



"Where working hard is a habit"

# IIT ASHRAM

JEE MAIN || JEE ADVANCED || MEDICAL || FOUNDATION

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## UDAAN (2020) ANSWER KEY AND SOLUTION CLASS -9

Mental Ability		Mathematics		Physics & Chemistry		Biology	
Q. No.	Ans	Q. No.	Ans	Q. No.	Ans	Q. No.	Ans
1	A	1	D	1	D	1	D
2	D	2	C	2	D	2	A
3	C	3	D	3	D	3	C
4	D	4	C	4	D	4	B
5	A	5	D	5	C	5	A
6	A	6	D	6	B	6	C
7	B	7	D	7	B	7	C
8	A	8	A	8	B	8	D
9	C	9	C	9	B	9	C
10	C	10	C	10	D	10	D
11	A	11	B	11	B	11	C
12	A	12	A	12	A	12	A
13	A	13	C	13	B	13	C
14	B	14	C	14	A	14	B
15	B	15	A	15	D	15	D
16	B	16	C	16	A	16	A
17	A	17	A	17	D		
18	D	18	C	18	A		
19	D	19	B	19	D		
20	A	20	A	20	D		
		21	B	21	C		
		22	C	22	B		
		23	A	23	D		
		24	B	24	B		
		25	C	25	C		
		26	C	26	D		
		27	A	27	A		
		28	D	28	C		
		29	B	29	A		
		30	B	30	B		
				31	B		
				32	C		
				33	C		
				34	B		

## PART - I MENTAL ABILITY

1. (a)
2. (d)
3. (c)
4. (d)

$$6 \times 3 \times 2 \times = 36 \Rightarrow \sqrt{36} = 6$$

$$4 \times 2 \times 4 \times 2 = 64 \Rightarrow \sqrt{64} = 8$$

$$\text{So, } 2 \times 2 \times 4 \times 9 = 144 \Rightarrow \sqrt{144} = 12$$

5. (a)

$$\therefore a > b$$

$$\& b > c \Rightarrow a > b > c$$

$$\therefore c > d \Rightarrow a > b > c > d$$

6. (a)

Total students = 60

Boys = 40

Girls = 20

Rank of shweta = 17th (from top)

boys before rich shweta = 9

so girls before = 7

so number of girls after her = 12

7. Ans. (b)

$J_4$  father

$J_3$  mother

- 8.

$J_2 \rightarrow J_1$  sister

So  $J_1$  is grand-daughter of  $J_4$ .

Ans. (a).

9. (c)

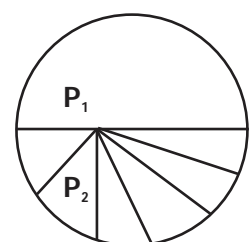
Since there are total seven pieces so  $P_2$  has 6 parts which are equal.

Since small part is of 20 gms.

So, weight of  $P_2 = 20 \times 6 = 120$  gm

$$P_1 = 120 \text{ gm}$$

Original Cake = 120 + 120 = 240 gm



10. (c)

Suppose distance b/w XY = d km

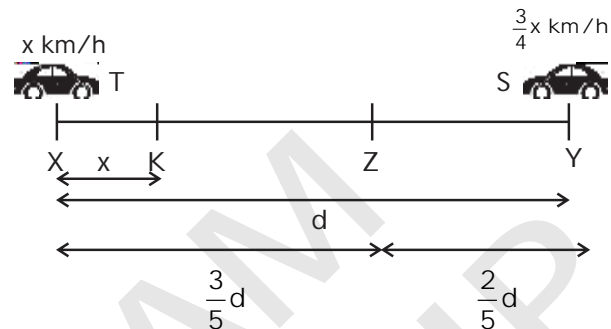
speed of T = x km/h

speed of S =  $\frac{3}{4}x$  km/h

Suppose at 4:00 pm T reach at K

distance b/w XK = x km.

at time t both train reaches at Z.

dis. travelled by T =  $\frac{3}{5}d - x$ dis. travelled by S =  $\frac{2}{5}d$ 

time for both is same

$$\text{So, } \frac{\frac{3}{5}d - x}{x} = \frac{\frac{2}{5}d}{\frac{3}{4}x} \Rightarrow \frac{3d - 5x}{5x} = \frac{8d}{15x} \Rightarrow 45d - 75x = 40d \Rightarrow 5d = 75x$$

$$\boxed{\frac{d}{x} = 15 \text{ hrs}}$$

11. (a)

Suppose present age of Barun = x yrs.

Arun's = 0.4x yrs

after 't' yrs -

$$\text{Barun's age} = x + t \text{ yrs} \Rightarrow \text{Arun's} = 0.4x + t \text{ yrs} \Rightarrow \text{Arun's} = \frac{1}{2} \text{ Barun's}$$

$$0.4x + t = \frac{x + t}{2} \Rightarrow 0.8x + 2t = x + t \Rightarrow t = .2x$$

$$\text{So } \% \text{ increment in Barun's age} = \frac{.2x}{x} \times 100 \Rightarrow 20\%$$

12. (a)

$$\text{Day 1 work} = \frac{1}{120}$$

$$\text{Day 2 work} = \frac{1}{120} + \frac{1}{120}$$

$$\text{Day 3 work} = \frac{1}{120} + \frac{1}{120} + \frac{1}{120}$$

Suppose no. of days n

So Day 1 work + Day 2 work + ..... + Day  
n work = 1

$$\frac{1}{120} + \frac{2}{120} + \dots + \frac{n}{120} = 1 \Rightarrow \frac{1}{120} (1+2+\dots+n) = 1 \Rightarrow \frac{n(n+1)}{2} = 120$$

$$n(n+1) = 240 \Rightarrow n(n+1) = 15 \times 16$$

So, n = 15 days

13. (a)

Speed of A =  $x_1$

$$B = x_2$$

$$C = x_3$$

$$\text{time by A to travel 10 km} = \frac{10}{x_1} = \frac{9}{x_2}$$

$$\text{Similarly time taken by B} = \frac{10}{x_2} = \frac{9}{x_3}$$

$$\frac{10}{x_1} = \frac{9}{x_2} = K \Rightarrow x_1 = \frac{10}{K}, x_2 = \frac{9}{K} \Rightarrow \frac{10}{x_2} = \frac{9}{x_3} = m \Rightarrow x_2 = \frac{10}{m}, x_3 = \frac{9}{m}$$

$$\text{So, } \frac{9}{K} = \frac{10}{m} \Rightarrow K = \frac{9m}{10} \Rightarrow \frac{K}{m} = \frac{9}{10}$$

Suppose A beat C by x km.

$$\text{So, } \frac{10}{x_1} = \frac{10-x}{x_3} \Rightarrow \frac{x_3}{x_1} = \frac{10-x}{10} \Rightarrow \frac{\frac{9}{m}}{\frac{10}{K}} = \frac{10-x}{10}$$

$$\Rightarrow \frac{9K}{10m} = \frac{10-x}{10} \Rightarrow 9 \times \frac{9}{10} = 10-x \Rightarrow \frac{81}{10} = 10-x \Rightarrow x = 10 - 8.1 = 1.9 \text{ km}$$

14. (b)

no. of odd days from Feb. 29, 2016 to

$$\text{Feb. 29, 2020} = 5$$

So, no. of odd days in 4 years = 5

To celebrate her birthday on Monday no. of odd days must be zero. By observing pattern,

So, after 28 years her birthday would fall on (i.e. on 29 Feb. 2044) Monday.

Since she will live till 2099.

So, no. of birthday on Monday.

$$2016 + 28 = 2044 \Rightarrow 2044 + 28 = 2072$$

So in 2044 & 2072 her birthday will come on Monday, twice.

15. (b)

Watch gain 5 sec. in 3 min.

$$\text{So in 1 min.} = \frac{5}{3} \text{ sec.} \Rightarrow \text{in 60 min.} = \frac{5}{3} \times 60 \Rightarrow 100 \text{ sec.}$$

from 7 : 00 am to 4:00 pm

Total hours = 9 hrs.

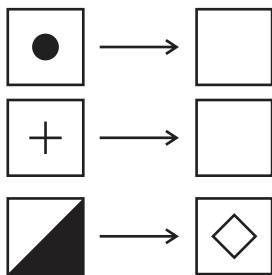
$$\begin{aligned} \text{In 9 hrs watch will gain} &= 9 \times 100 \\ &= 900 \text{ sec.} = 15 \text{ min.} \end{aligned}$$

So, till 4:00 pm it will gain 15 min.

hence it will show 4:15 pm when actual time is 4:00 pm.

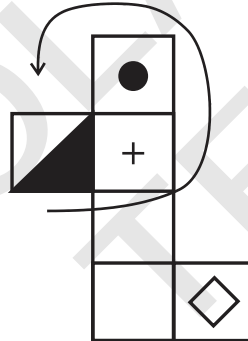
16. (b)

From the figure it is clear that the opposite faces are-



So when dice is closed either option (b) or (c) is correct (because opposite surface cannot come together).

But when we move in anti clock wise direction (as shown)



So only option (b) is correct.

17. (a) 5<sup>th</sup> Jan. 2001 → Friday

4<sup>th</sup> Jan. 2001 → Monday

So 31<sup>st</sup> Dec. 2001 → Monday

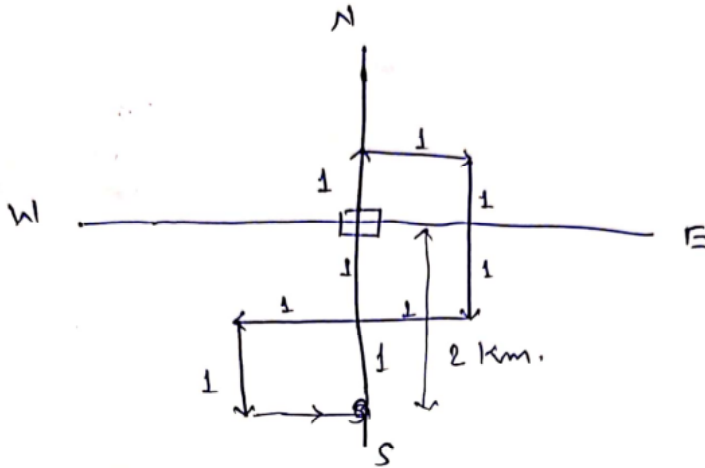
(1<sup>st</sup> day and last day of a n on leap year is same)

So 25<sup>th</sup> Dec. 2001 → Monday

18. (d) BED  $\rightarrow$  943  
 SWEET  $\rightarrow$  12448  
 492311  $\rightarrow$  EBWDSS
19. (d) at 7'O clock, the difference between both hand is 25 min.  
 for straight line the difference must be 30 minute.  
 So minute, hand has to gain 5 minute w.r.t. hour hand.

$$\text{So } 5 \times \frac{12}{11} = 5 \frac{5}{11}$$

20.



So Ans. (a) 2 Km

## PART - II MATHEMATICS

1. (d)
2. (c)
3. (d)
4. (c)
5. (d)
6. (d)

7. (D) given : ABCD is a trapezium . such that  $AB \parallel DC$ .

E is the mid-point of BC.

TPT:  $\text{area}(\triangle ABE) + \text{area}(\triangle DEC) = \frac{1}{2} \times \text{area}(\text{trapezium ABCD})$

proof:

$\text{area}(\triangle ABE) = \frac{1}{2} \times \text{area}(\triangle ABC)$  .....(1) [since the median divides the triangle into equal parts]

similarly  $\text{area}(\triangle DEC) = \frac{1}{2} \times \text{area}(\triangle BDC)$ .....(2)

$\text{area}(\triangle BDC) = \text{area}(\triangle ADC)$  [triangles formed between same pair of parallel lines and with the same base are equal in areas]

therefore  $\text{area}(\triangle DEC) = \frac{1}{2} \times \text{area}(\triangle ADC)$ .....(3)

adding eq(1) and eq(3):

$\text{area}(\triangle ABE) + \text{area}(\triangle DEC) = \frac{1}{2} \times$

$[\text{area}(\triangle ABC) + \text{area}(\triangle ADC)] = \frac{1}{2} \times \text{area}(\text{trapezium ABCD})$

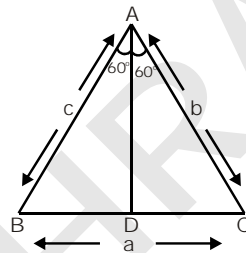
8. (A)
9. (C)
10. (C)
11. (B)
12. (A)
13. (C)
14. (C)
15. (A)
16. (C)
17. (A)
18. (C)
19. (B)
20. (A)
21. (B)
22. (C)
23. (A)

24. (B)  
 25. (C)  
 26. (C)  
 27. (A)  
 28. (D)

29. (B) Let  $AD = h$  (say), then Area of  $\triangle ABC = \frac{1}{2}bc \sin 120^\circ = \frac{\sqrt{3}}{4}bc$

Area of  $\triangle BAD = \frac{1}{2}ch \sin 60^\circ = \frac{\sqrt{3}}{4}ch$  and Area of  $\triangle CAD = \frac{1}{2}bh \sin 60^\circ = \frac{\sqrt{3}}{4}bh$

Now,  $\text{ar}(\triangle ABC) = \text{ar}(\triangle BAD) + \text{ar}(\triangle CAD)$



$$\frac{\sqrt{3}}{4}bc = \frac{\sqrt{3}}{4}ch + \frac{\sqrt{3}}{4}bh$$

$$\Rightarrow bc = h(b+c) \Rightarrow h = \frac{bc}{b+c}$$

30. (B)



**PART - III**  
**PHYSICS/CHEMISTRY**

1. (D)

$$u = 4 \text{ m/s}$$

$$h_1 = 5 \text{ m}$$

$$h_2 = 2.6 \text{ m}$$

$$v = ?$$

as ME remains constant.

$$KE_1 + PE_1 = KE_2 + PE_2$$

$$\frac{1}{2}mu^2 + mgh_1 = \frac{1}{2}mv^2 + mgh_2$$

$$\frac{1}{2}m(16) + 5mg = \frac{1}{2}mv^2 + 2.6mg$$

$$\frac{1}{2}mv^2 = 8m + 50m - 26m$$

$$\frac{v^2}{2} = 32$$

$$v^2 = 64$$

$$\boxed{v = 8 \text{ m/s}}$$

2. (D)

$$R' = 0.96 R$$

$$g' = \frac{GM}{R'^2} = \frac{GM}{(0.96R)^2} = \frac{GM}{(0.96)^2 R^2} = 1.085 g$$

$$\% \text{ change} = \frac{g' - g}{g} \times 100 = \frac{0.08 g}{g} \times 100 \text{ (approx)} = 8\%$$

3. (D)

$$F = 1 \text{ Na} = \frac{F}{m} = 0.1 \text{ m/s}$$

$$m = 10 \text{ kg}$$

$$s = 1 \text{ m}$$

$$t = 4 \text{ s}$$

$$s = ut + \frac{1}{2}at^2$$

$$1 = 4u + \frac{1}{2}a(16)$$

$$1 = 4u + 8 \times 0.1$$

$$0.2 = 4u$$

$$1 = u(4) + \frac{1}{2} \times \frac{1}{10} \times 4^2$$

$$u = \frac{0.2}{4} = \frac{1}{20} = 0.05 \quad \boxed{u = 5 \text{ cm/s}}$$

4. (D)

$$u = 10 \text{ m/s}$$

$$a = 9.8 \text{ m/s}^2$$

$$t = 1.2 \text{ s}$$

$$S = ut + \frac{1}{2} at^2$$

$$= 10 \times 1.2 + \frac{1}{2} \times 9.8 \times 1.44$$

$$= 12 + 7.056$$

$$= 19.05$$

$$\boxed{S = 19\text{m}}$$

5. (C)

$$\begin{array}{l} P \\ t_1 \left| \begin{array}{l} S \\ Q \\ S \\ R \end{array} \right. \end{array}$$

$$\text{as } PQ = QR = S$$

$$S = \frac{1}{2} g t_1^2$$

$$2S = \frac{1}{2} g (t_1 + t_2)^2$$

$$\frac{1}{2} = \frac{t_1^2}{(t_1 + t_2)^2}$$

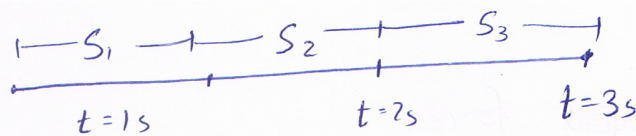
$$\frac{t_1}{t_1 + t_2} = \frac{1}{\sqrt{2}}$$

$$\sqrt{2} t_1 = t_1 + t_2 \quad (\sqrt{2} - 1) t_1 = t_2$$

$$\boxed{\frac{t_1}{t_2} = \frac{1}{\sqrt{2} - 1}}$$

6. (B)

$$u = 0 \text{ m/s}$$



$$S_1 = \frac{1}{2} a(1)^2 = \left(\frac{a}{2}\right) \Rightarrow S_1 + S_2 = \frac{1}{2} a(2)^2 = \left(\frac{a}{2}\right) \Rightarrow S_1 + S_2 + S_3 = \frac{1}{2} a(3)^2 = 9 \left(\frac{a}{2}\right)$$

$$S_1 = \frac{a}{2}, \quad S_2 = 3 \left(\frac{a}{2}\right), \quad S_3 = 5 \left(\frac{a}{2}\right)$$

$$\text{So, } S_1 : S_2 : S_3 = 1 : 3 : 5$$

7. (B) Fermi =  $10^{-15}$
8. (B) No unit
9. (B) Greater the distance travel, less will be retardation.
10. (D) From Newton's second law.
11. (B) 1 Kwhr =  $3.6 \times 10^6$  J

12. (A)  $60 = \frac{GM}{R^2}$  and  $30 = \frac{GM}{(R+h)^2}$

So,  $2 = \frac{(R+h)^2}{R^2}$  So,  $\frac{R+h}{R} = \sqrt{2}$

$h = 0.41R$

13. (B)
14. (A) due to Buoyant force
15. (D) Between F & O, Image will be enlarged & erect.
16. (A)
17. (D) Its speed & wavelength changes, frequency doesn't change.
18. (A)

Movement of colloidal particles under the influence of electrical field is called electrophoresis and it is used to determine the charge on colloidal particles.

19. (D)  
Amount of salt in solution prepared by Ranchi

$$11.2 = \frac{x}{x+320} \times 100$$

$$11.2x + 3584 = 100x$$

$$88.8x = 3584 \quad \therefore x = 40.36 \text{ gm}$$

Therefore mass percentage of the solution prepared by Abhinav

$$\text{Mass \%} = \frac{40.36}{180+40.3} \times 100 = \frac{40.36}{220.36} \times 100 = 18.3\%$$

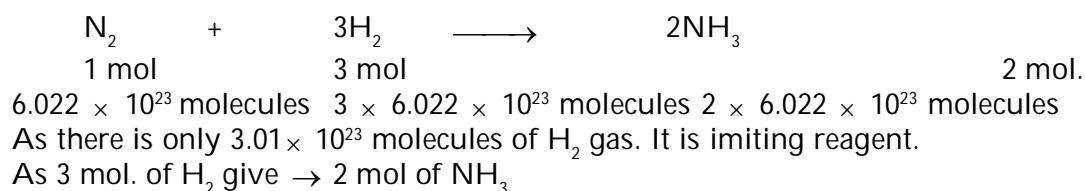
20. (D)  
All the statements are correct as temperature remains same during the change of state. QR represents latent heat of fusion while ST represents latent heat of vaporisation. At QR substance exists in both solid and liquid states and at ST it exists in both liquid and gaseous states.

21. (C)  
P is tetra atomic. So it should be represented by  $P_4$

22. (B)  
 $H \rightarrow 1\bar{e}$ ,  $Cl \rightarrow 17\bar{e}$ ,  $O \rightarrow 4 \times 8 = 32\bar{e}$   
Total in  $HClO_4 = 1 + 17 + 32 = 50 \bar{e}$ s

23. (D)  
In  ${}_6C^{12}$  there are 6 protons and 6 neutrons. The mass of the atom is due to protons and neutrons on the mass of electron is negligible. As the mass of neutron is halved so we can consider it equal to mass of 3 neutrons only. So the mass of atom will be reduced approx by 25%.

24. (B)



$$\therefore 1 \text{ mol. of H}_2 \text{ give } \rightarrow \frac{2}{3} \text{ mol of NH}_3$$

$$3.01 \times 10^{23} \text{ molecules i.e. 0.5 mol. H}_2 \text{ give } \frac{2}{3} \times 0.5 \text{ mol of NH}_3$$

$$= \frac{1}{3} \times 6.022 \times 10^{23} \text{ molecules of NH}_3$$

$$= 2.01 \times 10^{23} \text{ molecules of NH}_3$$

25. (C)

Out of  $\text{O}_2$ ,  $\text{H}_2$ ,  $\text{CO}_2$  and  $\text{CH}_4$  the molecular mass of  $\text{CO}_2$  is highest i.e. 44. Therefore  $\text{CO}_2$  has slowest rate of diffusion as rate of diffusion is inversely proportional to molecular mass.

26. (D)

27. (A)

28. (C)

29. (A)

30. (B)

31. (B)

32. (C)

33. (C)

34. (B)

## PART - IV BIOLOGY

1. (d) Ribosomes are specially for production of protein.
2. (a) Cow directly fied grass so it is a primary consumer.
3. (c) Each ecosystem completes with a series of organism. Production required for production consumer - who receive nutrition from producer and Decomposer for maintain the balance in environment.
4. (b) Chloroplast is the chief site of photosynthesis.
5. (a) Gram (legume family) plant have more protein value from other plants.
6. (c) Secondary growth is increasing the width (girth) of plant. its due to rapid division of lateral meristem.
7. (c) only a virus and a protein molecule can see the microscope with 1 nm resolution other things like frog egg and plant chloroplast have larger size molecule.
8. (d) DNA found in Nucleus as genetic information, mitochondria for formation of ADP. and In chloroplast for making ADP (A Temporary complex)
9. (c) Totipotency is the ability cell in which it can form any type of cell by the further division.
10. (d) Gills of fish perform respiration, excretion and osmoregulation.
11. (c) Tongue is voluntary it perform function which we provide by our Brain.
12. (a) Anaerobically participating organism for nitrogen cycle are Denitrifying bacteria.
13. (c) Fungal cell have cell wall as well as storgate material is Glycogen.
14. (b) Anabolic means synthesis - so these organelles do  
Ribosome - protein synthesis  
Rough ER - protein synthesis  
Smooth ER - lipid synthesis
15. (d) Green manure helps in incorporation of potassium, phosphate and nitrogen salt value in soil.
16. (a) Large Ear helps in cooling of Body due to heat exchange.