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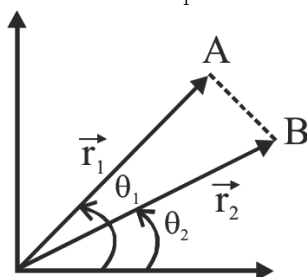
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## PHYSICS

1) Which of the following physical quantities is an axial vector ?

- (1) Velocity
- (2) Acceleration
- (3) Force
- (4) Angular Momentum

2) In a two dimensional motion of a particle, the particle moves from point A (position vector  $\vec{r}_1$ ) to point B (position vector  $\vec{r}_2$ ). If the magnitudes of these vectors are respectively,  $r_1 = 3$  and  $r_2 = 4$  and the angles they make with the x-axis are  $\theta_1 = 75^\circ$  and  $\theta_2 = 15^\circ$  respectively, then find the magnitude



of the displacement vector :-

- (1) 15
- (2)  $\sqrt{13}$
- (3) 17
- (4)  $\sqrt{15}$

3) Two vectors  $\vec{A}$  and  $\vec{B}$  are such that  $\vec{A} + \vec{B} = \vec{C}$  and  $A^2 + B^2 = C^2$ . If  $\theta$  is the angle between positive directions of  $\vec{A}$  and  $\vec{B}$ , then mark the correct alternative :-

- (1)  $\theta = 0$
- (2)  $\frac{\theta}{2} = \frac{\pi}{2}$
- (3)  $\frac{\theta}{3} = \frac{2\pi}{3}$
- (4)  $\theta = \pi$

4) At what angle must the two forces  $(X + Y)$  and  $(X - Y)$  act so that the resultant may be  $\sqrt{X^2 + Y^2}$  ?

- (1)  $\cos^{-1} \left( \frac{X^2 + Y^2}{2(X^2 - Y^2)} \right)$

$$(2) \cos^{-1} \left( -\frac{X^2 - Y^2}{X^2 + Y^2} \right)$$

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

$$(4) \cos^{-1} \left( -\frac{2(X^2 - Y^2)}{X^2 + Y^2} \right)$$

5) Find a unit vector which is making equal angles with all x, y & z axes :-

$$(1) \frac{\hat{i} + \hat{j} + \hat{k}}{3}$$

$$(2) \frac{(\hat{i} + 2\hat{j} + \hat{k})}{\sqrt{3}}$$

$$(3) \frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$$

(4) None of these

6) Find projection of vector  $\vec{A} = a_x\hat{i} + a_y\hat{j} + a_z\hat{k}$  on  $(\hat{i} - \hat{j} + \hat{k})$  :-

$$(1) a_x - a_y + a_z$$

$$(2) \frac{a_x - a_y - a_z}{\sqrt{3}}$$

$$(3) \frac{a_x - a_y + a_z}{\sqrt{3}}$$

$$(4) \frac{a_x - a_y + a_z}{3}$$

7) If resultant of  $\vec{A}$  and  $\vec{B}$  is perpendicular to  $\vec{A}$ , then angle between  $\vec{A}$  and  $\vec{B}$  is :

$$(1) \cos^{-1} \left( \frac{A}{B} \right)$$

$$(2) \cos^{-1} \left( -\frac{A}{B} \right)$$

$$(3) \sin^{-1} \left( \frac{A}{B} \right)$$

$$(4) \sin^{-1} \left( -\frac{A}{B} \right)$$

8) If  $\vec{A} = \vec{B} + \vec{C}$  and the magnitudes of  $\vec{A}$ ,  $\vec{B}$  and  $\vec{C}$  are 17, 8 and 15 units respectively. The angle between  $\vec{A}$  and  $\vec{C}$  is :-

$$(1) \cos^{-1} \left( \frac{8}{17} \right)$$

(2)  $\sin^{-1}\left(\frac{8}{17}\right)$

(3)  $\cos^{-1}\left(\frac{8}{15}\right)$

(4)  $\frac{\pi}{2}$

9) The angle between vectors  $(\hat{i} + \hat{j})$  and  $(\hat{j} - \hat{k})$  is:-

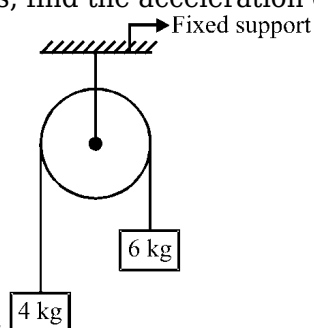
(1)  $30^\circ$

(2)  $45^\circ$

(3)  $60^\circ$

(4)  $90^\circ$

10) For the given pulley system with ideal pulley and ideal strings, find the acceleration of the 4 kg



block and tension in string connecting the blocks. ( $g = 10 \text{ m/s}^2$ ) :-

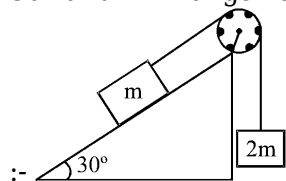
(1)  $2 \text{ m/s}^2, 32 \text{ N}$

(2)  $2 \text{ m/s}^2, 48 \text{ N}$

(3)  $4 \text{ m/s}^2, 32 \text{ N}$

(4)  $4 \text{ m/s}^2, 48 \text{ N}$

11) Two blocks of masses  $m$  and  $2m$  are connected by a light string passing over a frictionless pulley. As shown in the figure, the mass  $m$  is placed on a smooth inclined plane of inclination  $30^\circ$  and  $2m$  hangs vertically. If the system is released, the blocks move with an acceleration equal to



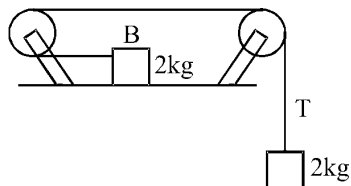
(1)  $g/4$

(2)  $g/3$

(3)  $g/2$

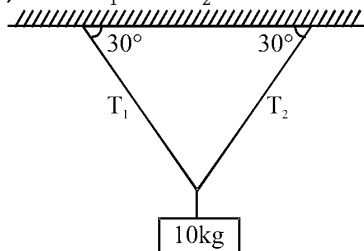
(4)  $g$

12) Consider the system of two masses and two pulleys as shown in fig. The pulleys and string are weightless and all surface are frictionless. The tension in the string is :- ( $g = 10 \text{ m/s}^2$ )



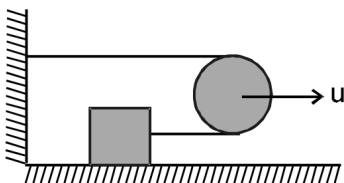
- (1) 0 N
- (2) 5 N
- (3) 10 N
- (4) 20 N

13) If system is in equilibrium, then  $T_1$  and  $T_2$  will be :-



- (1) 100N, 100N
- (2) 200N, 200N
- (3) 50N, 50N
- (4) 100N,  $100\sqrt{3}$ N

14) In the figure shown, the pulley is moving with velocity  $u$ . Calculate the velocity of the block attached with string.

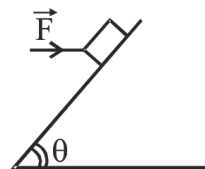


- (1)  $2u$
- (2)  $u$
- (3)  $3u$
- (4)  $4u$

15) The force acting on a body of mass 2 kg is given as :  $F = (4 t^3)$  N. What is the change in momentum of the body between  $t = 1$  s to  $t = 3$  s :-

- (1) 50 N-S
- (2) 80 N-S
- (3) 100 N-S
- (4) 0

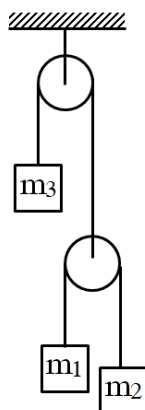
16) The figure shows a horizontal force  $\vec{F}$  acting on a block of mass  $m$  on an inclined plane (angle  $\theta$



with horizontal). What is normal reaction on the block :-

- (1)  $mg \sin \theta + F \cos \theta$
- (2)  $mg \sin \theta - F \cos \theta$
- (3)  $mg \cos \theta - F \sin \theta$
- (4)  $mg \cos \theta + F \sin \theta$

17) In the given diagram if all the three masses are held at rest and then released. To keep  $m_3$  at rest



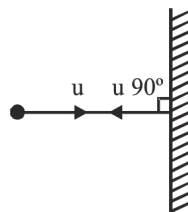
the condition will be :-

- (1)  $\frac{1}{m_3} = \frac{1}{m_1} + \frac{1}{m_2}$
- (2)  $m_1 + m_2 = m_3$
- (3)  $\frac{4}{m_3} = \frac{1}{m_1} + \frac{1}{m_2}$
- (4)  $\frac{1}{m_1} + \frac{2}{m_2} = \frac{3}{m_3}$

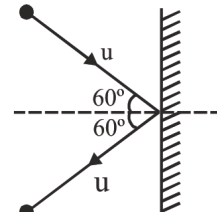
18) Velocity of a particle of mass 2 kg varies with time 't' according to the equation  $\vec{v} = (2t\hat{i} - 4\hat{j})$  m/s. Here 't' is in seconds. The impulse imparted to the particle in the time interval  $0 \leq t \leq 2$  s is:-

- (1)  $(4\hat{i})$  kg-m/s
- (2)  $(8\hat{i} - 4\hat{j})$  kg-m/s
- (3)  $(8\hat{i} + 4\hat{j})$  kg-m/s
- (4)  $(8\hat{i})$  kg-m/s

19) Two identical billiard balls strike a rigid vertical smooth wall with the same speed but at different angles and get reflected without any change in speed as shown in the figure. The ratio of



(a)



(b)

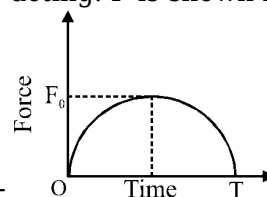
impulses imparted to the balls by the wall is :-

- (1) 1 : 2
- (2)  $\sqrt{3} : 2$
- (3)  $2 : \sqrt{3}$
- (4) 2 : 1

20) A machine gun is mounted on a 2000 kg vehicle on a horizontal smooth road (friction negligible). The gun fires 10 bullets per sec with a velocity of 500 m/s. If the mass of each bullet be 10 g, what is the acceleration produced in the vehicle ?

- (1)  $2.5 \text{ cm/s}^2$
- (2)  $25 \text{ cm/s}^2$
- (3)  $50 \text{ cm/s}^2$
- (4)  $25 \text{ m/s}^2$

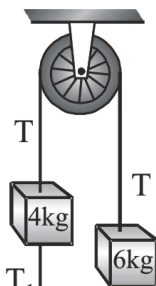
21) A particle of mass  $m$ , initially at rest, is acted upon by a variable force  $F$  for a brief interval of time  $T$ . It begins to move with a velocity  $u$  after the force stops acting.  $F$  is shown in the graph as a



function of time. The curve is a semi-ellipse. The value of  $u$  is :-

- (1)  $u = \frac{\pi F_0^2}{2m}$
- (2)  $u = \frac{\pi T^2}{8m}$
- (3)  $u = \frac{\pi F_0 T}{4m}$
- (4)  $u = \frac{F_0 T}{2m}$

22) Two bodies of mass 4kg and 6kg are attached to the ends of a string passing over a pulley. The 4 kg mass is attached to the table top by another string. The tension in this string  $T_1$  is equal to (Take



$g = 10 \text{ m/s}^2$ ):-

- (1) 20 N
- (2) 25 N
- (3) 10.6 N
- (4) 10 N

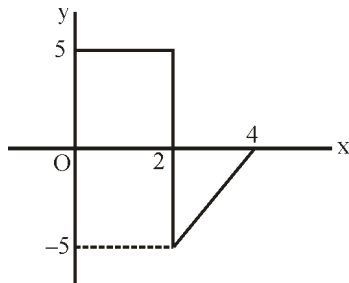
23)

$\cos \frac{\theta}{2}$  can be represented as :-

- (1)  $\sqrt{\frac{1 + \cos \theta}{2}}$
- (2)  $\sqrt{\frac{1 + \sin \theta}{2}}$
- (3)  $\sqrt{\frac{1 - \cos \theta}{2}}$
- (4)  $\sqrt{\frac{1 - \sin \theta}{2}}$

24)

For the graph shown in fig. value of  $\int_0^4 y dx$  is :-



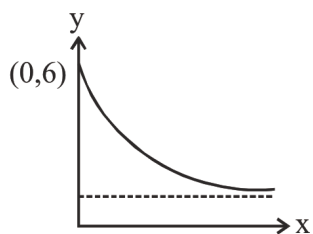
- (1) 5
- (2) 15
- (3) 10
- (4) Zero

25)  $\int \sin(10t - 50).dt$  :-

- (1)  $\frac{+\cos(10t - 50)}{10} + C$
- (2)  $10 \cos (10t - 50) + C$
- (3)  $\frac{-\cos(10t - 50)}{10}$
- (4) None of these

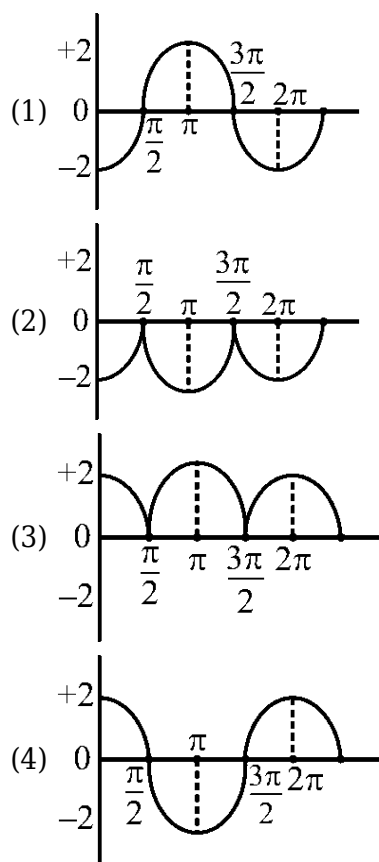
26) Graph of an exponential function  $y = 2 + ae^{-x}$  is shown in figure. What is the value of a ?





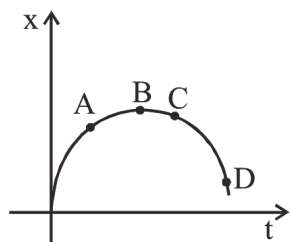
- (1) 6
- (2) 4
- (3) 5
- (4) 2

27) If  $y = -2\cos^2 x$  then graph between y & x is :-



28)

Position-time graph of a particle is shown :-



Find point at which speed is maximum?

- (1) A
- (2) B
- (3) C

(4) D

29) If length PQ, between points P(2,4) and Q(x,-1) is 5 unit the value of x will be :-

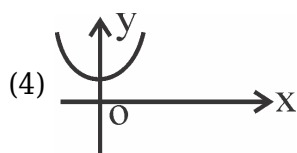
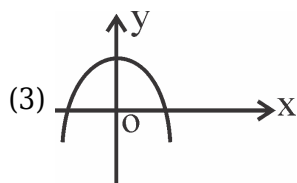
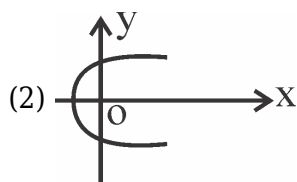
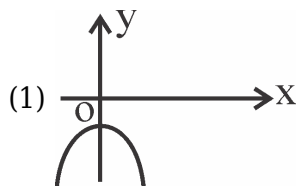
(1) 2

(2) 3

(3) 1

(4) 5

30)  $y = -3x^2 - 5$ , then graph can be :



31)  $2 - 1 + \frac{1}{2} - \frac{1}{4} + \frac{1}{8} \dots$  upto  $\infty$  term is :

(1)  $\frac{4}{3}$

(2) 4

(3) 8

(4) 2

32)  $[1-x]^{-5/2}$  is nearly equal to :

(1)  $1 + \frac{5x}{2}$

(2)  $1 - \frac{5x}{2}$

(3)  $1 + \frac{2x}{3}$

(4)  $1 - \frac{2x}{3}$

33) A thermometer with a arbitrary scale has the ice point at  $-20^{\circ}$  and the steam point at  $180^{\circ}$ . When the thermometer reads  $5^{\circ}$ , a Centigrade thermometer will read.

- (1)  $7.5^{\circ}\text{C}$
- (2)  $12.5^{\circ}\text{C}$
- (3)  $16.5^{\circ}\text{C}$
- (4)  $-9.37^{\circ}\text{C}$

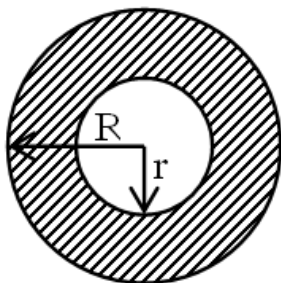
34) On centigrade scale the temperature of a body increases by 30 degrees. The increase in temperature on Fahrenheit scale is :

- (1)  $50^{\circ}$
- (2)  $40^{\circ}$
- (3)  $30^{\circ}$
- (4)  $54^{\circ}$

35) When a uniform rod is heated, which of its following properties will increase as a result of it?

- (1) mass
- (2) weight
- (3) center of mass
- (4) moment of inertia

36) A circular metallic disc of radius  $R$  has a small circular cavity of radius  $r$  as shown in figure. On



heating the system.

- (1)  $R$  increases and  $r$  decreases
- (2)  $R$  decreases and  $r$  increases
- (3) Both  $R$  and  $r$  increases
- (4) Both  $R$  and  $r$  decreases

37) If the length of a cylinder on heating increases by 3%, the area of its base will increase by:

- (1) 5%
- (2) 2%
- (3) 6%
- (4) 4%

38) If two rods of length  $L$  and  $2L$  having coefficients of linear expansion  $\alpha$  and  $2\alpha$  respectively are connected so that total length becomes  $3L$ , the average coefficient of linear expansion of the

composition rod equals:

(1)  $\frac{3}{2}\alpha$

(2)  $\frac{5}{2}\alpha$

(3)  $\frac{5}{3}\alpha$

(4) none of these

39) The volume of metal sphere increases by 0.15% when its temperature is raised by 24°C. The coefficient of volume expansion is :-

(1)  $\frac{5}{8} \times 10^{-4}$

(2)  $\frac{8}{5} \times 10^{-4}$

(3)  $\frac{4}{5} \times 10^{-4}$

(4)  $\frac{5}{4} \times 10^{-4}$

40) Two spheres made of same substance have diameters in the ratio 1 : 2. Their thermal capacities are in the ratio of :-

(1) 1 : 2

(2) 1 : 8

(3) 1 : 4

(4) 2 : 1

41) 1260J of energy supplied to 10g of water will raise its temperature by.

(1) 10°C

(2) 20°C

(3) 30°C

(4) 40°C

42) A bullet of mass 10 g moving with a speed of 20 m/s hits an ice block of mass 990 g kept fixed on a floor and gets stuck in it. How much ice will melt, if 50 % of the lost KE goes to ice ? (initial temperature of the ice block and bullet = 0°C)

(1) 0.001 g

(2) 0.002 g

(3) 0.003 g

(4) 0.004 g

43) 10 litres of hot water at 70°C is mixed with an equal volume of cold water at 20°C. Then resultant temperature of the water. (Specific heat of water = 4200 J/kg-k) :-

- (1) 35°C  
(2) 45°C  
(3) 55°C  
(4) 65°C

44) A liquid of mass  $m$  and specific heat  $C$  is heated to a temperature  $2T$ . Another liquid of mass  $m/2$  and specific heat  $2C$  is heated to a temperature  $T$ . If these two liquids are mixed, the resulting temperature of mixture is

- (1)  $\frac{2}{3}T$   
(2)  $\frac{8}{5}T$   
(3)  $\frac{3}{5}T$   
(4)  $\frac{3}{2}T$

45) A 10 gm of ice at  $-20^\circ\text{C}$  is added to 10 gm of water at  $50^\circ\text{C}$ . Specific heat of water =  $1 \text{ cal/g}^\circ\text{C}$ , specific heat of ice =  $0.5 \text{ cal/gm}^\circ\text{C}$ . Latent heat of ice =  $80 \text{ cal/gm}$ . Then resulting temperature is.

- (1)  $-20^\circ\text{C}$   
(2)  $15^\circ\text{C}$   
(3)  $0^\circ\text{C}$   
(4)  $50^\circ\text{C}$

## CHEMISTRY

1) Select the elements belonging to the same group :

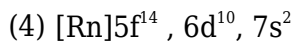
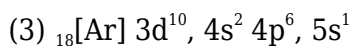
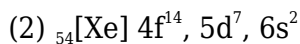
- (1) 3, 9, 16, 35  
(2) 4, 12, 38, 88  
(3) 5, 11, 19, 27  
(4) 24, 42, 47, 55

2) Which of the elements whose atomic numbers are given below, cannot be accommodated in the present set up of the long form of periodic table?

- (1) 107  
(2) 118  
(3) 126  
(4) Both 1 & 3

3) Which of the configuration belongs to different block

- (1)  $_{56}[\text{Kr}] 4d^{10}, 5s^1$



4) Elements found in liquid state :-

(1) Cs, Fr, Ga, Hg, Bi

(2) Na, K, Ca

(3) Ga, Hg, Br

(4) Ne, Ar, K, Hg

5) Which of the following does not follow  $(n + \ell)$  rule

(1) Mn ( $Z = 25$ )

(2) Hf ( $Z = 72$ )

(3) Th ( $Z = 90$ )

(4) Hg ( $Z = 80$ )

6) What is the atomic number of the element with the maximum number of unpaired 4p electrons :-

(1) 33

(2) 26

(3) 23

(4) 15

		25	
			B
	A		C
		D	

7)

For the given structure of periodic table. Which of the following statement is not correct ?

(1) D is a transuranic element and its  $e^-$  configuration is  $[\text{Rn}] 7s^2 5f^{14} 6d^5$

(2) Atomic no. of A, B, C, D are 75, 43, 76, 107 respectively.

(3) A, B, C, D are transition elements

(4) None

8) no. of elements in 4<sup>th</sup> period having electrons in 4s, 3d and 4p subshell respectively.

(1) 18, 16, 12

(2) 18, 16, 6

(3) 2, 10, 6

(4) 2, 16, 6

3NA

9) If  $\frac{3NA}{2}$  atoms of X(g) are converted to  $X^+(g)$  by energy  $E_1(\text{ev})$ . Then ionisation energy of X(g) in ev is-

- (1)  $E_1$   
 (2)  $\frac{2E_1}{3N_A}$   
 (3)  $\frac{3E_1}{2N_A}$   
 (4)  $\frac{E_1}{2}$

10) Which has maximum radius for Mn ?

- (1) MnO  
 (2) MnO<sub>2</sub>  
 (3) MnO<sub>4</sub><sup>-</sup>  
 (4) Mn<sub>2</sub>O<sub>3</sub>

11)

The I.E.<sub>1</sub>, and the I.E.<sub>2</sub> in kJ mol<sup>-1</sup> of a few elements designated by P,Q,R,S are shown below :-

Atom	I.E. <sub>1</sub>	I.E. <sub>2</sub>
P	2372	5251
Q	520	7300
R	900	1760
S	1680	3380

Based on the above information:-

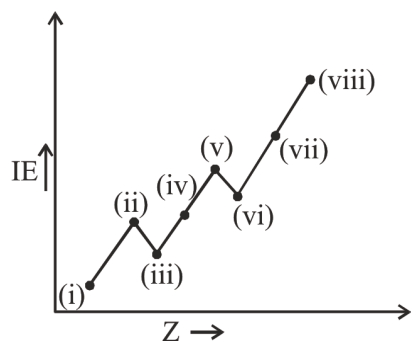
Which element represents a noble gas ?

- (1) P  
 (2) Q  
 (3) R  
 (4) S

12) In which of the following pair of species IE<sub>1</sub> of first species is more than that of second species, but reverse is true for IE<sub>2</sub> :-

- (1) N, O  
 (2) N, F  
 (3) O, F  
 (4) All

13) A graph is plotted between IE<sub>1</sub> of 2nd period elements and their atomic numbers as below :-



Then which of the following option is incorrect ?

- (1) at (i) position Li is present
- (2) at (viii) position Ne is present
- (3) at (vi) position N is present
- (4) at (iii) position B is present

14) Which of the following facts is not related with lanthanoid contraction ?

- (1) I.E. of Ag < IE of Au
- (2) I.E.I of Hg > IE of Cd
- (3) Size of Hf = size of Zr
- (4) Size of Y < size of La

15) Correct order of Increasing atomic radius of following elements is :

- (1) S < O < Se < C
- (2) O < C < S < Se
- (3) O < S < Se < C
- (4) C < O < S < Se

16) Correct order of  $IE_2$  of C, N, O and F are in order :

- (1) F > O > N > C
- (2) C > N > O > F
- (3) O > N > F > C
- (4) O > F > N > C

17) If  $r_{K^+} \simeq r_{Cl^-} \simeq 1.34 \text{ \AA}$  then  $r_k$  and  $r_{Cl}$  will be respectively :

- (1) <1.34 Å, <1.34 Å
- (2) >1.34 Å, >1.34 Å
- (3) >1.34 Å, <1.34 Å
- (4) Not possible to determine

18) Which atom will have highest vanderwaal radius :-

- (1) N
- (2) O



- (3) F  
(4) Ne

19)

No. of valence electrons of element from the following data of successive I.E. values in eV:  
50, 80, 130, 155, 190, 235, 275, 1500, 1550, 1590

- (1) 5  
(2) 6  
(3) 7  
(4) 8

20)

Select the correct order of size for:

$\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Br}^-$ ,  $\text{Li}^+$

- (1)  $\text{Br}^- > \text{Cl}^- > \text{Li}^+ > \text{Na}^+$   
(2)  $\text{Cl}^- > \text{Br}^- > \text{Na}^+ > \text{Li}^+$   
(3)  $\text{Br}^- > \text{Na}^+ > \text{Cl}^- > \text{Li}^+$   
(4)  $\text{Br}^- > \text{Cl}^- > \text{Na}^+ > \text{Li}^+$

21) Which of the following anion has smallest radius ?

- (1)  $\text{H}^-$   
(2)  $\text{F}^-$   
(3)  $\text{Cl}^-$   
(4)  $\text{Br}^-$

22) The first, second and third ionisation energies ( $E_1$ ,  $E_2$  &  $E_3$ ) for an element are 7eV, 12.5eV and 42.5eV respectively. The most stable oxidation state of the element will be :-

- (1) +1  
(2) +4  
(3) +3  
(4) +2

23) Select the incorrect matching of given atomic number with their IUPAC official name :-

- (1) 104 - Rutherfordium  
(2) 110 - Hassium  
(3) 107 - Bohrium  
(4) 102 - Nobelium

24)

IE<sub>1</sub> and IE<sub>2</sub> of Mg are 178 and 348 K. cal mol<sup>-1</sup>. The enthalpy required for the reaction,  $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$  is :-

- (1) + 170 K.cal
- (2) + 526 K.cal
- (3) - 170 K.cal
- (4) - 526 K.cal

25) In which of the following pairs the radii of second species is greater than that of first?

- (1) C, O
- (2) Mg, Al
- (3) Cl, F
- (4) Br, I

26) The electronic configuration of gadolinium (Atomic number 64) is

- (1)  $[\text{Xe}] 4f^3 5d^5 6s^2$
- (2)  $[\text{Xe}] 4f^7 5d^2 6s^1$
- (3)  $[\text{Xe}] 4f^7 5d^1 6s^2$
- (4)  $[\text{Xe}] 4f^8 5d^6 6s^2$

27) Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R),

**Assertion (A):** First ionisation energy of Mg is higher than that of Na, but the second ionisation energy of Na is higher than that of Mg.

**Reason (R):** Mg has a pair of electrons in its valence shell while Na has only one unpaired electron in valence shell.

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are true and (R) is not the correct explanation of (A)
- (3) (A) is true but (R) is false
- (4) (A) is false but (R) is true

28) Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R),

**Assertion (A):** Li and Mg show diagonal relationship.

**Reason (R):** They have very close ionic radii

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are true and (R) is not the correct explanation of (A)
- (3) (A) is true but (R) is false
- (4) (A) is false but (R) is true

29) **Statement-I:** First ionisation energy of neon is more than it's second ionisation energy.

**Statement-II:** First ionisation energy of nitrogen is more than it's second ionisation energy.

- (1) Statement I is correct but Statement II is incorrect  
 (2) Statement I is incorrect but Statement II is correct  
 (3) Both Statement I and Statement II are correct  
 (4) Both Statement I and Statement II are incorrect

30) Among the following least and most metallic element will be respectively :

- (I) [He]  $2s^1$       (II) [Kr]  $5s^2 4d^{10} 5p^5$   
 (III) [Xe]  $6s^1$       (IV) [He]  $2s^2 2p^5$

- (1) I and II  
 (2) II and IV  
 (3) III and IV  
 (4) IV and III

31) The rate equation of a reaction is as follows :

$$\text{rate} = k[P][Q]^{0.5}[R]^{0.5}$$

Which is statement about the above equation is wrong ?

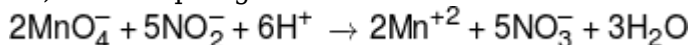
- (1) Order with respect to P is one  
 (2) Total order of the reaction is two  
 (3) Order with respect to each of Q and R is 0.5  
 (4) Unit of specific reaction rate is  $\text{mol L}^{-1}\text{s}^{-1}$

32) At  $27^\circ\text{C}$ , for the reaction,  $\text{N}_2\text{O}_{4(g)} \rightarrow 2\text{NO}_{2(g)}$ ,

rate of reaction is  $6 \times 10^{-3} \text{ atm min}^{-1}$ . Find rate of same reaction in terms of  $\text{mol L}^{-1} \text{ min}^{-1}$ .

- (1)  $1.2 \times 10^{-4}$   
 (2)  $2.4 \times 10^{-4}$   
 (3)  $3.2 \times 10^{-2}$   
 (4)  $6 \times 10^{-3}$

33) With help of given reaction :



Calculate the rate (in  $\text{M s}^{-1}$ ) at which the  $\text{NO}_2^-$  concentration is decreasing if the  $\text{MnO}_4^-$  is decreasing at a rate of  $0.024 \text{ M s}^{-1}$ .

- (1)  $4.8 \times 10^{-3}$   
 (2)  $6 \times 10^{-2}$   
 (3)  $3 \times 10^{-2}$   
 (4)  $2.4 \times 10^{-3}$

34) For the reaction  $\text{A} + \text{B} \rightarrow \text{C}$ ; starting with different initial concentration of A and B, initial rate of reaction were determined graphically in three experiments.

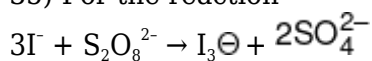
S.No.	[A] <sub>0</sub> /M (Initial conc.)	[B] <sub>0</sub> /M (Initial conc.)	rate/ ( $\text{M s}^{-1}$ )
-------	--	--	--------------------------------

1	$1.6 \times 10^{-3}$	$5 \times 10^{-2}$	$10^{-3}$
2	$3.2 \times 10^{-3}$	$5 \times 10^{-2}$	$4 \times 10^{-3}$
3	$1.6 \times 10^{-3}$	$10^{-1}$	$2 \times 10^{-3}$

Rate law for reaction from above data is:-

- (1)  $r = k[A]^2 [B]^2$
- (2)  $r = k[A]^2 [B]$
- (3)  $r = k[A] [B]^2$
- (4)  $r = k[A] [B]$

35) For the reaction



if  $-\frac{\Delta [S_2O_8^{2-}]}{\Delta t} = 1.5 \times 10^{-3} \text{ M} \times \text{s}^{-1}$

Then value of  $-\frac{\Delta [I^-]}{\Delta t}$  will be :-

- (1)  $4.5 \times 10^{-3} \text{ M} \times \text{s}^{-1}$
- (2)  $5 \times 10^{-4} \text{ M} \times \text{s}^{-1}$
- (3)  $1.5 \times 10^{-3} \text{ M} \times \text{s}^{-1}$
- (4)  $3 \times 10^{-3} \text{ M} \times \text{s}^{-1}$

36) For an elementary reaction :  $A + 2B \rightarrow \text{product}$ ,

The differential rate equation is :-

- (1)  $-\frac{1}{2} \frac{d[A]}{dt} = -\frac{d[B]}{dt} = k[A][B]^2$
- (2)  $\frac{1}{2} \frac{d[A]}{dt} = \frac{d[B]}{dt} = k[A][B]^2$
- (3)  $-\frac{d[A]}{dt} = -\frac{1}{2} \frac{d[B]}{dt} = k[A][B]^2$
- (4)  $\frac{d[A]}{dt} = \frac{1}{2} \frac{d[B]}{dt} = k[A][B]^2$

37) For a reaction  $2SO_2 + O_2 \rightarrow 2SO_3$  if rate of formation of  $SO_3$  is  $0.8 \text{ g/min}$ . Then what will be rate of disappearance of  $SO_2$

- (1)  $1.6 \text{ g/min}$
- (2)  $0.64 \text{ g/min}$
- (3)  $10^{-3} \text{ mol/min}$
- (4)  $10^{-4} \text{ g/min}$

38) Which of the following statement is incorrect?

- (1) Unit of rate of disappearance is  $\text{Ms}^{-1}$
- (2) Unit of rate of reaction is  $\text{Ms}^{-1}$

(3) Unit of rate constant  $k$  depends upon order

(4) Unit of  $k$  for first order reaction is  $\text{Ms}^{-1}$

39) The decomposition of dimethylether leads to formation of  $\text{CH}_4$ ,  $\text{H}_2$ ,  $\text{CO}$  and reaction rate is given

by rate =  $K \left[ P_{\text{CH}_3\text{OCH}_3} \right]^{3/2}$  if pressure is measured in bar and time in minutes then what is unit of rate and rate constant -

(1)  $\text{bar min}^{-1}$ ,  $\text{min}^{-1}$

(2)  $\text{bar}$ ,  $\text{min}^{-1}$

(3)  $\text{bar min}^{-1}$ ,  $\text{bar}^{-1/2} \text{ min}^{-1}$

(4)  $\text{bar min}^{-1}$ ,  $\text{bar}^{3/2} \text{ min}^{-1}$

40) The order of a reaction with rate equal =  $kC_A^{3/2}C_B^{-1/2}$  is :

(1) 1

(2)  $\frac{1}{2}$

(3)  $-\frac{3}{2}$

(4) 2

41)

During the kinetic study of the reaction,  $2A + B \rightarrow C + D$ , following results were obtained:-

Ex. No.	[A] ( $\text{mol L}^{-1}$ )	[B] ( $\text{mol L}^{-1}$ )	Initial rate of formation of D ( $\text{mol L}^{-1}\text{min}^{-1}$ )
I	0.1	0.1	$6.0 \times 10^{-3}$
II	0.3	0.2	$7.2 \times 10^{-2}$
III	0.3	0.4	$2.88 \times 10^{-1}$
IV	0.4	0.1	$2.40 \times 10^{-2}$

Based on the above data which one of the following is correct ?

(1) rate =  $k[A][B]^2$

(2) rate =  $k[A]^2[B]$

(3) rate =  $k[A][B]$

(4) rate =  $k[A]^2[B]^2$

42) for an elementary reaction  $A + 2B \rightarrow P$ ; if rate constant is  $2 \times 10^{-6} \text{ mol}^{-2} \text{ L}^2 \text{ s}^{-1}$  and concentration of A and B was 0.1 M, 0.2 M initially. Calculate rate of reaction when A is reduced to 0.05 M is :-

(1)  $8 \times 10^{-9} \text{ Ms}^{-1}$

(2)  $3.889 \times 10^{-9} \text{ Ms}^{-1}$

(3)  $4.8 \times 10^{-9} \text{ Ms}^{-1}$

(4)  $10^{-9} \text{ Ms}^{-1}$

43) For the reaction  $\text{N}_2\text{O}_{5(g)} \rightarrow 2\text{NO}_{2(g)} + \frac{1}{2}\text{O}_{2(g)}$ , the value of rate of disappearance of  $\text{N}_2\text{O}_5$  is given as  $6.25 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$ . The rate of formation of  $\text{NO}_2$  and  $\text{O}_2$  is given respectively as :

- (1)  $1.25 \times 10^{-2} \text{ mol L}^{-1} \text{ s}^{-1}$  and  $6.25 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$
- (2)  $6.25 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$  and  $6.25 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$
- (3)  $1.25 \times 10^{-2} \text{ mol L}^{-1} \text{ s}^{-1}$  and  $3.125 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$
- (4)  $6.25 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$  and  $3.125 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$

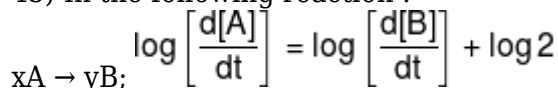
44) The initial rate of the reaction,  
 $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$ , at  $25^\circ\text{C}$  is  $0.028 \text{ mol L}^{-1} \text{ s}^{-1}$ . The experiment rate is given by :-  
 $r = k[\text{NO}]^2[\text{O}_2]$

If the initial concentrations of the reactants are

$\text{O}_2 = 0.040 \text{ mol L}^{-1}$  and  $\text{NO} = 0.01 \text{ mol L}^{-1}$ , the rate constant of the reaction is :

- (1)  $7.0 \times 10^{-3} \text{ L mol}^{-1} \text{ s}^{-1}$
- (2)  $7.0 \times 10^{-4} \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$
- (3)  $7.0 \times 10^2 \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$
- (4)  $7.0 \times 10^3 \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$

45) In the following reaction :



where -ve sign indicates rate of disappearance of the reactant. Thus,  $x : y$  is :

- (1) 1 : 2
- (2) 2 : 1
- (3) 3 : 1
- (4) 3 : 10

## BIOLOGY

1) Which of the following option is not correct ?

- (1) Biological names are generally in Latin and written in italics.
- (2) The first word in biological name represents the genus while the second component denotes the specific epithet.
- (3) Both the words in a biological name, when handwritten, are in italics.
- (4) Name of the author appears after the specific epithet

2) The number of species that are known and described range between :

- (1) 1.7 to 1.8 billion
- (2) 17 to 18 lacs
- (3) 1.7 to 1.8 lacs
- (4) 17 to 18 million

3) Read the following regarding numerical taxonomy:

- (i) It takes use of computers.
- (ii) It is based on all observable characters of organisms.
- (iii) Vegetative characters are given more importance.
- (iv) Number and codes are assigned to all the characters, data are then processed.
- (v) Only one character can be considered at a time.

How many of the above statements are correct?

- (1) Three
- (2) One
- (3) All
- (4) Two

4) Identify the correct match from the column-I, II and III.

Column-I		Column-II		Column-III	
(I)	Wheat	(a)	<i>Homo</i>	(i)	Monoco-tyledonae
(II)	Man	(b)	<i>Musca</i>	(ii)	Dico-tyledonae
(III)	Mango	(c)	<i>Mangifera</i>	(iii)	Insecta
(IV)	Housefly	(d)	<i>Triticum</i>	(iv)	Mammalia

- (1) I-d-i, II-a-iv, III-c-ii, IV-b-iii
- (2) I-d-i, II-c-ii, III-a-iv, IV-b-iii
- (3) I-d-ii, II-c-i, III-a-iv, IV-b-iii
- (4) I-a-iv, II-d-i, III-b-iii, IV-c-ii

5) Identify the correct statements from the following and select the correct option from option given below

- A. One genus may have more than one specific epithet representing different species.
- B. One specific epithet can be present in different genus.
- C. Scientific term for convenient categories used in taxonomy is taxa/taxon
- D. Cats, dogs, mammals and animals are different taxa.

- (1) A and D only
- (2) A, C and D only
- (3) A, B and D only
- (4) A, B, C and D

6) Arrange the following different taxon in ascending sequence according to their rank.

- A. Poaceae
- B. Polymoniales

C. Panthera      D. Monocotyledonae

- (1) C - A - B - D
- (2) D - C - B - A
- (3) C - B - A - D
- (4) D - B - A - C

7) Given below is a characteristics of the four kingdoms with four blanks (A-D), identify the blanks :-

	<b>Monera</b>	<b>Protista</b>	<b>Fungi</b>	<b>Plantae</b>
Cell wall	Peptidoglycan	Present in some	B	Present (cellulose)
Nuclear membrane	A	Present	Present	Present
Body organisation	Cellular	Cellular	Multicellular	D
Mode of nutrition	Autotrophic, heterotrophic	C	Heterotrophic	Autotrophic

- (1) A-Absent, B-Cellulose, C-Autotrophic, D-Tissue/organ/organ system
- (2) A-Present, B-Non-cellulosic, C-Heterotrophic, D-Cellular
- (3) A-Absent, B-Chitin, C-Autotrophic and heterotrophic, (D)-Tissue/organ
- (4) A-Present, B-Peptidoglycan, C-Heterotrophic, D-Cellular

8) Choose the incorrect statement from following :-

- (1) Ribosomes are the site of protein synthesis
- (2) Pili do not play a role in motility
- (3) Inclusion bodies are bounded by membrane
- (4) Cell wall prevent the bacterium from bursting and collapsing

9) Single protective unit of bacteria are made up of:-

- (1) Cell wall, cell membrane, Cytoplasm
- (2) Glycocalyx, Cell membrane, Cytoplasm
- (3) Glycocalyx, Cell wall, Cell membrane
- (4) Flagella, Pili, Glycocalyx

10) Which of the following structure is responsible to attach the bacteria to host tissues and to rocks in streams ?

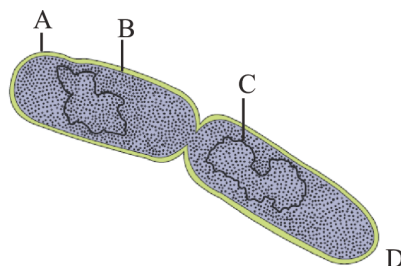
- (1) Longer Pili
- (2) Flagella
- (3) Capsule
- (4) Fimbriae



11) **Assertion** : Lichens are symbiotic association in between algae and fungi where algae is known as phycobiont and fungi is known as mycobiont.

**Reason** : In lichen algae is autotrophs and absorb water and nutrient from soil while fungi is heterotrophs and synthesize food for it self as well as for algae.

- (1) Both Assertion and Reason are true but Reason is NOT the correct explanation of Assertion.
- (2) Assertion is true but Reason is false.
- (3) Assertion is false but Reason is true.
- (4) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.



12) Identify the labelled A, B, C and D in the following figure.

- (1) A-Plasma membrane, B-Cell wall, C-RNA, D-Spore formation
- (2) A-Plasma membrane, B-Mucilaginous sheath, C-DNA, D-Transformation
- (3) A-Mucilaginous sheath, B-Cell membrane, C-RNA, D-Conjugation
- (4) A-Cell wall, B-Cell membrane, C-DNA, D-Binary fission

13) Which of the following set of diseases are caused by bacteria?

- (1) Cholera, Typhoid, Citrus canker
- (2) Cholera, Typhoid, Small pox
- (3) Tetanus, Herpes, Cholera
- (4) Tetanus, Typhoid, Mad cow disease

14) Read the following point carefully.

- (a) Nitrogen fixation ability
- (b) Oxygenic photosynthesis
- (c) Colonies are generally surrounded by gelatinous sheath
- (d) Cause water bloom

These points are related with-

- (1) Eubacteria
- (2) Euglenoids
- (3) Green algae
- (4) Cyanobacteria

15)

Consider the following statements about *Mycoplasma* :

- (I) That completely lack a cell wall  
(II) Mycoplasma is the smallest living organism  
(III) They can not survive without oxygen  
(IV) Many mycoplasma are pathogenic in animals and plants.

Which of the statements given above are **correct**?

- (1) I, II and III  
(2) II, III and IV  
(3) I, II and IV  
(4) I, III and IV

16) Which of the following statement is incorrect regarding archaeobacteria ?

- (1) They can be present in the gut of several ruminant animals such as cows and buffaloes  
(2) They are responsible for the production of methane (biogas) from the dung  
(3) They can live in extreme salty areas, hot springs and marshy areas  
(4) Archaeobacteria have similar cell wall structure like eubacteria

17) Find the incorrect statements from the following:- (A) Bacteria are the sole member of kingdom Monera (B) Bacteria show the most extensive metabolic diversity  
(C) The vast majority of bacteria are autotrophs and a few are heterotrophs  
(D) Bacterial cell wall is made up of lipoprotein

- (1) Only A, B & C  
(2) Only C & D  
(3) Only A, C & D  
(4) Only B & C

18) In ascomycetes and basidiomycetes, the ascospores and basidiospore are produced respectively :-

- (1) Exogenously and endogenously  
(2) Endogenously and endogenously  
(3) Exogenously and exogenously  
(4) Endogenously and exogenously

19) In the list given below maximum members are of which kingdom according to five kingdom system ?

*Rhizobium, Azolla, Gonyaulax, Euglena, Frankia, Nostoc, Aspergillus, Porella, Chlorella, PPLO, Anabaena*

- (1) Protista  
(2) Monera  
(3) Fungi  
(4) Plantae

20) Read the following statements (A-D) and choose the correct options.

- (A) Though the bacterial structure is very simple, they are very complex in behaviour.  
 (B) Archaeobacteria differ from other bacteria in having a different cell wall structure.  
 (C) The cyanobacteria have 'chlorophyll-a' similar to green plants.  
 (D) Eubacteria play a great role in recycling of nutrients like nitrogen, phosphorous, iron and sulphur.

- (1) A, B correct and C, D incorrect.  
 (2) A, C, D correct and A incorrect.  
 (3) C, D correct and A, B incorrect.  
 (4) A, B, C and D correct.

21) Choose the correct statement :-

- (1) *E.coli* show amphitrichous nature  
 (2) *Rhodospirillum* is an example of purple sulphur bacteria  
 (3) *Acetobacter aceti* is an example of facultative anaerobic  
 (4) *Nitrosomonas* and *Nitrobacter* are example of nitrogen fixating bacteria.

22) Find out the incorrect match of the following :

- (1) Eubacteria - True bacteria  
 (2) Archaeobacteria - production of methane  
 (3) Cyanobacteria - cell wall of heterocyst is thin & made up of lignin  
 (4) Mycoplasma - Pathogenic in animals & plants

23) Which option is related with only and only monera not related with other kingdom of R. H. Whittaker

- (1) Decomposer nature  
 (2) Presence of cell wall and cell membrane  
 (3) Multicellular body  
 (4) Nitrogen fixation ability with prokaryotic nature

24) Cyanobacteria, mycoplasma and archaeobacteria are similar in the presence of?

- (1) Photosynthetic pigments  
 (2)  $N_2$  - fixation structure  
 (3) Types of ribosomes  
 (4) Structure of cell membrane

25) Consider the followings- *Solanum tuberosum*, *Mangifera indica*, *Triticum aestivum*, *Solanum nigrum*, *Panthera leo*, *Panthera pardus*, *Solanum melongena*, *Panthera tigris*, *Musca domestica* How many family, genus and species are represented by above set of organisms?

- (1) 5, 5, 5 respectively  
 (2) 5, 5, 9 respectively  
 (3) 9, 6, 5 respectively

(4) 6, 5, 9 respectively

26) Read the following terms carefully.

Cilia, Flagella, Zygote, Photosynthesis, Pellicle, Peptidoglycan wall, Nitrogen fixation ability, Multicellular, Heterocyst, Tissue, Pseudopodia. How many terms are not related with kingdom protista ?

- (1) 4
- (2) 5
- (3) 7
- (4) 6

27) An organism which have photosynthetic nature with cell wall like lids of soap box also have -

- (1) chl a and b pigment
- (2) Leucosin and fat (oil) stored food
- (3) Sporangia formation
- (4) Flagella for movement

28) Which organism are responsible for red appearance of sea by their rapid multiplication?

- (1) *Euglena*
- (2) *Noctiluca*
- (3) *Gonyaulax*
- (4) *Trypanosoma*

29) Identify the group of organism on basis of given characters :-

- (A) Presence of two flagella.
- (B) Holophytic nutrition.
- (C) Cell wall with cellulosic plates.
- (D) Mostly marine.

- (1) Euglenoids
- (2) Chrysophytes
- (3) Slime moulds
- (4) Dinoflagellates

30) The walls are embedded with silica and thus the walls are indestructible in :-

- (1) Slime moulds
- (2) Euglenoids
- (3) Diatoms
- (4) Dinoflagellates

31) Which option is not related to Euglenoids ?

- (1) Majority of them are fresh water organisms, found in stagnant water.

- (2) The pigments are identical to those present in higher plants
- (3) When deprived of sunlight they behave like heterotrophs
- (4) Most of them have two flagella; one lies longitudinally and the other transversely

32) Slime moulds are \_\_\_\_ (i) \_\_\_\_ protists. The body moves along decaying twigs and leaves engulfing organic material under suitable conditions, they form an aggregation called \_\_\_\_ (ii) \_\_\_\_ which may grow and spread over several feet.

In above question (i) & (ii) are respectively.

- (1) (i) Autotrophic, (ii) plasmodium
- (2) (i) Chemosynthetic autotrophic, (ii) plasmodium
- (3) (i) Saprophytic, (ii) Phycobiont
- (4) (i) saprophytic, (ii) plasmodium

33) Two statements regarding protozoa is given below. Read these statements carefully and identify the correct option from options given below :

Statement I : Protozoa is classified in kingdom Protista by R. H. Whittaker, which was previously classified in kingdom animalia by Carolus Linnaeus due to absence of cellulosic cell wall

Statement II : Cell wall is completely absent in members of protozoa although some amoeboidal protozoans present in fresh water have silica shell outside body

- (1) Statement I is true while II is false
- (2) Statement I is false while II is true
- (3) Both Statement-I and Statement-II are true
- (4) Both Statement-I and Statement-II are false

34) Choose the incorrect statement from following:-

- (1) Yeast are used to make bread and beer.
- (2) Fungi prefer to grow in warm and humid places.
- (3) Cell wall of fungi is composed of chitin and polysaccharides.
- (4) Fungi show symbiotic association with algae as mycorrhiza and with roots of higher plants as lichens.

35) A group of college student orderd a pizza with pineapple, onion and Mushroom. Mushroom belong to which kingdom ?

- (1) *Agaricus*
- (2) Ascomycetes
- (3) Fungi
- (4) Basidiomycetes

36) In Ascomycetes and Basidiomycetes, the intervening period between plasmogamy and karyogamy is known as :-

- (1) Diplophase
- (2) Dikaryophase

- (3) Interphase
- (4) Resting phase

37) Choose the incorrect statement about phycomycetes.

- (1) Members are found in aquatic habitat also
- (2) Spores are endogeneous produced in sporangium
- (3) A zygospore is formed by reduction division
- (4) They show all type of sexual reproduction

38)

Which of the following fungi is used extensively in biochemical and genetic work ?

- (1) *Alternaria*
- (2) *Aspergillus*
- (3) *Neurospora*
- (4) *Claviceps*



39)

Identify the organism and feature associated with it :-

- (1) *Morchella* - Edible fungus
- (2) *Agaricus* - Edible fungus
- (3) *Rhizopus* - Bread mold
- (4) *Alternaria* - Pathogenic fungus

40) Which option is associated with Basidiomycetes?

- (1) Rust, smut, Ergot
- (2) Rust, Smut, Mushroom
- (3) Yeast, Rust, Puff balls
- (4) Yeast, Smut, Mushroom

41) Many members of this class are decomposers of litter, and its examples are *Alternaria*, *Colletotrichum* and *Trichoderma*. This class is :-

- (1) Psilopsida
- (2) Basidiomycetes
- (3) Chlorophyceae
- (4) Deuteromycetes

42) Choose the incorrect match :-

- (1) Ascomycetes - Some members used in genetic work
- (2) Deuteromycetes - Rust and smut fungi
- (3) Basidiomycetes - Lack sex organs
- (4) Phycomycetes - Produce zoospore and Oospore

43) Read the following statements :-

- (A) Lichens do not grow in polluted areas.
- (B) Viroids have low molecular weight DNA
- (C) Virus are inert outside their specific host cell.
- (D) AIDS, small pox and cholera disease caused by Bacteria.

Which statements are correct ?

- (1) A and B
- (2) A and C
- (3) A, B and C
- (4) A, B and D

44) Which of the following is abnormally folded protein ?

- (1) Viroids
- (2) Mycorrhiza
- (3) Prions
- (4) Virus

45) Mycorrhiza is :-

- (1) A fungus parasiting root system of higher plants.
- (2) An association of *rhizobium* with roots of leguminous plants
- (3) A symbiotic association of plant roots and certain fungi
- (4) An association of algae with fungi

46) Which is a correct match for the animal and its common name ?

- (1) *Obelia* - Jelly fish
- (2) *Taenia* - Tapeworm
- (3) *Neries* - Earthworm
- (4) *Pila* - Pearl oyster

47) Which is not a character of cartilaginous fishes?

- (1) 2- Chambered heart
- (2) Paired fins
- (3) Air or swim bladder
- (4) Gills without operculum

48) Metagenesis means :-

- (1) Polyp produce medusae asexually and medusae produce polyp sexually
- (2) Polyp produce medusae sexually and medusae produce polyp sexually
- (3) Polyp produce medusae asexually and medusae produce polyp asexually.
- (4) Polyp produce medusae sexually and medusae produce polyp Asexually.

49) Which one is correct about Porifera :-

- (1) Unisexual
- (2) Internal fertilisation with indirect development
- (3) External fertilisation with direct development
- (4) External fertilisation with indirect development

50) Which of the following is exclusively marine :-

- (1) Sea walnut
- (2) *Amphioxus*
- (3) *Ascidia*
- (4) All above

51) Read the following (A-D) four statements :-

- (A) Mouth is located ventrally
- (B) Notochord is absent throughout the life
- (C) Gill slits are absent
- (D) Placoid scale present

How many of the above statements are correct for Chondrichthyes ?

- (1) Four
- (2) Three
- (3) Two
- (4) One

52) In which phylum the cells performing the same function are arranged into tissues for the first time ?

- (1) Porifera
- (2) Coelenterata
- (3) Platyhelminthes
- (4) Aschelminthes

53) The property of a living organism to emit light is found in :

- (1) *Sycon*
- (2) *Pleurobrachia*
- (3) *Hydra*



(4) *Taenia*

54) The animal group where the adults are less developed but larvae are more developed is :-

- (1) Agnatha
- (2) Tunicate
- (3) Amphibian
- (4) Cephalochordates

55) The animals of which phylum are bilaterally symmetrical, triploblastic, segmented and coelomate ?

- (1) Coelenterata
- (2) Ctenophora
- (3) Aschelminthes
- (4) Arthropoda

56) Which of the following statement is incorrect for reptiles ?

- (1) They have creeping or crawling mode of locomotion
- (2) Heart is usually three chambered
- (3) Snakes and lizards shed their scales as skin cast
- (4) Fertilisation is external

57) In the given examples, how many animals are viviparous ? *Corvus*, *Columba*, *Macropus*, *Pteropus*, *Calotes*, *Hemidactylus*, *Psittacula*, *Struthio* and *Macaca*

- (1) Three
- (2) Four
- (3) Five
- (4) Six

58) In which one of the following the genus name, its two character and its class/phylum are correctly matched?

	Genus name		Two characters	Class/ Phylum
(1)	<i>Ascaris</i>	(a)	Body segmented	Annelida
		(b)	Males and females distinct	
(2)	Frog	(a)	A tympanum represents ear	Amphibia
		(b)	Fertilization is external	
(3)	<i>Pteropus</i>	(a)	Skin possesses hair	Mammalia
		(b)	Oviparous	
(4)	<i>Aurelia</i>	(a)	Cnidoblasts	Coelenterata

	(b)	Organ level of organization	
--	-----	-----------------------------	--

- (1) 1
- (2) 2
- (3) 3
- (4) 4

59) Fill in the blanks :-

In ....a...., the cells are arranged as loose cell aggregates, i.e., they exhibit ....b.... of organisation. Some division of labour (activities) occur among the cells :-

- (1) a-sponges, b-cellular level
- (2) a-coelentrates, b-tissue level
- (3) a-platyhelminthes, b-organ level
- (4) a-coelentrates, b-cellular level

60) Read the given statements and select the correct option.

**Statement-1** : All triploblastic animals are eucoelomates.

**Statement-2** : Diploblastic animals have a false coelom.

- (1) Both statements 1 and 2 are correct.
- (2) Statement 1 is not correct but statement 2 is correct.
- (3) Statement 1 is correct and statement 2 is not correct.
- (4) Both statements 1 and 2 are incorrect.

61)

How many of the following animals show organ/organ system level of body organisation along with bilateral symmetry ?

*Pleurobrachia, Fasciola, Ancylostoma, Hirudinaria, Anopheles, adult Cucumaria, Balanoglossus*

- (1) Five
- (2) Four
- (3) Two
- (4) Three

62)

Identify the organism from the following hints :-

- (A) Fresh water habitat with streamlined body
- (B) Two chambered heart

(C) Air bladder present to regulate buoyancy (D) Four pair of gill slits with operculum

- (1) *Scoliodon*
- (2) *Trygon*
- (3) *Myxine*
- (4) *Catla*

63) The excretory organ of hemichordates:

- (1) Flame cells
- (2) Solenocytes
- (3) Kidneys
- (4) Proboscis gland

64) In which of the following groups, all animals are monoecious?

- (1) Tapeworm, *Neries*, *Pheretima*
- (2) Leech, Tapeworm, Earthworm
- (3) *Ascaris*, Tapeworm, Earthworm
- (4) Star fish, *Pheretima*, *Sepia*



65) No. of cranial nerves in the animal shown in given diagram is :-

- (1) 10
- (2) 12 pairs
- (3) 8 pairs
- (4) 20

66) Which of the following combination of animals and it's description is incorrect ?

- (1) Pila - Bilateral symmetrical
- (2) Balanuglossus - Proboscis gland for excretion
- (3) Echinus - With spiny body
- (4) Balanoglossus - Closed type blood circulatory system

67) Feather like gills are present in :

- (1) Annelida
- (2) Echinodermata
- (3) Hemichordata
- (4) Mollusca

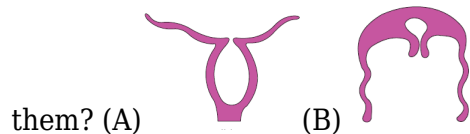
68) In which one of the following the genus name, its two character and its class are correctly matched :-

	Genus	Two character	Class / phylum
(1)	<i>Felis</i>	(a) External ears or pinnae are absent (b) Homeothermic	Mammalia

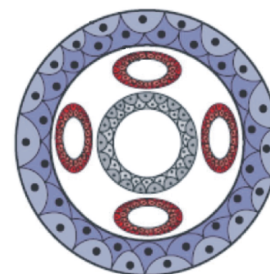
(2)	<i>Struthio</i>	(a) Pleurodont teeth (b) Endoskeleton fully ossified	Aves
(3)	<i>Bungarus</i>	(a) epidermal scales (b) Poisonous snake	Reptilia
(4)	<i>Ichthyophis</i>	(a) 2 pair of limbs present (b) Poikilothermic animal	Amphibia

- (1) 1  
 (2) 2  
 (3) 3  
 (4) 4

69) Here two basic forms of coelenterates (*Obelia*) are given. Which one option is correct about



- (1) (A) and (B) both are free swimmers  
 (2) (A) produce (B) asexually and (B) produce (A) sexually  
 (3) (A) is medusa and (B) is polyp  
 (4) (A) and (B) both are sessile



70) Which of the following option is correct about the figure given below ?

- (1) Planeria  
 (2) Fasciola  
 (3) Ancylostoma  
 (4) Pleurobrachia

71) Match the following organism with their respective characteristics :-

(a)	Cnidoblast	I.	Pila
(b)	Comb plates	II.	Anopheles
(c)	Malpighian tubules.	III.	Physalia
(d)	Radula.	IV.	Ctenoplane

- (1) a-III, b-IV, c-II, d-I  
 (2) a-I, b-III, c-IV, d-II  
 (3) a-IV, b-II, c-I, d-III

(4) a-II, b-IV, c-III, d-I

72) **Statement-I :-** Echinodermites have spiny body with Incomplete digestive system.

**Statement-II :-** Echinoderms are Triploblastic & radial symmetrical animals

(1) Statement-I is correct but Statement-II is incorrect

(2) Statement-I and Statement-II both are incorrect

(3) Statement-I is incorrect but Statement-II is correct

(4) Statement-I and Statement-II both are correct

73) Animal which was earlier considered as chordate but now is a non-chordate.

(1) Balanoglaussus

(2) Saccoglaussus

(3) Salpa

(4) Both (1) and (2)

74) Triploblastic and eucoelomate animals belong to which phylum?

(1) Annelida and Arthropoda

(2) Annelida and Hemichordata

(3) Echinodermata and Mollusca

(4) All of above phyla

75) Locomotory organ in Pleurobrachia is :

(1) Comb plate

(2) Cnidoblast

(3) Stinging cell

(4) Eight external rows of flagella



76)

The respiratory organ in above animal is ?

(1) Skin

(2) Lungs

(3) Gills

(4) Trachea

77) Which animals shed their skin as skin cast :

- (1) Frog
- (2) Lizard
- (3) Snake
- (4) 2 and 3 both

78) Which gland is present in Psittacula ?

- (1) Sweat gland
- (2) Mucos gland
- (3) Mammary gland
- (4) Oil gland

79) The most distinctive feature of Echinoderms is :-

- (1) Water vascular system
- (2) Water transport system
- (3) Water canal system
- (4) All of these

80) **Statement-I** : Digestion in sponges is intracellular.

**Statement-II** : Digestion in sponges take place in collar cells.

- (1) Both Statement-I and Statement-II are correct.
- (2) Both Statement-I and Statement-II are incorrect.
- (3) Statement-I is correct but Statement-II is incorrect.
- (4) Statement-I is incorrect but Statement-II is correct.

81) "Mantle" is the character of which animal.

- (1) *Antedone*
- (2) *Aplysia*
- (3) *Aedes*
- (4) *Ancylostoma*

82) Which of the following is member of Tetrapoda :

- (1) Ascidia
- (2) Amphioxus
- (3) Clarias
- (4) Ichthyophis

83) Which of the following characters is not shared by both cnidarians and ctenophores ?

- (1) Tissue level of organisation
- (2) Radial symmetry
- (3) Digestion is extracellular and intracellular

(4) Reproduction takes place only by sexual means.

84) Internal fertilization and mostly viviparous animal group is :

- (1) *Camelus*, *Hippocampus*
- (2) *Exocoetus*, *Clarias*
- (3) *Taenia*, *Ascaris*
- (4) *Scoliodon*, *Pristis*

85) **Assertion** : Class osteichthyes includes both marine & fresh water fishes with bony endoskeleton and don't have to swim continuously.

**Reason** : Air bladder is present which regulates buoyancy.

- (1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- (2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- (3) Assertion is True but the Reason is False.
- (4) Both Assertion & Reason are False.

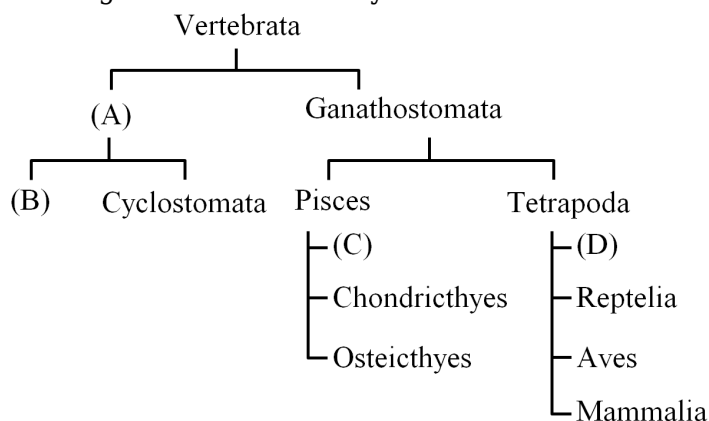
86) Read the following statements :-

- (A) Protochordates are exclusively marine
- (B) In Cephalochordates, notochord extends from head to tail region.
- (C) In Urochordates, notochord is present only in larval tail.
- (D) Cranium and vertebral column are bony in Cyclostomates.

Which of the above statement is/are correct?

- (1) A alone
- (2) B, C and D
- (3) A, B and C
- (4) All

87) Read the following flow chart carefully and select the correct option for A, B, C and D

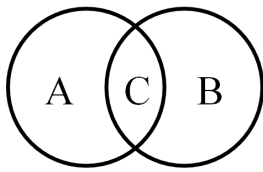


respectively :-

- (1) Ostracodermi, Agnatha, Placodermi, Amphibia
- (2) Agnatha, Placodermi, Ostracodermi, Amphibia
- (3) Agnatha, Ostracodermi, Placodermi, Amphibia
- (4) Amphibia, Ostracodermi, Placodermi, Agnatha

88)

Observe the venn diagram shown below here :-



A = Bilateral symmetry

B = Radial symmetry

Based the provided information, identify the phylum A, B and C.

	A	B	C
(1)	Porifera	Chordata	Mollusca
(2)	Chordata	Echinodermata	Coelenterata
(3)	Platyhelminthes	Coelenterata	Echinodermata
(4)	Annelida	Arthropoda	Mollusca

(1) 1

(2) 2

(3) 3

(4) 4

89) Which type of cavity found in coelenterata ?

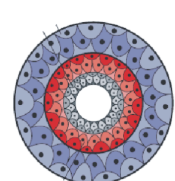
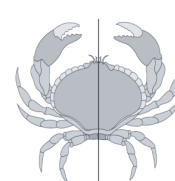
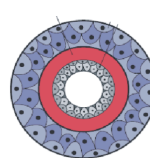
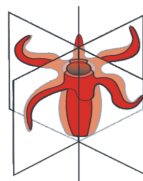
(1) Spongocoel cavity

(2) Gastro Vascular cavity

(3) Water Vascular cavity

(4) Haemocoel cavity

90) Following are two categories of symmetry and germ layer given below. Choose an appropriate



answer which belongs to the figures given :

(A)

(B)

	Category	Symmetry	Germ layer	Phylum
(1)	A	Radial	Diploblastic	Platyhelminthes
(2)	B	Bilateral	Triploblastic	Platyhelminthes
(3)	A	Bilateral	Diploblastic	Colenterata
(4)	B	Radial	Triploblastic	Annelida

(1) 1

(2) 2

(3) 3



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## ANSWER KEYS

### PHYSICS

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A.	4	2	2	1	3	3	2	2	3	2	3	3	1	1	2	4	3	4	4	1
Q.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A.	3	1	1	1	3	2	2	4	1	1	1	1	2	4	4	3	3	3	1	2
Q.	41	42	43	44	45															
A.	3	3	2	4	3															

### CHEMISTRY

Q.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
A.	2	3	3	3	3	1	2	2	2	1	1	1	3	4	2	4	3	1	3	4
Q.	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
A.	2	4	2	2	4	3	2	1	4	4	4	2	2	2	1	3	2	4	3	1
Q.	86	87	88	89	90															
A.	1	4	3	4	2															

### BIOLOGY

Q.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
A.	3	2	1	1	4	1	3	3	3	4	2	4	1	4	3	4	2	4	2	4
Q.	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
A.	3	3	4	3	2	2	2	3	4	3	4	4	1	4	3	2	3	3	2	2
Q.	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
A.	4	2	2	3	3	2	3	1	2	4	3	2	2	2	4	4	1	2	1	4
Q.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170
A.	1	4	4	2	4	4	4	3	2	3	1	3	4	4	1	2	4	4	1	1
Q.	171	172	173	174	175	176	177	178	179	180										
A.	2	4	4	4	1	3	3	3	2	2										

# SOLUTIONS

## PHYSICS

1)

Angular momentum is axial vector as it's direction is along axis of rotation.

2) Displacement = AB

Angle bwtween  $\vec{r}_1$  and  $\vec{r}_2$

$$\theta = 75^\circ - 15^\circ = 60^\circ$$

From figure

$$\begin{aligned} (AB)^2 &= r_1^2 + r_2^2 - 2r_1r_2 \cos \theta \\ &= 3^2 + 4^2 - 2 \times 3 \times 4 \times \cos 60^\circ = 13 \end{aligned}$$

$$3) \vec{A} + \vec{B} = \vec{C}$$

$$A^2 + B^2 = C^2$$

$$\Rightarrow \theta = 90^\circ$$

$$4) (X + Y)^2 + (X - Y)^2 + 2(X + Y)(X - Y) \cos \theta = X^2 + Y^2$$

$$(X^2 + Y^2) + 2(X^2 - Y^2) \cos \theta = 0$$

$$\Rightarrow \cos \theta = \frac{-(X^2 + Y^2)}{2(X^2 - Y^2)}$$

5)

$$\alpha = \beta = \gamma$$

$$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$$

$$\cos \alpha = \cos \beta = \cos \gamma = \frac{1}{\sqrt{3}}$$

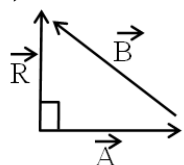
$$1 \cos \alpha \hat{i} + 1 \cos \beta \hat{j} + 1 \cos \gamma \hat{k} = \frac{1}{\sqrt{3}}$$

$$= \frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$$

6)

$$\begin{aligned} \text{Projection of } \vec{A} \text{ over } \vec{B} &= \frac{\vec{A} \cdot \vec{B}}{B} \\ &= \frac{A_x - A_y + A_z}{\sqrt{3}} \end{aligned}$$

$$7) t_{\max} = \frac{B \sin \theta}{A + B \cos \theta}$$



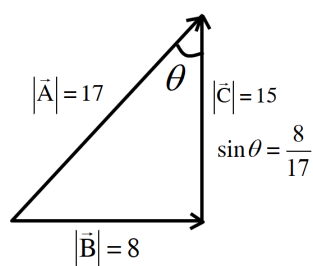
Now  $\alpha = 90^\circ$

$$\frac{1}{0} = \frac{B \sin \theta}{A + B \cos \theta}$$

$$A + B \cos \theta = 0$$

$$\cos \theta = -\frac{A}{B}$$

$$\Rightarrow \theta = \cos^{-1} \left( -\frac{A}{B} \right)$$



8)

$$9) \vec{A} \cdot \vec{B} = 1$$

$$A = \sqrt{2} \text{ \& } B = \sqrt{2}$$

$$\vec{A} \cdot \vec{B} = AB \cos \theta$$

$$\cos \theta = \frac{1}{2} \Rightarrow \theta = 60^\circ$$

$$10) a = \frac{6g - 4g}{6 + 4} = 2 \text{ m/s}^2$$

$$T = \frac{2m_1 m_2 g}{m_1 + m_2} = \frac{2 \times 6 \times 4 (10)}{(6 + 4)} = 48 \text{ N}$$

11) **Concept:**

Newton's Second Law and constraint relation in pulley systems; tension is same in the string.

**Formula:**

$$\frac{(m_2 - m_1 \sin \theta) g}{m_1 + m_2}$$

$$\text{Using } a =$$

**Calculation / Explanation:**

A. Mass on incline:  $m_1 = m$ , angle  $\theta = 30^\circ$

B. Hanging mass:  $m_2 = 2m$

C.  $\sin 30^\circ = 1/2$

$$a = \frac{\left(2m - m \cdot \frac{1}{2}\right)g}{m + 2m} = \frac{(2m - 0.5m)g}{3m} = \frac{1.5m \cdot g}{3m} = \frac{g}{2}$$

Now,

12) **Explain :** Two masses are connected by a string passing over pulleys. One mass is on a horizontal frictionless surface, and the other hangs vertically. find the tension in the string.

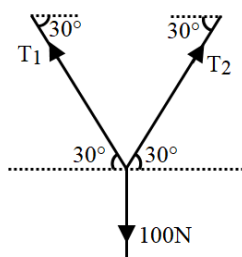
**Concept :** The tension in the string is equal to the force required to accelerate the horizontal mass and is also related to the weight of the hanging mass and its acceleration.

**Formula :** Newton's second law:  $F = ma$

**Calculation :** acceleration of the system  $a = \frac{2g}{4} = 5 \text{ m/s}^2$

$$T = m_1 a = (2 \text{ kg})(5 \text{ m/s}^2) = 10 \text{ N}$$

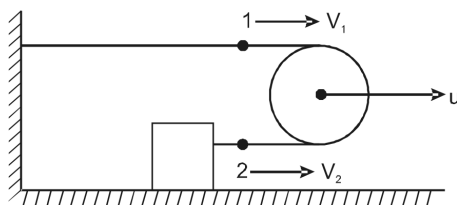
Ans (3)



13)

using lami's theorem

$$\frac{T_1}{\sin 120^\circ} = \frac{T_2}{\sin 120^\circ} = \frac{100}{\sin 120^\circ}$$



14)

Velocity of point 1 is  $V_1$  which is 0 because string is fixed.

Velocity of point 2 is  $V_2$

$$\frac{V_1 + V_2}{2} = u$$

$$\frac{0 + V_2}{2} = u$$

$$V_2 = 2u$$

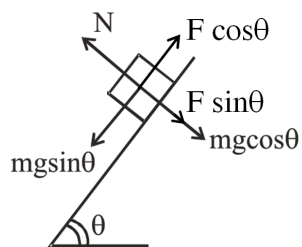
15)

$$\text{Impulse } I = \int_{t_1}^{t_2} F dt$$

$$I = \int_1^3 4t^3 dt$$

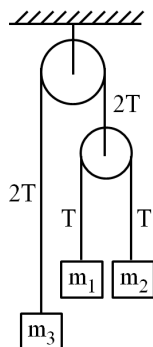
$$I = \left[ t^4 \right]_1^3$$

$$I = (3)^4 - (1)^4 = 80 \text{ N-S}$$



16)

$$N = mg \cos \theta + F \sin \theta$$



17)

$$T = \frac{2m_1 m_2 g}{m_1 + m_2}$$

for equilibrium of  $m_3$

$$m_3 g = 2T$$

$$m_3 g = \frac{2 \times 2m_1 m_2 g}{m_1 + m_2}$$

$$m_3 = \frac{4m_1 m_2}{m_1 + m_2}$$

18)

Impulse = Change in momentum

$$= 2 \left[ (2 \times 2\hat{i} - 4\hat{j}) - (2 \times 0\hat{i} - 4\hat{j}) \right]$$

$$= (8\hat{i}) \text{ kg-m/s}$$

19)

Impulse =  $\Delta p$

$$\Delta p_1 = 2mv$$

$$\Delta p_2 = 2mv \cos 60^\circ = mv$$

$$\frac{\Delta p_1}{\Delta p_2} = \frac{2}{1}$$

20)

$$a = \frac{nmv}{M} = \frac{10 \times 10 \times 10^{-3} \times 500}{2000}$$

$$= 25 \times 10^{-3} \text{ m/s}^2$$

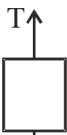
$$= 2.5 \text{ cm/s}^2$$


21) Initially particle was at rest. By the application of force its momentum increases.  
Final momentum of the particle Area of F - t graph  $\Rightarrow mu = \text{Area of semi - ellipse}$

$$\Rightarrow mu = \frac{\pi r^2}{2} = \frac{\pi r_1 r_2}{2} = \frac{\pi (F_0) (T/2)}{2}$$

$$\Rightarrow u = \frac{\pi F_0 T}{4m}$$

22)  $T - 6g = 0 \quad T = 6g$





$$T = 4g + T_1$$

$$T_1 = T - 4g$$

$$= 6g - 4g$$

$$= 2g = 20$$

23)

$$\cos 2\theta = 2 \cos^2 \theta - 1$$

24)  $\int_0^4 y dx = \text{Area under graph}$

$$25) \int \sin(ax + b) dx = -\frac{1}{a} \cos(ax + b) + c$$

26) at  $x = 0 \quad y = 6$

$$6 = 2 + ae^0$$

$$a = 4$$

27)

Graph will always be negative.

28)

Speed = |slope of x - t graph|

29)

$$\text{Distance} = \sqrt{(x-2)^2 + 5^2} = 5$$
$$x = 2$$

30)

Parabola opening downwards y is negative at x = 0

$$31) S_{\infty} = \frac{a}{1-r}$$

$$32) [1+x]^n \simeq 1+nx$$

$$33) \frac{S+20}{200} = \frac{C}{100}$$

$$34) \frac{\Delta C}{5} = \frac{\Delta F}{9}$$

$$\frac{30}{5} \times 9 = \Delta F$$

$$\Delta F = 54^{\circ}$$

35)

### Question Explanation :

A uniform rod is heated. We need to determine which of its properties will increase as a result of this heating.

### B. Given Data :

A. A uniform rod is heated.

### C. Concept :

A. **Thermal Expansion** : When a substance is heated, its particles gain kinetic energy and move further apart. This causes an increase in the object's dimensions, a phenomenon known as thermal expansion.

B. **Moment of Inertia** : The moment of inertia of a rotating object is a measure of its resistance to rotational motion. It depends on the object's mass distribution and the axis



of rotation. For a rod rotating about an axis perpendicular to its length, the moment of inertia is directly proportional to the square of its length.

#### D. Calculation :

##### A. Effect of Heating on Length :

A. When the rod is heated, it undergoes thermal expansion, leading to an increase in its length.

##### B. Effect of Length Increase on Moment of Inertia :

Since the moment of inertia of the rod is proportional to the square of its length, an increase in length will result in an increase in its moment of inertia.

**E. Final Answer :** The property of the uniform rod that will increase when it is heated is its **moment of inertia**. Option 4

36)

Photography enlargement

$$37) \frac{\Delta A}{A} = \frac{2\Delta L}{L} = 6\%$$

$$38) \Delta l = \Delta l_1 + \Delta l_2$$

$$3L\alpha_{av} \Delta T = L \alpha \Delta T + 2L (2\alpha) \Delta T$$

$$\Rightarrow \alpha_{av} = \frac{5}{3}\alpha$$

$$39) \frac{\Delta V}{V} \times 100 = \gamma \Delta T \times 100$$

$$0.15 = \gamma \times 24 \times 100$$

$$\gamma = \frac{0.15}{24 \times 100} = \frac{15}{24} \times 10^{-4}$$

$$= \frac{5}{8} \times 10^{-4}$$

40)

$$H = ms = (\delta v) s$$

$$\square H \propto \text{volume}$$

41)

$$\theta = m S \Delta T$$

$$\frac{1260}{4.2} = 10 \times 1 \times \Delta T$$

$$42) \frac{1}{2} \left( \frac{1}{2} m v^2 \right) = m_i L_f$$

where  $m = 10 \text{ g} = 10 \times 10^{-3} \text{ kg}$

$m_i$  will be in gm,  $L_f = 336 \text{ J/g}$

$$m_i = \frac{1}{4} \times \frac{10 \times 10^{-3} \times (20)^2}{336} = 0.003 \text{ g}$$

43) Resultant temperature

$$\theta = \frac{m_1 S_1 \theta_1 + m_2 S_2 \theta_2}{m_1 S_1 + m_2 S_2}$$

here  $m_1 = m_2 = 10 \text{ kg}$

(Since mass of 1 litre of water is 1 kg)

$\theta_1 = 70^\circ\text{C}$  ;  $\theta_2 = 20^\circ\text{C}$

and  $S_1 = S_2 = 4200 \text{ J/kg-K}$

$$\theta = \frac{10 \times 4200 \times 70 + 10 \times 4200 \times 20}{10 \times 4200 + 10 \times 4200}$$

$$\theta = 45^\circ\text{C}$$

44) Heat gain = Heat loss

$$\frac{m}{2} (2C) (T_f - T) = mC (2T - T_f)$$

$$T_f = \frac{3T}{2}$$

45)

Heat loss by water =  $10 \times 1 \times 50 = 500 \text{ cal}$

Heat required by ice to melt at  $0^\circ\text{C}$

$$= 10 \times 20 \times \frac{1}{2} + 10 \times 80 = 900 \text{ Cal}$$

$H_{\text{ice}} > H_{\text{water}}$

$$\therefore T = 0^\circ\text{C}$$

## CHEMISTRY

46)

4, 12, 38, 88

4 → Beryllium (Group 2)

12 → Magnesium (Group 2)

38 → Strontium (Group 2)

88 → Radium (Group 2)

47)

126 → Element with atomic number 126 has not been discovered yet and exceeds the currently known periodic table. It is part of hypothetical superheavy elements or island of stability theories. Not accommodated in current periodic table.

48)

The configuration that clearly belongs to a different block is:

Option (3)  $[\text{Ar}] 3d^{10} 4s^2 4p^6 5s^1 \rightarrow s\text{-block}$

(All others are in d-block elements )

49)

Ga, Hg, Br

These are the common elements that can be liquid.

50)

Th ( $Z = 90$ ) Thorium does not follow  $(n + l)$  rule.

51)

33 → Arsenic (As)

Electron Configuration:  $[\text{Ar}] 3d^{10} 4s^2 4p^3$

$4p^3 \rightarrow 3$  unpaired electrons (Hund's rule: each p orbital gets 1 electron before pairing).

52)

Atomic no. of A, B, C, D are 75, 43, 76, 107 respectively

53)

18, 16, 6

54)

Ionization energy per atom =  $2E^{1/3}N_A$

55)

MnO

(Mn has maximum radius here, in +2 oxidation state.)

56)

P → (Element P represents a noble gas.)

57)

order of IE1 is  $N > O$  while order of IE2 is  $N < O$

58)

at vi position N is present is a wrong statement ...

59)

Size of Y < size of La is not related by lanthanoid contraction

60)

correct order of radius is  $O < C < S < Se$

61)

correct order of IE2 is  $O > F > N > C$

62)

radius of K will be larger than 1.34 Å while radius of Cl will be smaller than 1.34 Å

63)

order of vanderwall radius will be  $N > O > F > Ne$

64)

since there is a large difference between IE7 and IE8 of element so there will be 7 electrons in valence shell.

65)

correct option is 4 ..apply  $z_{eff}$  and no of shells factors

66)

correct order of radius is  $F^- < Cl^- < Br^- < H^-$

67)

an large difference is between IE2 and IE3 of given element so no of valence e is 2 and most stable oxidation state is +2

68)

element having atomic no 110 is Darmstadtium

69)

total energy required to convert Mg into  $Mg^{+2}$  is sum of IE1 and IE2

70)

radius of F is smaller than Cl and radius of Br is smaller than I

71)

correct electronic configuration of Gd is given in option 3

72)

Both (A) and (R) are true and (R) is not the correct explanation of (A)

73)

Both (A) and (R) are true and (R) is the correct explanation of (A)

74)

Both Statement I and Statement II are incorrect

75)

IV and III

76) **Explaining** : Order of the reaction determined by the Given rate.

**Concept** : This Question is based on Rate law.

**Solution** : Order wrt P is 1 and Order wrt Q and R is 0.5

Total order of reaction =  $1 + 0.5 + 0.5 = 2$

**Final Answer** : (4)

$$77) \pm \frac{\Delta c}{\Delta t} = \pm \frac{\Delta P}{\Delta t} \times \frac{1}{RT}$$

$$78) \frac{1}{2} \times (\text{ROD})_{\text{MnO}_2} = \frac{1}{5} \times (\text{ROD})_{\text{NO}_2^-}$$

$$(\text{ROD})_{\text{NO}_2^-} = \frac{5}{2} \times (\text{ROD})_{\text{MnO}_4^-}$$

$$= \frac{5}{2} \times 0.024 = 5 \times 0.012$$

$$= 0.06 \text{ ms}^{-1} = 6 \times 10^{-2} \text{ ms}^{-1}$$

79)

NCERT Pg.No.99

80)

$$\text{ROR} = - \frac{\Delta \text{S}_2\text{O}_8^{2-}}{\Delta t} = - \frac{\Delta \Gamma^-}{\Delta t} \times \frac{1}{3}$$

81)

A + 2B → P-elementary reaction

$$r = - \frac{d[A]}{dt} = - \frac{1}{2} \frac{d[B]}{dt} = k[A][B]^2$$

82)

Concept :- rate expression in terms of ROD & ROA.

Solution :-  $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$

$$r = \frac{1}{2} \left( - \frac{d[\text{SO}_2]}{dt} \right) = \frac{1}{2} \left( + \frac{d[\text{SO}_3]}{dt} \right)$$

$$\left( - \frac{d[\text{SO}_2]}{dt} \right) = \frac{1}{2} \times 2 \times \frac{0.8}{80} \times 64 = 0.64 \text{ g/min}$$

Answer :- 2

83)

Unit of x for I<sup>st</sup> order reaction is time<sup>-1</sup>

84) NCERT (4.4)

$$r = \frac{\Delta P}{\Delta T} = \frac{\text{bar}}{\text{min}} = \text{bar min}^{-1}$$

$$r = K [\text{PCH}_3\text{OCH}_3]^{3/2}$$

$$\text{bar min}^{-1} = K(\text{bar})^{3/2}$$

$$K = \text{bar}^{-1/2} \text{ min}^{-1}$$

85)

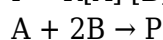
$$\text{order} = \frac{3}{2} - \frac{1}{2} = 1$$

86)

$$r = k[A][B]^2$$

87)

$$r = K[A][B]^2$$



$$0.1 \quad 0.2 \rightarrow 0$$

$$(0.1 - x) \quad (0.2 - 2x) \rightarrow x$$

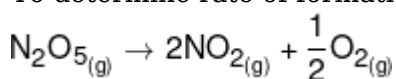
$$0.05 \quad 0.1 \rightarrow 0.05$$

$$r = 2 \times 10^{-6} \times 0.05 \times (0.1)^2$$

$$r = 10^{-9} \text{ Ms}^{-1}$$

88) **Question Explanation :**

To determine rate of formation of  $\text{NO}_2$  and  $\text{O}_2$  in given reaction



**Given Data :**

Rate of disappearance of  $\text{N}_2\text{O}_5$

$$= 6.25 \times 10^{-3} \text{ mol l}^{-1}\text{s}^{-1}$$

**Concept :**

$$\text{rate} = -\frac{d}{dt}[\text{N}_2\text{O}_5] = \frac{1}{2}\frac{d}{dt}[\text{NO}_2] = 2 \cdot \frac{d}{dt}[\text{O}_2]$$

89)

$$r = K[\text{NO}]^2[\text{O}_2]$$

$$\therefore K = \frac{0.028}{(0.01)^2 (0.04)} = 7 \times 10^3 \text{ L}^2\text{mol}^{-2}\text{s}^{-1}$$

$$90) \quad -\frac{1}{x} \frac{d(A)}{dt} = +\frac{1}{y} \frac{d(B)}{dt}$$

$$-\frac{d(A)}{dt} = \left(\frac{x}{y}\right) \frac{d(B)}{dt}$$

$$\log \left( \frac{-d(A)}{dt} \right) = \log \frac{x}{y} + \log \frac{d(B)}{dt} \quad \dots(i)$$

$$\text{So } \log \frac{x}{y} = \log 2 \Rightarrow \frac{x}{y} = 2$$

## BIOLOGY

91) NCERT Pg. # 4

92) NCERT-XI, Pg # 4

93)

NCERT XI Page No. # 22

94) NCERT-XI, Pg # 8

95) NCERT-XI, Pg.# 4, 5

96)

NCERT XI Pg. # 8

97) NCERT XI Pg.# 11

98) NCERT (XI) Pg. # 90, 91

99) NCERT (XI) Pg. # 91

100) NCERT XI pg.# 91

101)

NCERT XI Page No. # 21

102) NCERT-XI<sup>th</sup> Pg # 14, Fig. 2.3

103) NCERT-XI, Pg. # 14

104)

NCERT-XI Pg#13

105) NCERT XI Pg.# 14



106) NCERT XI ; Page No. # 13 (2.1.1)

107)

NCERT (XI) ; Page. # 12,13

108) NCERT Pg. # 17, 18

109) 5 members are of monera  
(*Rhizobium*, *Frankia*, *Nostoc*, *PPL*O, *Anabaena*)

110) NCERT Pg. # 13

111)

Module Page No. # 29, 32

112)

NCERT-XI, Pg. # 13, 14

113) NCERT XI Page No. # 11, 13

114) NCERT XI, Pg. # 90, 91

115)

NCERT XI, Page No. # 4,5

116)

NCERT-XI, Pg. # 20, 21

Peptidoglycan wall, Nitrogen fixation ability, multicellular, heterocyst, tissue.

117)

NCERT XI Page No. # 14

118) NCERT, Pg. # 15

119)

NCERT XI Page # 15

120)

NCERT XI Page No. # 14

121)

NCERT XI<sup>th</sup> Pg. # 15

122)

NCERT XI Page No. # 15

123) NCERT-XI, Pg. # 12,16

124) NCERT (XI) Pg # 16

125) All mushrooms, including edible ones like Agaricus, belong to the Kingdom Fungi.

126)

NCERT Pg # 17

127)

NCERT Pg # 17

128)

NCERT (XI) Pg. # 18

129) NCERT XI Page No. # 17, 18

130)

NCERT Pg # 18

131) NCERT-XI Pg. # 18

132) NCERT (XI) (E & H) Pg. # 17, 18

133) NCERT (XI) Pg # 20, 21

134)

NCERT-XI, Pg. # 21

135)

NCERT XI Page No. # 21

136) Pg. No. 51 NCERT 2022 - 2023 Edition

137) NCERT (XI) Pg# 56 Para: 4.2.11.2

138)

NCERT (XI) Pg. # 50

139)

NCERT (XI) Pg. # 49

140) **Explaining the Question:**

Which of the following is exclusively marine.

**Concept:** Marine

**Solution:**

- A. Sea walnut - Ctenuchids - Exclusively Marine
- B. Ascidia - Urochordate - Marine
- C. Amphioxus - Cephalocarids - Marine

**Final Answer:**

Option (4) All above

141) New NCERT - XI, Pg. # 47

**(A) Mouth is located ventrally:**

● **True.** Chondrichthyes, like sharks and rays, have their mouths positioned on the underside of their bodies (ventrally).

**(B) Notochord is absent throughout the life:**

● **False.** Chondrichthyes do possess a notochord, which is a flexible rod-shaped structure that provides support. While it is replaced by cartilage in most vertebrates, it remains present in Chondrichthyes.

**(C) Gill slits are absent:**

● **False.** Chondrichthyes are characterized by the presence of gill slits, which are openings on the sides of their head used for respiration.

**(D) Cycloid scale is absent:**

● **True.** Cycloid scales are a type of fish scale found in bony fishes (Osteichthyes) and not in Chondrichthyes. Chondrichthyes have placoid scales, which are small, tooth-like structures.

Therefore, out of the four statements, only **two are correct for Chondrichthyes**: (A) Mouth is located ventrally and (D) Cycloid scale is absent.

So, the answer to the question "How many of the above statements are correct for Chondrichthyes?" is

**Option 3: Two**

142) NCERT Pg. # 50

143) NCERT Pg. # 42

144)

NCERT Pg. # 46

145) NCERT Pg. # 42

146)

New NCERT - XI, Pg. # 49

147)

NCERT Pg. # 48,49,50

148)

The correct answer is Option 2.

- **Genus Name:** Frog

- **Two Characters:**

A. **(a) A tympanum represents ear:** Frogs have a tympanum, which is an external eardrum.

B. **(b) Fertilization is external:** Most frogs exhibit external fertilization, where the female releases eggs into the water, and the male fertilizes them externally.

- **Class/Phylum: Amphibia:** Frogs belong to the class Amphibia.

149) NCERT XIth Pg.#46, Last Para

150)

Pg. No. 47, 48 NCERT 2022 - 2023 Edition

151) Pg. No. 46, 47 NCERT 2022 - 2023 Edition

152)

153) NCERT (XI) Pg# 54 Para 4.2.10

154) The correct answer is **2. Leech, Tapeworm, Earthworm.**

• **Monoecious** organisms have both male and female reproductive organs in the same individual. This means they can produce both sperm and eggs.

155) Salamanders, being amphibians just like newts, also typically have 10 pairs of cranial nerves. Therefore, the number of cranial nerves in a salamander is 10 pairs OR 20 IN NUMBER .

156) NCERT-XI, Pg. # 54

157) NCERT-XI, Pg. # 44

158) NCERT-XI, Pg. # 58

159) NCERT Pg.#41 Figure-4.6

160) **Explanation:**

Phylum Aschelminthes (Nematoda) exhibits a pseudocoelom, meaning:

A. The mesoderm does not completely line the body cavity instead scattered in form of pouches.

**Correct Answer:** Option (3) Pseudocoelom

161) XI NCERT Pg. No :- 50, 54

162) NCERT Pg. # 45

163) NCERT Pg. # 45

164) NCERT Pg. # 43, 45

165) NCERT-XII, Pg # 42

166) NCERT, Pg # 49

167) NCERT, Pg # 49

168) NCERT, Pg # 49

169) NCERT, Pg # 45

170) NCERT Pg. # 40

171) NCERT Pg. # 44

172) NCERT, Pg # 46-48

173) NCERT Pg. # 41, 42

174) NCERT Pg. # 57

175) NCERT-XII Pg. # 57

176)

Pg. No. 55 NCERT 2022 - 2023 Edition

177) NCERT Pg. # 47

178) NCERT Pg. # 38

179)

Module-5 Page No. # 50

180) NCERT XI Page No. 38