

## SSC CGL Tier-II Paper-I 2022-23 Memory Based (Mathematical Abilities) (Based on 02 Mar 2023 Exam)

**Q1.** Find the average of the sum of the cube of 1<sup>st</sup> five natural numbers.

- (a) 35
- (b) 45
- (c) 49
- (d) 52

**Q2.** Simplify the expression.

$$18 \div 2 \times 5 \times (19 - 13 \times 12 + 160)$$

- (a) 1035
- (b) 935
- (c) 405
- (d) 905

**Q3.** A Shopkeeper sells a pen sell phone to customer of after two successive discount of 48% and 45%. If the marked price of the sell phone is 48000, then find the selling price of sell phone after successive discount.

- (a) 14,028
- (b) 17,288
- (c) 14,500
- (d) 13,728

**Q4.** A certain sum inverted on compound interest grows to Rs. 21,952 and Rs. 29791. In three and six years respectively, when the interest is compounded annually. Find the percentage rate of interest.

- (a) 11%
- (b) 9.56%
- (c) 10.71%
- (d) 13.13%

**Q5.** A, B and C pipes can fill a tank in 8hrs, 10hrs, and 14hrs respectively. If A and C opened for first two house only and then A is closed while B is opened. Find in how many hours the tank gets full after A is closed?

- (a)  $6\frac{17}{24}$
- (b)  $8\frac{18}{15}$
- (c)  $4\frac{15}{24}$
- (d)  $3\frac{13}{24}$

**Q6.** If the income of Rahul and Radha is 7 : 4 and there expenditure is 3 : 1 each one saves Rs. 4000. Find the sum of the income of both.

- (a) 18000
- (b) 17600
- (c) 13,050
- (d) 14000

**Q7.** If  $\tan(A + B) = \sqrt{3}$  and  $\tan(A - B) = 1$ , then,

- (a)  $A = 52.5$  and  $B = 7.5$
- (b)  $A = 62.5$  and  $B = 8.5$
- (c)  $A = 0^\circ$  and  $B = 40^\circ$
- (d)  $A = 90^\circ$  and  $B = 75^\circ$

**Q8.** Find the mean of 22, 18, 21, 20, 24.

- (a) 21
- (b) 22
- (c) 23
- (d) 20

**Q9.** If the speed of a boat in still water is 12 km/hr and speed of river is 4 km/hr. A boat goes downstream and return upstream then takes 6 hours. Find the width of river.

- (a) 30km
- (b) 25km
- (c) 32km
- (d) 40km



**Q10.** A person purchase a machine is Rs. 6000 and sold it in Rs. 7000 after 1 year and after 2 years he purchased another machine is Rs. 9000 and sold it in Rs. 11000. overall percent of profit.

- (a) 23%
- (b) 20%
- (c) 21%
- (d) 25%

**Q11.** Two numbers are 20% and 35% more than a third number than find the ratio of that two number.

- (a) 9:8
- (b) 11:10
- (c) 7:5
- (d) 5:4

**Q12.** In a business A, B and C gets a profit in the ratio 4:3:5 respectively for a certain time which is in the ratio 2:6:9. Find the ratio of there capital invested?

- (a) 17 : 15 : 7
- (b) 18 : 6 : 10
- (c) 36: 9 : 10
- (d) 35 : 46 : 10

**Q13.** From top of a tower the angle of depression of a boat is  $30^\circ$  when boat goes 260 meter towards the tower the angle of depression become  $60^\circ$  find the height of the tower.

- (a)  $130\sqrt{2}$
- (b)  $230\sqrt{3}$
- (c)  $120\sqrt{3}$
- (d)  $130\sqrt{3}$

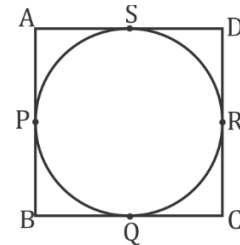
**Q14.** If  $p^2 - 24p + 45 = 0$ , then  $(p - 2) + \frac{1}{p-2} = ?$

- (a) 20
- (b) 24
- (c) 21
- (d) 18

**Q15.** The average price of four books is 12024 and their prices are in the ratio of 3: 5 :7: 9, then the price of costliest book is:

- (a) 18036
- (b) 18360
- (c) 18240
- (d) 18042

**Q16.** In the given figure, ABCD touches the circumference of circle at P, Q, R, and S. If AD = 20 cm, QC = 18 cm, AS = 10 cm and BQ = 15, then the perimeter of ABCD is:



- (a) 102cm
- (b) 106cm
- (c) 101cm
- (d) 91cm

**Q17.** In  $\Delta ABC$ ,  $\angle A = 60^\circ$ , Its sides AB and AC are produced to the point D and E. If the bisectors of  $\angle CBD$  and  $\angle BCE$  meet at the point O, then  $\angle BOC$  is equal to:

- (a)  $90^\circ$
- (b)  $60^\circ$
- (c)  $27^\circ$
- (d)  $63^\circ$

**Q18.** If  $\sin A + \sin B = \frac{-21}{65}$  and  $\cos A + \cos B = -\frac{27}{65}$  and  $\pi < (A - B) < 3\pi$ , then  $\cos(A - B) = ?$

- (a)  $\frac{-55}{51}$
- (b)  $\frac{56}{60}$
- (c)  $-\frac{56}{65}$
- (d)  $\frac{-65}{62}$

**Q19.** A vessel which contains 300lt of mango juice. 50lt of the mango taken out from it and replaced with milk. Then, again 60lt of the mixture is taken out and replaced with milk. Find the quantity of the mango juice in this mixture:

- (a) 245lt.
- (b) 362lt.
- (c) 200lt.
- (d) 150lt.

**Q20.** If a sum amounts to Rs. 2920 in six years and Rs. 3212 in seven years at compound interest, when the interest is compounded yearly, then the annual rate of interest is:

- (a) 15%
- (b) 10%
- (c) 8%
- (d) 12%

**Q21.** If the sides of a triangle are 16cm, 20cm and 28cm, then what is the inradius (in cm) of the triangle?

- (a)  $2\sqrt{3}$ cm
- (b)  $2\sqrt{5}$ cm
- (c)  $2\sqrt{6}$ cm
- (d)  $2\sqrt{1}$ cm

**Q22.** The price of an article is reduced by 20%. But the daily sale of the article is increased by 30%. The net effect on the daily sale receipts is:

- (a) 4% decrease
- (b) 4% increase
- (c) 2% increase
- (d) 2% decrease

**Q23.**  $2 \tan 50^\circ + \tan 20^\circ$  is equal to :

- (a)  $\tan 60^\circ$
- (b)  $\cos 40^\circ$
- (c)  $\cot 20^\circ$
- (d) 0

**Q24.** The ratio of the efficiencies of A, B and C is 3 : 5 : 7. Working together, they can complete a work in 12 days. A and B together can complete  $\frac{4}{5}$ th part of that work in:

- (a) 24 days
- (b) 18 days
- (c) 15 days
- (d) 21 days

**Q25.** If 12 % of  $(A + B) = 18$  % of  $(A - B)$ , then what percent of B is equal to A ?

- (a) 200%
- (b) 500%
- (c) 400%
- (d) 350%

**Q26.** The area of parallelogram is 675 square metres. If its altitude is thrice the corresponding base, its base is:

- (a) 12 m
- (b) 15 m
- (c) 18 m
- (d) 24 m

**Q27.** Two circles of radius 12 cm and 10 cm intersect each other and the length of their common chord is 16 cm. What is the distance between their centers ?

- (a)  $6 + 3\sqrt{5}$
- (b)  $6 + 4\sqrt{5}$
- (c)  $4 + 6\sqrt{5}$
- (d)  $12 + 8\sqrt{3}$

**Q28.** In a  $\Delta ABC$  line AD and CE are such that point D and E on line BC and AB respectively.

If  $AE : EB = 3 : 5$  and  $CO : OE = 8 : 11$ , where O is the intersection point of AD and CE. Find the ratio of BD : DC:

- (a) 10: 11
- (b) 10: 19
- (c) 11 : 3
- (d) 11: 2

**Q29.** The marks of the students of a class who appeared for a test in English are represented in the following frequency table:

Class Interval	1-10	11-20	21-30	31-40	41-50	51-60
Frequency	9	22	-	20	12	8

100 (total frequency)

What is/are the modal class(es)?

- (a) 10.5 — 20.5 only
- (b) 20.5 — 30.5 only
- (c) 10.5 — 20.5 and 20.5 — 30.5
- (d) There is no modal class

**Q30.** If a card is drawn randomly from a well-shuffled pack of 52 cards, then find the probability of getting a Clubs card.

- (a)  $\frac{1}{4}$
- (b)  $\frac{1}{16}$
- (c)  $\frac{1}{2}$
- (d)  $\frac{1}{8}$

# Solutions

**S1. Ans.(b)**

**Sol.** Average =  $\frac{1^3+2^3+3^3+4^3+5^3}{5} = \frac{1+8+27+64+125}{5} = 45$

**S2. Ans.(a)**

**Sol.**  $\Rightarrow 18 \div 2 \times 5 [19 - 13 \times 12 + 160]$   
 $\Rightarrow 9 \times 5 \times [19 - 156 + 160]$   
 $\Rightarrow 45 \times [23]$   
 $\Rightarrow 1035$

**S3. Ans.(d)**

**Sol.** Successive discount =  $-48 - 45 + \frac{48 \times 45}{100}$

= -71.4%

Selling price of cell phone =  $\frac{48000}{100} \times (100 - 71.4\%)$

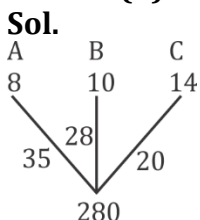
= Rs. 13,728

**S4. Ans.(c)**

**Sol.**  $\sqrt[3]{21952} : \sqrt[3]{29791}$   
 $\frac{28}{31}$

$\Rightarrow \frac{3}{28} \times 100 = 10.71\%$

**S5. Ans.(d)**



$A + C = (35 + 20) \times 2 = 110$

Remaining work =  $280 - 110 = 170$

Time required =  $\frac{170}{(28+20)} = \frac{170}{48} = 3\frac{13}{24}$  hrs.

**S6. Ans.(b)**

**Sol.**

Income 14 : 8

Expenditure  $\frac{9}{5} : \frac{3}{3}$

5 : 5  $\rightarrow$  4000

1  $\rightarrow$  800

Income =  $(14 + 8) \times 800 = 17600$

**S7. Ans.(a)**

**Sol.**

$\tan(A + B) = \sqrt{3}$ ,  $A + B = 60^\circ$

$\tan(A - B) = 1$ ,  $A - B = 45^\circ$

$A = 52.5$

$B = 7.5$

**S8. Ans.(a)**

**Sol.**

Mean =  $\frac{22+18+21+20+24}{5} = \frac{105}{5} = 21$

**S9 Ans.(c)**

**Sol.** Speed of boat downstream =  $12 + 4 = 16$  km/hr

Speed of boat upstream =  $12 - 4 = 8$  km/hr

Ratio of speed  $\Rightarrow$  Downstream : Upstream

16 : 8

$\frac{2}{1}$

Ratio of time  $\Rightarrow$   $\frac{1}{2}$

3 units  $\rightarrow$  6 hours

1 units  $\rightarrow$  2 hours

Distance covered (downstream) =  $16 \times (1 \times 2) = 32$ km

Distance covered (upstream) =  $8 \times (2 \times 2) = 32$ km

**S10. Ans.(b)**

**Sol.**

	SP	CP	Profit
Profit on 1 <sup>st</sup> machine	7000	6000	= 1000
Profit on 2 <sup>nd</sup> machine	11000	9000	= 2000
Overall Profit	$\frac{(1000+2000)}{(9000+6000)} \times 100$		
	$= \frac{3000}{15000} \times 100 = 20\%$		

**S11. Ans.(a)**

**Sol.**

	IIIrd	IInd	Ist
Let third number =	100	135%	120
Required Result =	135	: 120	
	9	: 8	



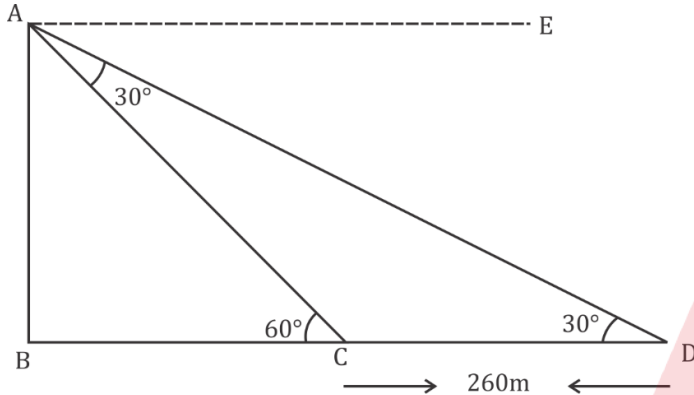
**S12. Ans.(c)****Sol.**

$$\text{Time} \rightarrow 2 : 6 : 9$$

$$\text{Profit} \rightarrow 4 : 3 : 5$$

$$\text{Investment} = \frac{\text{Profit}}{\text{Time}} 2 : \frac{1}{2} : \frac{5}{9}$$

Now, Divide the investment ratio with 18.  
then, ratio  $\Rightarrow 36 : 9 : 10$

**S13. Ans.(d)****Sol.**

If  $\angle C = 60^\circ$  then,  $\angle CAE = 60^\circ$   
and,  $\angle ADB = 30^\circ$  then  $\angle DAE = 30^\circ$   
So,  $\angle CAD = \angle CAE - \angle DAE = 60^\circ - 30^\circ = 30^\circ$   
Now,  $\angle CAD = \angle CAD = 30^\circ$   
 $AC = CD = 260$

Ratio of sides for  $60^\circ$  in right angle triangle.

$$AB : BC : AC$$

$$\sqrt{3} : 1 : 2$$

$$2 \rightarrow 260$$

$$1 \rightarrow 130$$

$$\text{Now, Height} = 130 \times \sqrt{3} = 130\sqrt{3}$$

**S14. Ans.(a)****Sol.** we are given  $p^2 - 24p + 45 = 0$ 

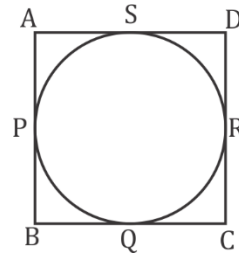
$$\Rightarrow p^2 - 24p + 44 + 1 = 0 \Rightarrow p^2 - 2p - 22p + 44 + 1 = 0$$

$$\Rightarrow p(p-2) - 22(p-2) + 1 = 0$$

$$p - 22 + \frac{1}{p-2} = 0 \Rightarrow p - 2 + \frac{1}{p-2} = 20$$

**S15. Ans.(a)****Sol.** Sum of ratio =  $3 + 5 + 7 + 9 = 24$ 

$$\text{Highest price} = \frac{9}{24} \times 12024 \times 4 = 18036$$

**S16. Ans.(b)****Sol.**

We know,  $AB + DC = AD + BC$

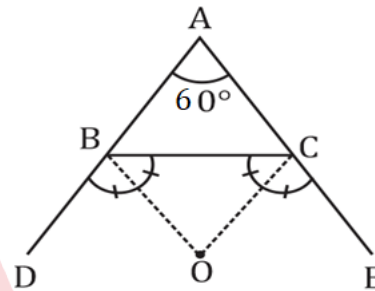
Where  $AD = 20$  cm

$$BC = BQ + QC = 15 + 18 = 33$$

then, Perimeter =  $AB + BC + CD + DA$

$$= 2(AD + BC)$$

$$= 2(20 + 33) = 106 \text{ cm}$$

**S17. Ans.(b)****Sol.**

$$\angle BOC = 90 - \frac{1}{2} \angle A$$

$$= 90 - 30 = 60^\circ$$

**S18. Ans.(c)**

$$\text{Sol. } \sin A + \sin B = \frac{-21}{65}, \text{ (i)}$$

$$\cos A + \cos B = \frac{-27}{65} \text{ (ii)}$$

Add  $eq^n$  (i) and (ii) after squaring

$$\sin^2 A + \sin^2 B + 2\sin A \sin B + \cos^2 A + \cos^2 B + 2\cos A \cos B$$

$$= \left(\frac{-21}{65}\right)^2 + \left(\frac{-27}{65}\right)^2$$

$$\Rightarrow 2 + 2(\sin A \sin B + \cos A \cos B) = \frac{18}{65}$$

$$1 + \sin A \sin B + \cos A \cos B = \frac{9}{65}$$

$$\cos(A - B) = \frac{-56}{65}$$

**S19. Ans.(c)**

$$\text{Sol. Quantity of mango juice} = 300 \times \frac{250}{300} \times \frac{240}{300}$$

$$= 200 \text{ lt.}$$

Remaining Quantity of mango juice = 200 lt.

**S20. Ans.(b)**

**Sol.** Rate of Interest =  $\left[ \left( \frac{\text{Amount}}{\text{Principle}} \right)^t - 1 \right] \times 100$

$$\Rightarrow \left[ \left( \frac{3212}{2920} \right)^1 - 1 \right] \times 100$$

$$= \left[ \left( \frac{11}{10} \right)^1 - 1 \right] \times 100 = 10\%$$

**S21. Ans.(c)**

**Sol.** Area of triangle =  $r \times S$ ,  $r = \frac{\Delta}{S}$

Semi - perimeter  $S = \frac{16+20+28}{2} = 32$

Area of  $\Delta ABC = \sqrt{S(S-a)(S-b)(S-c)}$

$$= \sqrt{32 \times 16 \times 12 \times 4}$$

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

$$= 64\sqrt{2 \times 3}$$

$$= 64\sqrt{6}$$

Inradius =  $\frac{64\sqrt{6}}{32} = 2\sqrt{6}\text{cm}$

**S22. Ans.(b)**

**Sol.**  $20\% = \frac{1}{5}$ ,  $30\% = \frac{3}{10}$

	Initial	Final
Price	5	4
Sale	$\frac{10}{50}$	$\frac{13}{52}$

% increase =  $\frac{2}{50} \times 100 = 4\%$  increase

**S23. Ans.(c)**

**Sol.**

$$\because \tan 70^\circ = (\tan 50^\circ + \tan 20^\circ)$$

$$\Rightarrow \frac{\tan 50^\circ + \tan 20^\circ}{1 - \tan 50^\circ \tan 20^\circ} = \tan 70^\circ$$

$$\Rightarrow \tan 50 + \tan 20 = \tan 70 - (\tan 70 \tan 20) \tan 50^\circ$$

$$\Rightarrow 2 \tan 50 + \tan 20 = \tan 70 \quad (\because a + b = 90^\circ)$$

$$\Rightarrow 2 \tan 50 + \tan 20 = \cot 20^\circ$$

**S24. Ans.(b)**

**Sol.** Total work =  $(3 + 5 + 7) \times 12 = 180$  units

$\frac{4}{5}$ th part of work =  $\frac{180 \times 4}{5} = 144$  unit

Time taken by (A + B) for  $\frac{4}{5}$ th part =  $\frac{144}{8} = 18$  days

**S25. Ans.(b)**

**Sol.**  $\frac{12}{100} (A + B) = \frac{18}{100} (A - B)$

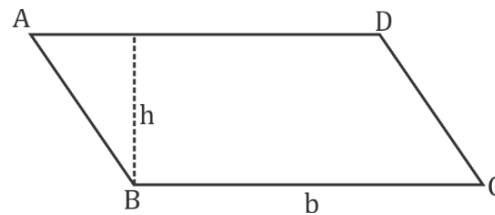
$$\Rightarrow 4(A + B) = 6(A - B) \Rightarrow 4A + 4B = 6A - 6B$$

$$\Rightarrow 2A = 10B \Rightarrow A = 5B$$

Required % =  $\frac{A}{B} \times 100 = \frac{5B}{B} \times 100 = 500\%$

**S26. Ans.(b)**

**Sol.**



Let the base is b.

We know that the area of parallelogram =  $h \times b$

A.T.Q,  $h = 3b$

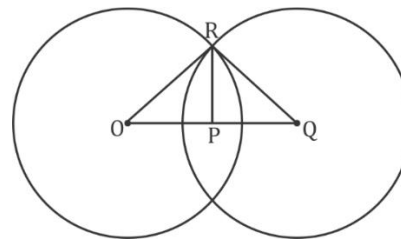
$$\Rightarrow 3b \times b = 675$$

$$\Rightarrow b^2 = 225$$

$$b = 15 \text{ m}$$

**S27. Ans.(b)**

**Sol.**



In  $\Delta OPR$ ,  $\angle P = 90^\circ$

Applying Pythagoras theorem

$$\text{Length of } OP = \sqrt{(12)^2 - (8)^2} = 4\sqrt{5}$$

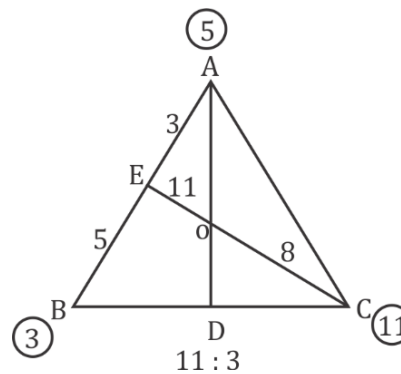
In  $\Delta PRQ$ ,

$$\text{Length of } PQ = \sqrt{10^2 - 8^2} = 6$$

$$\text{Length of } OQ = 6 + 4\sqrt{5}$$

**S28. Ans.(c)**

**Sol.**



From mass - point geometry,

mass on point B and C will be 3 and 11

respectively,

Therefore,  $BD : DC = 11 : 3$

**S29. Ans.(b)**

**Sol.**

Total frequency =  $9 + 22 + f_1 + 20 + 12 + 8$

$$100 = 71 + f_1$$

$$f_1 = 29$$

Highest frequency is 29, which lies in interval (20.5 – 30.5).

**S30. Ans. (a)**

**Sol.** Required probability =  $\frac{{}^{13}C_1}{{}^{52}C_1}$

$$= \frac{1}{4}$$

