to their profit,

A's capital : B captital = $\frac{140}{3} : \frac{95}{4}$

= 112 : 57

Difference between their capitals = 112 – 57 = 55, but the actual difference is 500.

$\therefore$ A's capital = $112 \times \frac{550}{55}$ = ₹ 1120

24.(A) Houses containing only one person = 100 – 40 = 60%

Houses containing only a male

$= 60 \times \frac{20}{100} = 12\%$

Houses containing only one female = 60 – 12 = 48%

25. (D) Present age of husband and wife = 2 × 23 + 2 × 5 = 56 years

Present age of husband, wife and child = 3 × 20 = 60 years

Present age of child = (60 – 56) = 4 years

26. (B) Let son's age be x, then Kamla's age = $10x$ years

Kamla's age at the time of marriage = $(10x - 6)$ years.

$\therefore \; 10x = \frac{5}{4}(10x - 6)$

or $40x = 50x - 30$

or $x = 3$ years.

27.(D) Let Marked price = x

and cost price = y

$$x \times \frac{15}{16} \times \frac{96}{100} = y \times \frac{135}{100}$$

$$\frac{x}{y} = \frac{3}{2}$$

Required % = $\frac{3-2}{2} \times 100 = 50\%$

28.(C)

	a%	b%	
I st month	1000	2000	1000
2nd month	1000	3000	

On this he gets (1300 – 900 = 400)

$1000 \times \frac{b}{100} = 400$

$\Rightarrow$ b = 40%

In I st month $\frac{40}{100} \times 2000 = 800$

$\frac{a}{100} \times 1000 = 100$

$\Rightarrow a = \frac{100}{1000} \times 100 = 10\%$

29. (B) Ratio of parts

$$= \frac{1}{100+2\times5} : \frac{1}{100+3\times5} : \frac{100}{100+4\times5}$$

$$= \frac{1}{110} : \frac{1}{115} : \frac{1}{120}$$

$= 276 : 264 : 253 = 793 \xrightarrow{\times 10} 7930$

Difference between greatest and smallest = 276 – 253

= 23 (× 10) = ₹ 230

30. (A) Let amount lent at 5% = x

$$\frac{5}{100} \times x + \frac{4}{100} \times (2000 - x) = 92$$

$\Rightarrow \frac{x}{100} + 80 = 92$

$\Rightarrow x =$ ₹ 1200

31.(B) SI for 2 years = ₹ 200

SI for 1 year = ₹ 100

CI for 2 years

= SI for 2 years + Interest on 1st year's SI

$= 200 + \frac{100\times 20}{100} = ₹\ 220$

32.(C) $900 = P \times \frac{6}{100} \times 3$

$\Rightarrow P = ₹\ 5000$

$CI = 5000\left(1+\frac{6}{100}\right)^3 - 5000 = 955.08$

Difference = 955.08 – 900 = ₹ 55.08

33.(D) Payment is quarterly, so r = 4%, t = 8 years

Required answer $= \frac{100\times 2280}{100\times 8+\frac{8\times 7\times 4}{2}}$

$= \frac{2280\times 100}{912}$

= ₹ 250

34.(A) $20\% = \frac{1}{5}$

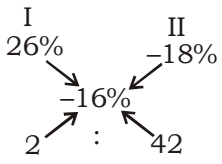
P	A
$180 = 5_{\times 36}$	$6_{\times 36}$
$150 = 25_{\times 6}$	$36_{\times 6}$
$\underline{125} = 125$	$216 \xrightarrow{\times 10} 2160$

$455 \xrightarrow{\times 10} 4550$

Total interest = 2160 × 3 – 4550

= ₹ 1930

35.(A)



I^{St} = 2 Kg

2^{nd} = 42 Kg

36.(B) After taking out 20 litres of mixture

A : B

3 : 2

A	:	B	
3	:	2	10 $\xrightarrow{\times 2}$ 20
$1_{\times 3}$	:	$4_{\times 3}$	

Make A equal because it is not changing.

Mixture's initial quantity = (3+2) × 2 + 20

= 30

A's quantity = $\frac{3}{5}$ × 30 = 18 Litre

37.(B) $\frac{A+C}{B} = \frac{2}{1}\times\frac{4}{4} = \frac{8}{4}$

$\frac{A+B}{C} = \frac{3}{1}\times\frac{3}{3} = \frac{9}{3}$

$\Rightarrow$ B = 4, C= 3, A= 5

(A + B + C)'s 1 day work = 4 + 3 +5=12 unit

12 day's work = 12 × 12 = 144 unit

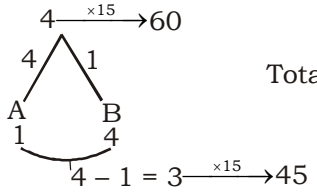
A will take $\frac{144}{5} = 28\frac{4}{5}$ days

B will take $\frac{144}{4}$ = 36 days

C will take $\frac{144}{3}$ = 48 days

38.(A) A is 4 times as fast as B.

It means if A does a work in 1 day then B will do in 4 days.



Total = $\frac{60}{4+1}$ = 12 days

39.(B) Required time = $\sqrt{4\times 9}$

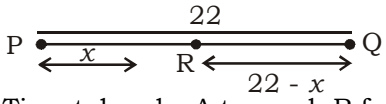
= 6 minutes

40.(B) Total time = $\frac{54}{18} + 53 \times \frac{18}{60}$

= 3 hours + 15 hours 54 min

= 18 hours 54 min

41.(C)



Time taken by A to reach R from P = Time taken by B to reach Q and return from Q to R

$\Rightarrow \frac{x}{5} = \frac{22}{6} + \frac{22-x}{6}$

$\Rightarrow \frac{x}{5} + \frac{x}{6} = \frac{22}{6} + \frac{22}{6}$

$\Rightarrow \frac{11x}{30} = \frac{22}{3}$

$\Rightarrow x$ = 20 km

42.(B) $\frac{4}{5}$ of total time in train = 4 hours

$\therefore$ Total time in train = $4 \times \frac{5}{4}$ = 5 hours

Total time spent in air = 8 – 5 = 3 hours

By air, in 4 hrs distance travelled = 400 Km

$\therefore$ in 3 hours, distance travelled = $\frac{400}{4} \times 3$

= 300 Km

Distance covered by train = 400 – 300

= 100 km

So, the required ratio = 300 : 100

= 3 : 1

43.(B) Let original speed be x km/hour.

$$\frac{35}{x-2} = \frac{35}{x} + 2$$

$$\Rightarrow 35\left[\frac{1}{x-2} - \frac{1}{x}\right] = 2$$

$$\Rightarrow 35\left[\frac{x-x+2}{x(x-2)}\right] = 2$$

$$\Rightarrow 35 = x(x-2)$$

$$\Rightarrow x = 7 \text{ Km/hour}$$

44. (A) Let distance between Delhi and Kanpur is x. Let train leaving from Delhi is A and from Kanpur is B.

$$\text{A's speed} = \frac{x}{10\text{am} - 5\text{am}} = \frac{x}{5} \text{ Km/hour}$$

$$\text{B's speed} = \frac{x}{2\text{pm} - 7\text{am}} = \frac{x}{7} \text{ Km/hour}$$

$$\text{Distance covered by A till 7 am} = \frac{2x}{5} \text{ Km}$$

$$\text{Remaining Distance} = x - \frac{2x}{5} = \frac{3x}{5} \text{ Km}$$

$$\text{Relative speed} = \frac{x}{5} + \frac{x}{7} = \frac{12x}{35} \text{ Km/hour}$$

Time taken by both trains to cover the distance

$$= \frac{\frac{3}{5}x}{\frac{12x}{35}} = \frac{7}{4} \text{ hours} = 1 \text{ hours } 45 \text{ min}$$

$\therefore$ The two trains will meet at 7 am + 1hour 45 min
= 8 : 45 am

45.(C) $\tan 2A = \tan(A + B + A - B)$

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

$$= \frac{\frac{1}{2} + \frac{1}{3}}{1 - \frac{1}{2}.\frac{1}{3}}$$

$$= \frac{5}{5} = 1 = \sin 90^\circ$$

46.(D) Take $\theta = 45^\circ$

$x = 1+1 = 2$

$$y = \sqrt{2} - \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$

$(x^2y)^{2/3} - (xy^2)^{2/3}$

$$= \left(4 \times \frac{1}{\sqrt{2}}\right)^{2/3} - \left(2.\frac{1}{2}\right)^{2/3}$$

$$= \left(2 \times \sqrt{2}\right)^{2/3} - (1)^{2/3}$$

$$= 2 - 1$$

$$= 1$$

47.(D) $$z = \frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}}$$

$$\Rightarrow z = \frac{\left(\sqrt{1+\sin x} + \sqrt{1-\sin x}\right)}{\left(\sqrt{1+\sin x} - \sqrt{1-\sin x}\right)} \times \frac{\left(\sqrt{1+\sin x} + \sqrt{1-\sin x}\right)}{\left(\sqrt{1+\sin x} - \sqrt{1-\sin x}\right)}$$

$$\Rightarrow z = \frac{1+\sin x + 1 - \sin x + 2\sqrt{1+\sin x} \times \sqrt{1-\sin x}}{1+\sin x - 1 + \sin x}$$

$$\Rightarrow z = \frac{2 + 2\sqrt{1+\sin x} \times \sqrt{1-\sin x}}{2\sin x}$$

$$\Rightarrow z = \frac{1 + \sqrt{1-\sin^2 x}}{\sin x}$$

$$\Rightarrow z = \frac{1 + \sqrt{\cos^2 x}}{\sin x}$$

$$\Rightarrow z = \frac{1+\cos x}{\sin x}$$

$$\Rightarrow z = \text{cosec } x + \cot x$$

48.(A) $$\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$$

$$\Rightarrow \frac{\sin(x+y) + \sin(x-y)}{\sin(x+y) - \sin(x-y)} = \frac{a+b+a-b}{a+b-a+b}$$

$$\Rightarrow \frac{\sin x\cos y + \cos x \sin y + \sin x \cos y - \cos x \sin y}{\sin x\cos y + \cos x \sin y - \sin x \cos y + \cos x \sin y} = \frac{a}{b}$$

$$\Rightarrow \frac{\sin x \cos y}{\cos x \sin y} = \frac{a}{b}$$

$$\Rightarrow \frac{\tan x}{\tan y} = \frac{a}{b}$$

49. (D) $2 \text{ cosec } \theta = y + \frac{1}{y}$

$$\cot\theta = \sqrt{\text{cosec}^2\theta - 1}$$

$$\Rightarrow \cot\theta = \sqrt{\frac{1}{4}\left(y + \frac{1}{y}\right)^2 - 1}$$

$\Rightarrow \cot\theta = \frac{1}{2}\sqrt{y^2+\frac{1}{y^2}+2-4}$

$\Rightarrow \cot\theta = \frac{1}{2}\sqrt{y^2+\frac{1}{y^2}-2}$

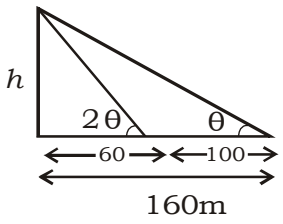
$\Rightarrow \cot\theta = \pm\frac{1}{2}\left(y-\frac{1}{y}\right)$

50.(C) (1 + cot A – cosec A) (1 + tan A + Sec A)
Put A = 45°,
(1+cot 45°– cosec 45°) (1+ tan45° + sec 45°)
$= (1+1-\sqrt{2})(1+1+\sqrt{2})$
$= (2-\sqrt{2})(2+\sqrt{2})$
$= 4-2$
$= 2$

51.(C) $3\sin 2\theta = 2\sin 3\theta$
$3.2.\sin\theta.\cos\theta = 2(3\sin\theta - 4\sin^3\theta)$
$\Rightarrow 3\cos\theta = 3 - 4\sin^2\theta$
$\Rightarrow 3\cos\theta + 1 = 4\cos^2\theta$
$\Rightarrow 4\cos^2\theta - 3\cos\theta - 1 = 0$
$\Rightarrow 4\cos^2\theta - 4\cos\theta + \cos\theta - 1 = 0$
$\Rightarrow 4\cos\theta(\cos\theta - 1) + 1(\cos\theta - 1) = 0$
$\Rightarrow (4\cos\theta + 1)(\cos\theta - 1) = 0$
$\Rightarrow \cos\theta = 1 \text{ or } -\frac{1}{4}$

52.(D) $x = \sin^2 5° + \sin^2 10° + \sin^2 15° + \text{---} + \sin^2 85° + \sin^2 90°$
$\therefore \sin^2 5° + \sin^2 85° = 1$
$\sin^2 10° + \sin^2 80° = 1$
$\sin^2 45° = \frac{1}{2}$
$\sin^2 90° = 1$
So, $x = 8 + \frac{1}{2} + 1$
$\Rightarrow x = 9\frac{1}{2}$

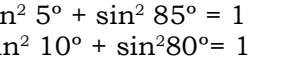
53. (A)



$\tan\theta = \frac{h}{160}$
$\tan 2\theta = \frac{h}{60}$
$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$
$\Rightarrow \frac{h}{60} = \frac{2\times\frac{h}{160}}{1-\left(\frac{h}{160}\right)^2}$
$\Rightarrow \frac{80}{60} = \frac{1}{1-\left(\frac{h}{160}\right)^2}$
$\Rightarrow 1-\left(\frac{h}{160}\right)^2 = \frac{60}{80}$
$\Rightarrow \left(\frac{h}{160}\right)^2 = \frac{1}{4}$
$\Rightarrow \frac{h}{160} = \frac{1}{2}$
$\Rightarrow h = 80 \text{ m}$

54.(B) Let speeds are $5x$ and $9x$ m/s
length of Ist train = $5x \times 5 = 25x$ m
length of IInd train = $9x \times 5 = 45x$ m
Time to cross each other
$= \frac{\text{Sum of lengths}}{\text{Sum of speeds}} = \frac{25x+45x}{5x+9x}$
$= \frac{70x}{14x}$
= 5 sec

55.(A)



I can row from P to R in 4 hours.
$\therefore$ I can row from P to Q in 2 hours.
I can row from P to Q and back in 10 hours.
$\therefore$ I can row from Q to P in (10 – 2)
= 8 hours
Hence in rowing with the current, I takes 2 hours and in rowing against the current, I takes 8 hours. The distance is same, therefore, 'down rate' and the 'up rate' are inversely proportional to the times.
$\therefore$ down rate : up rate = 8 : 2 = 4 : 1
$\therefore$ speed of boat in still water : speed of river
= 4 + 1 : 4 – 1
= 5 : 3

56.(C)

A	B	C
1000 = $100_{\times 10}$	$90_{\times 10}$	
	$100_{\times 9}$	$90_{\times 9} = 810$
	(make B equal)	

In 1000 m race, A can beat C by
1000 – 810 = 190m.
In 100 m race, A can beat C by 19 m

57.(C) $x = \sqrt{\frac{\sqrt{5}+1}{\sqrt{5}-1} \times \frac{\sqrt{5}+1}{\sqrt{5}+1}}$

$\Rightarrow x = \sqrt{\frac{\left(\sqrt{5}+1\right)^2}{5-1}} = \sqrt{\frac{\left(\sqrt{5}+1\right)^2}{4}} = \frac{\sqrt{5}+1}{2}$

Now, $5x^2 - 5x - 1$

$= 5\left(\frac{\sqrt{5}+1}{2}\right)^2 - 5\left(\frac{\sqrt{5}+1}{2}\right) - 1$

$= 5\frac{\left(5+1+2\sqrt{5}\right)}{4} - 5\left(\frac{\sqrt{5}+1}{2}\right) - 1$

$= \frac{15+5\sqrt{5}-5\sqrt{5}-5-2}{2}$

$= 4$

58.(C) $x^{x\sqrt{x}} = (x\sqrt{x})^x$

$\Rightarrow x^{x^{3/2}} = \left(x^{\frac{3}{2}}\right)^x$

$\Rightarrow x^{x^{3/2}} = x^{\frac{3}{2}x}$

By comparing

$x^{\frac{3}{2}} = \frac{3}{2}x$

$\Rightarrow x^{\frac{1}{2}} = \frac{3}{2}$

$\Rightarrow x = \frac{9}{4}$

59.(B) $x = \frac{\sqrt{3}}{2}$

$\therefore \sqrt{1+x} = \sqrt{1+\frac{\sqrt{3}}{2}} = \sqrt{\frac{2+\sqrt{3}}{2} \times \frac{2}{2}}$

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

$\Rightarrow \sqrt{1+x} = \frac{\sqrt{3}+1}{2}$

$\therefore \sqrt{1-x} = \sqrt{1-\frac{\sqrt{3}}{2}} = \sqrt{\frac{2-\sqrt{3}}{2} \times \frac{2}{2}}$

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

$\Rightarrow \sqrt{1-x} = \frac{\sqrt{3}-1}{2}$

$\therefore \frac{\sqrt{1+x}}{1+\sqrt{1+x}} + \frac{\sqrt{1-x}}{1-\sqrt{1-x}}$

$= \frac{\frac{\sqrt{3}+1}{2}}{1+\frac{\sqrt{3}+1}{2}} + \frac{\frac{\sqrt{3}-1}{2}}{1-\frac{\sqrt{3}-1}{2}}$

$= \frac{\sqrt{3}+1}{\sqrt{3}+3} + \frac{\sqrt{3}-1}{3-\sqrt{3}}$

$= \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}}$

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

60.(C) $\sqrt{x} = \sqrt{3} - \sqrt{5}$

$x = 3 + 5 - 2.\sqrt{3}.\sqrt{5}$

$\Rightarrow x = 8 - 2\sqrt{15}$

Now, $x^2 - 16x + 6$

$= \left(8-2\sqrt{15}\right)^2 - 16\left(8-2\sqrt{15}\right) + 6$

$= 64 + 60 - 32\sqrt{15} - 128 + 32\sqrt{15} + 6$

$= 2$

61.(B) If $x^2 = y + z$, $y^2 = z + x$, $z^2 = x + y$

$\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1}$

$= \frac{x}{x^2+x} + \frac{y}{y^2+y} + \frac{z}{z^2+z}$

$= \frac{x}{x+y+z} + \frac{y}{x+y+z} + \frac{z}{x+y+z}$

(from given condition)

$= 1$

62.(B) $\frac{b-c}{a} + \frac{a+c}{b} + \frac{a-b}{c} = 1$

$\Rightarrow \frac{b-c}{a} + \frac{a-b}{a} = 1 - \frac{a+c}{b}$

$\Rightarrow \frac{bc-c^2+a^2-ab}{ac} = \frac{b-a-c}{b}$

$\Rightarrow \frac{bc-ab+a^2-c^2}{ac} = \frac{(a+c-b)}{b}$

$\Rightarrow \frac{-b(a-c)+(a-c)(a+c)}{ac} = -\frac{(a+c-b)}{b}$

$\Rightarrow \frac{a-c}{ac} = -\frac{1}{b}$

$\Rightarrow \frac{1}{c} - \frac{1}{a} = -\frac{1}{b}$

$\Rightarrow \frac{1}{a} = \frac{1}{b} + \frac{1}{c}$

63.(A) Check through options.

When $x = (a+b+c)^2$

$$\frac{x-a^2}{b+c} + \frac{x-b^2}{c+a} + \frac{x-c^2}{a+b}$$

$$= \frac{(a+b+c)^2 - a^2}{b+c} + \frac{(a+b+c)^2 - b^2}{c+a} + \frac{(a+b+c)^2 - c^2}{a+b}$$

$$= \frac{(2a+b+c)(b+c)}{(b+c)} + \frac{(a+2b+c)(a+c)}{c+a} + \frac{(a+b+2c)(a+b)}{a+b}$$

$= 2a + b + c + a + 2b + c + a + b + 2c$

$= 4(a+b+c)$

64.(C) Let numbers be $17x$ and $17y$, where x and y are co-primes.

LCM of $17x$ and $17y = 17xy$

According to the question,

$17xy = 714$

$\Rightarrow xy = 42 = 6 \times 7$

$\Rightarrow x = 6$ and $y = 7$

or $x = 7$ and $y = 6$

$\therefore$ First number $= 17x = 17 \times 6 = 102$

Second number $= 17x = 17 \times 7 = 119$

$\therefore$ Sum of numbers $= 102 + 119 = 221$

65.(C) $x = \sqrt{30 + \sqrt{30 + \sqrt{30 + \cdots}}}$

$x^2 = 30 + \sqrt{30 + \sqrt{30 + \cdots}}$

$\Rightarrow x^2 = 30 + x$

$\Rightarrow x^2 - x - 30 = 0$

$\Rightarrow x^2 - 6x + 5x - 30 = 0$

$\Rightarrow (x-6)(x+5) = 0$

$x = 6$, because $x = -5$ can't be considered

66.(A) $4^{61} + 4^{62} + 4^{63} + 4^{64}$

$= 4^{61}(1 + 4 + 4^2 + 4^3)$

$= 4^{61}(1 + 4 + 16 + 64)$

$= 4^{61} \times 85$ which is divisible by 17.

67. (A) $x - y = \frac{x+y}{7} = \frac{xy}{4} = K$

$\Rightarrow x - y = K$

$x + y = 7K$

$\therefore (x+y)^2 - (x-y)^2 = 49K^2 - K^2$

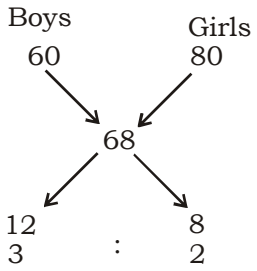
$\Rightarrow 4xy = 48K^2$

$\Rightarrow 16K = 48K^2$

$\Rightarrow K = \frac{1}{3}$

$\therefore xy = 4K = \frac{4}{3}$

68. (B)



% of boys in class $= \frac{3}{3+2} \times 100 = 60\%$

69.(B) Percentage of families having either a cow or a buffalo or both $= 60 + 30 - 15 = 75\%$

It means 25% of families do not have either a cow or a buffalo

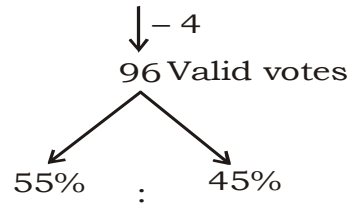
$\therefore$ Required number of families

= 25% of 96

$= 96 \times \frac{25}{100}$

$= 24$

70. (D) Let total votes = 100



55% – 45% = 10% of 96 $\rightarrow$ 240

$100 \rightarrow \frac{240}{96 \times 10} \times 100 \times 100$

$= 2500$ votes

71.(B) Ratio of capital investment

A	:	B	:	C
25,000	:	30,000	:	15,000
5	:	6	:	3

Let total profit be 100.

A get 30% for management

Remaining profit = 70%

A's share $= 30 + 70 \times \frac{5}{14} = 55\%$

(B+C)'s share $= 100 - 55 = 45\%$

When, difference $55 - 45 = 10$, then total profit = 100

When difference ₹ 200, then total profit

$= 100 \times 20$

= ₹ 2000

72.(A) $15000 \xrightarrow[\text{or } 3000]{-20\%} 12000 \xrightarrow[\text{or } 1200]{-10\%} 10,800 \xrightarrow[1080]{-10\%}$ ₹ 9720

73.(B) Present worth $= P\left(1 - \frac{R}{100}\right)^T$

$= 62500\left(1-\frac{4}{100}\right)^2$

$= 62500\left(1-\frac{1}{25}\right)^2$

$= 62500 \times \frac{24\times24}{25\times25}$

$= ₹\ 57600$

74.(A) According to question,

$1M = 2W = 4B$

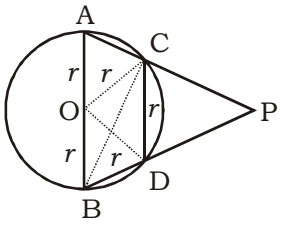
$M_1D_1 = M_2D_2$

$(1M + 1W + 1B) \times 7 = 1B \times D_2$

$\Rightarrow (4B + 2B + 1B) \times 7 = 1B \times D_2$

$\Rightarrow D_2 = 49$ day

75.(D)



ΔOCD is equilateral triangle.

$\angle COD = 60°$

$\therefore \angle CBD = 30°$ (Property)

$\because \angle ACB = 90°$

$\therefore \angle BCP = 180° - 90°$

In ΔCBP

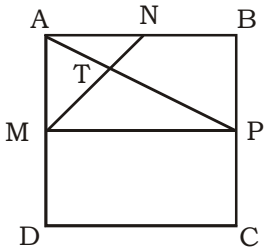
$\angle BCP + \angle CBP + \angle CPB = 180°$

$\Rightarrow 90° + 30° + \angle CPB = 180°$

$\Rightarrow \angle CPB = 60°$

and $\angle APB = 60°$

76.(C)



If area $\Delta ATM = 1$,

then area $\Delta AMN = 2$

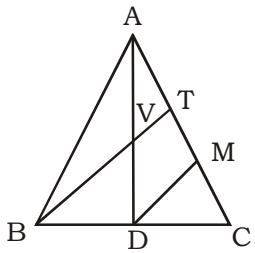
$\therefore$ area ABPM = 8

area $\Delta MNP = 8 - 2 - 2 = 4$

area $\Delta MTP = 2$

$\Delta ATM : \Delta TMP = 1 : 2$

77.(C)



AT = 6 (Given)

$\Delta AVT \sim \Delta ADM$

$\frac{AV}{AD} = \frac{AT}{AM}$

$\frac{1}{2} = \frac{6}{AM}$

$\Rightarrow AM = 12$

$\therefore TM = 6$

$\Delta CDM \sim \Delta CBT$

$\frac{CD}{BD} = \frac{CM}{TM}$

$\Rightarrow \frac{1}{1} = \frac{CM}{6}$

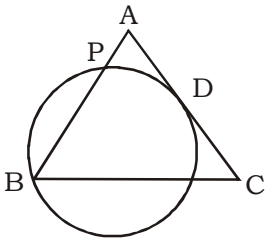
$\Rightarrow CM = 6$

$\therefore TC = CM + TM$

$= 6 + 6 = 12$

78. (*)

79.(B)



AB = AC

D is mid point of AC

$AP \times AB = AD^2$ (Property)

$AP \times AB = \left(\frac{AB}{2}\right)^2$

$AP = \frac{AB}{4}$

$\therefore PB = \frac{3}{4} AB$

PB : PA

$\Rightarrow \frac{3}{4}AB : \frac{1}{4}AB$

$\Rightarrow 3 : 1$

80.(C) $2 \sin \alpha + 15 \cos^2 \alpha = 7$

$\Rightarrow 2 \sin \alpha + 15 - 15 \sin^2 \alpha = 7$

$\Rightarrow 15 \sin^2 \alpha - 2\sin \alpha - 8 = 0$

$\Rightarrow 15 \sin^2 \alpha - 12\sin \alpha + 10 \sin \alpha - 8 = 0$

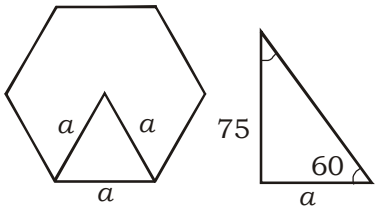
$\Rightarrow 3\sin \alpha (5\sin \alpha - 4) + 2 (5\sin \alpha - 4) = 0$

$\Rightarrow (3 \sin \alpha + 2)(5 \sin \alpha - 4) = 0$

$\Rightarrow \sin \alpha = \frac{4}{5}$

$\Rightarrow \cot \alpha = \frac{3}{4}$

81. (D)



$$\tan 60^\circ = \frac{75}{a}$$

$$\sqrt{3} = \frac{75}{a}$$

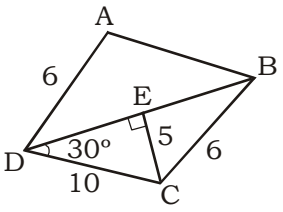
$$a = \frac{75}{\sqrt{3}} = 25\sqrt{3}$$

Area of regular hexagon $= 6 \times \frac{\sqrt{3}}{4} \times a^2$

$$= 6 \times \frac{\sqrt{3}}{4} \times (25\sqrt{3})^2$$

$$= 5625.\frac{\sqrt{3}}{2} \text{ m}^2$$

82. (B)



In Δ DEC

$$\sin 30^\circ = \frac{EC}{CD}$$

$$\frac{1}{2} = \frac{EC}{10}$$

$EC = 5$

$$\cos 30^\circ = \frac{ED}{CD}$$

$$\frac{\sqrt{3}}{2} = \frac{ED}{10}$$

$ED = 5\sqrt{3}$

In ΔECB

$EB^2 = BC^2 - EC^2$

$\Rightarrow EB^2 = 6^2 - 5^2$

$\Rightarrow EB^2 = 36 - 25$

$\Rightarrow EB^2 = 11$

$\Rightarrow EB = \sqrt{11}$

$BD = ED + EB$

$BD = 5\sqrt{3} + \sqrt{11}$

83. (B) Let sides be $4x$, $5x$, $6x$.

$$\text{inradius} = \frac{\Delta}{S}$$

$$S = \frac{4x + 5x + 6x}{2} = \frac{15x}{2}$$

$$\Rightarrow 4 = \frac{\Delta}{\frac{15}{2}x}$$

$$\Rightarrow \Delta = 30x$$

Smallest altitude will be on the longest side

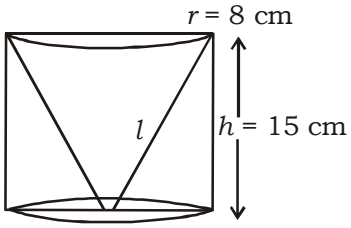
Area of $\Delta = \frac{1}{2} \times h \times 6x$

$$\Rightarrow 30x = \frac{1}{2} \times h \times 6x$$

$\Rightarrow h = 10$ cm.

Read; "Height and base radius of the cone are same" of the question as "Height and base radius of the cone are respectively equal to the height and base radius of the cylinder"

84.(B)



$$l = \sqrt{8^2 + 15^2}$$

$$\Rightarrow l = \sqrt{64 + 225}$$

$$\Rightarrow l = \sqrt{289}$$

$\Rightarrow l = 17$ cm

Total surface area

$= \pi r^2 + 2\pi rh + \pi rl$

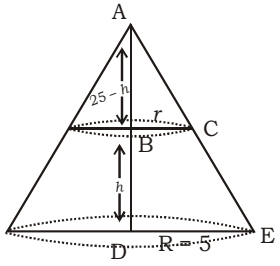
$= \pi[64 + 2 \times 8 \times 15 + 8 \times 17]$

$= 440\pi$ cm^2

85.(D) R = 5 cm

H = 25 cm

$\Delta ABC \sim \Delta ADE$



$$\frac{25 - h}{r} = \frac{25}{5}$$

$\Rightarrow 25 - h = 5r$

$\Rightarrow h = 25 - 5r$

Volume of frustrum $= \frac{1}{3}\pi h (R^2 + r^2 + Rr)$

$110 = \frac{1}{3} \times \frac{22}{7} \times (25 - 5r)(25 + r^2 + 5r)$

$\Rightarrow 21 \times 5 = (25 - 5r)(25 + r^2 + 5r)$

$\Rightarrow 21 = (5 - r)(25 + r^2 + 5r)$

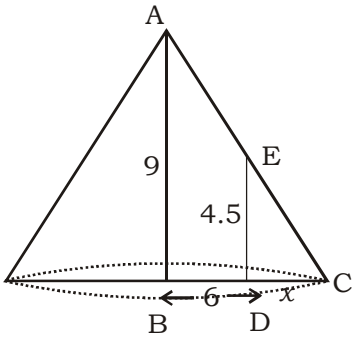
$\Rightarrow 21 = 5^3 - r^3$

$\Rightarrow 21 = 125 - r^3$

$\Rightarrow r^3 = 104$

$\Rightarrow r = \sqrt[3]{104}$ cm

86.(A)



$\Delta ABC \sim \Delta EDC$

$\frac{9}{4.5} = \frac{6+x}{x}$

$2x = 6 + x$

$x = 6$

$BC = 12$ m

$l = AC = \sqrt{AB^2 + BC^2}$

$= \sqrt{81+144}$

$= \sqrt{225}$

$= 15$ m

Lateral surface area $= \pi rl$

$= \frac{22}{7} \times 12 \times 15$

$= 565.7$ m^2

87.(B) Area covered by roller in one revolution $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 0.7 \times 10$

$= 44$ cm^2

Let total area be A

88% of A $= 1200 \times 44$

$A = \frac{1200 \times 44}{88} \times 100$

$= 60{,}000$ cm^2

Total cost of levelling $= 2.5 \times A$

$= 2.5 \times 60{,}000$

$=$ ₹ 150000

88. (B) Let 1 Man can do 1 unit work in 1 day, then 50 men will do in 40 days
$= 50 \times 40 = 2000$ unit work.

Days	Men	Work
1-10	50	$50 \times 10 = 500$
11-20	45	$45 \times 10 = 450$
21-30	40	$40 \times 10 = 400$
31-40	35	$35 \times 10 = 350$
41-50	30	$30 \times 10 = 300$
		2000

Total days = 50

89.(A) Ratio of efficiency

A : B : C

4 : 2 : 3

Working together they will empty in
1 hours = 4 + 2 + 3
= 9 units

In 6 hours 40 min $= \frac{20}{3}$ hours, they will

empty $= \frac{20}{3} \times 9 = 60$ units

A will empty the pool in $\frac{60}{4} = 15$ hours.

90.(C) If $x = a(\sin\theta + \cos\theta)$,
$y = b(\sin\theta - \cos\theta)$

Now,

$\frac{x^2}{a^2} + \frac{y^2}{b^2}$

$= (\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2$

$= \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta + \sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta$

$= 1 + 1$

$= 2$

91.(C) Required answer

$= \frac{35 \times 30}{100} + \frac{35 \times 15}{100} + \frac{35 \times 15}{100}$

$= \frac{35}{100}(30 + 15 + 15)$

$= \frac{35 \times 60}{100} = 21$ lakhs

92.(D) Percentage variation :

Model A $\Rightarrow \frac{40-30}{30} \times 100 = 33\frac{1}{3}\%$

Model B $\Rightarrow \frac{20-15}{15} \times 100 = 33\frac{1}{3}\%$

Model C $\Rightarrow \frac{15-20}{20} \times 100 = -25\%$

93.(A) Required difference

$= \frac{44\times20}{100} - \frac{35\times15}{100}$

$= \frac{880-525}{100} = \frac{355}{100}$ lakhs

= 355000

94.(B) Required production

$= \frac{44\times30}{100}$ lakhs

= 1320000

95.(C) Required answer

$= 35 \times \frac{10}{100} \times \frac{15}{100} + 44 \times \frac{10}{100} \times \frac{15}{100}$

$= \frac{150}{10000} \times 79 = 1.1850$ lakhs

= 118500

96.(D) $100\% = 360^\circ$

$\therefore \quad 1\% = \frac{360^\circ}{100}$

$10\% = \frac{360^\circ\times10}{100} = 36^\circ$

97.(B) 35% Total cost = ₹ 17500

$\therefore$ 15% of total cost

$₹ \frac{17500\times15}{35}$ = ₹ 7500

98.(C) Difference in percent cost of 'binding and cutting charges' and 'royalty'

= (18 – 15)% = 3%

$\because$ 4% of total cost = ₹ 6000

$\therefore$ 3% of total cost = $₹ \frac{6000\times3}{4}$ = ₹ 4500

99.(B) Difference in percent expenses on printing cost and advertisement charges

= (35 – 18)% = 17%

Now, 1% = 3.6°

$\therefore$ 17% = 3.6° × 17 = 61.2°

100.(B) The required percentage

$= \frac{10\times100}{35}$ = 28.6% (approx.)

SSC MAINS(MATHS) MOCK TEST-1 (ANSWER KEY)

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