Multiple Choice Questions

Time : 3 hrs Marks : 30

Examination Rules :

1. All competitors must be present at examination room ten minutes before the examination starts.
2. You are not allowed to bring any tools except personal medicine or approved personal medical equipment.
3. You have to sit at your designated desk.
4. Before the examination starts, you must check the stationary and any tools (pen, ruler, calculator) provided by the organizers.
5. You have to check the question and answer sheets provided. Raise your hand, if you find any missing sheets. Start tasks after the start whistle is blown.
6. During the examination, you are not allowed to leave the examination room except in an emergency and then you will be accompanied by a supervisor/volunteer/invigilator.
7. You are not to disturb other competitors. If you need any assistance you may raise your hand and wait for a supervisor to come to assist.
8. There will be no discussion about the examination tasks or problems. You must stay at your desk until the examination is over, even if you have finished the examination you do not want to continue working.
9. At the end of the examination time you will hear a whistle blow. You are not to write anything on the answer sheet after the stop whistle. You must leave the room quietly when asked to do so. The question and answer sheets must be left neatly on your desk.

Multiple Choice Questions

Time : 3 hrs Marks : 30

Read the following instructions carefully:

A. The time available is 3 hours.

B. The total number of the questions is 30. Check that you have a complete set of the test questions and the answer sheet.

C. Use only the pen provided.

D. Write down your name, code, country and signature in your answer sheet.

E. Read carefully each problem and choose your correct answer by crossing one of the capital letters in your answer sheet. There is only one right answer for each problem.

Example:

1	~~A~~	B	C	D

F. If you want to change your answer, you have to circle the first answer and then cross a new letter as your correct answer. You are only allowed to make one correction.

Example:

1	(A)	B	C	~~D~~

A is the first answer and D is the corrected answer

Time : 3 hrs Marks : 30

Multiple Choice Questions

G. All competitors are not allowed to bring any stationary and tools provided from outside. After completing your answers, all of the question and answer sheets should be put neatly on your desk.

H. Grading rules**:**

i. Correct answer : + 1.00 point

ii. Wrong answer : : - 0.25 point

iii. No answer : 0 point

Multiple Choice Questions

Time : 3 hrs Marks : 30

1. Which of the following is the largest number:

A) Number of air molecules in a 3m x 3m x 3m classroom.

B) Number of water molecules in a one-litre bottle.

C) Number of breaths you have taken since your birth.

D) Age of the universe in seconds.

Answer A

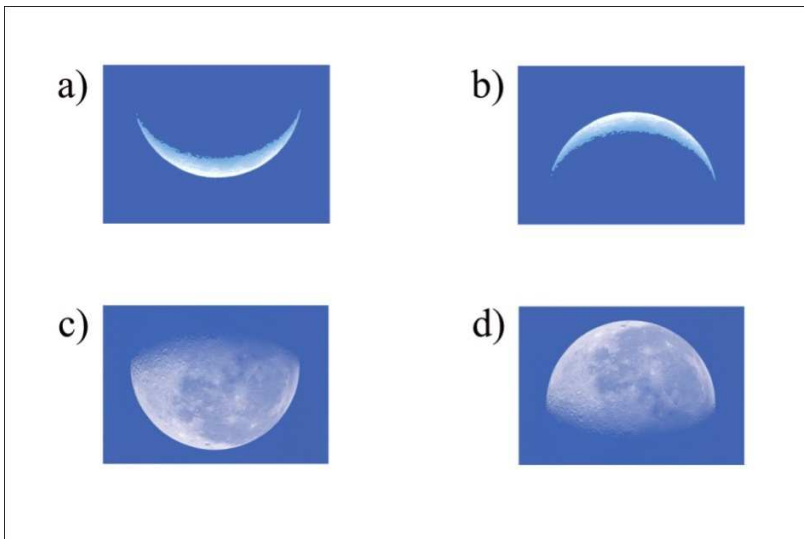
Solution : a: 27m3 / 22.4 lt = 10^3 moles = 10^26 molecules

b: 1000/18 = 50 moles = 10^25 atoms

c: 5 seconds for 1 breath => 10^8 breaths

d: 14 billion years => 10^17 seconds

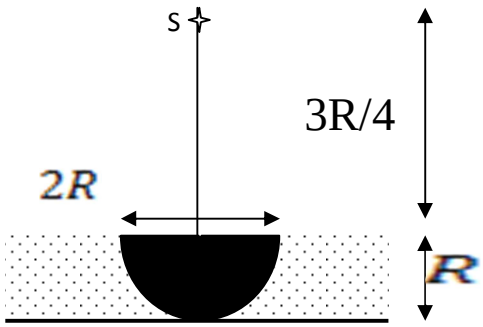
2. The Moon was observed near the eastern horizon just before sunrise. The shape of the moon would have been closest to:



Answer : A

Solution: The sun is just below the horizon. The Moon is just above the horizon. This implies crescent moon. Since the illumination is from below, answer is A.

3. An opaque hemisphere of radius R lies on a horizontal plane as shown in the figure below.



On the perpendicular through the point of contact, a point source of light is placed at a distance $\frac{3}{4}R$ above the centre of the hemisphere. A transparent liquid of refractive index $\frac{4}{3}$ is filled above the plane such that the hemisphere is just covered with the liquid.

The area of the shadow on the horizontal plane is

A) $\frac{49}{9}\pi R^2$

B) $\frac{49}{16}\pi R^2$

C) πR^2

D) $4\pi R^2$

Answer: B

Solution :

$$\mu = \frac{\sin i}{\sin r}$$

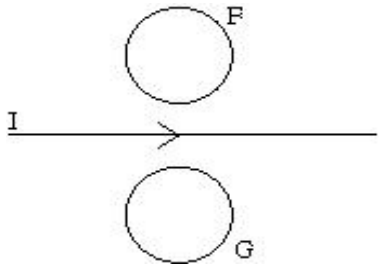
$$\sin r = \frac{\sin i}{\mu} = \frac{R/\sqrt{1+(3/4)^2}R}{\frac{4}{3}} = \frac{3}{5},$$

$$\cot r = \frac{4}{3} = \frac{R}{R' - R}$$

$$R' = \frac{7}{4}R$$

Area of shadow = $\frac{49}{16}\pi R^2$

4. Two circular loops A and B are kept in a plane on either side of a straight current-carrying wire at a distance R from the wire, as shown in the figure below.



If the current in the wire decreases in magnitude, the induced current in the loops will be

A) clockwise in F and clockwise in G
B) anti-clockwise in F and clockwise in G
C) clockwise in F and anti-clockwise in G
D) anti-clockwise in F and anti-clockwise in G

Solution: The magnetic field above the wire is out of the plane. This flux is decreasing and should be compensated by the current in the loop F and so the current in loop F will be anti- clockwise. For loop G the situation is opposite
Level : 2.5

5. The equation of state for one mole of a *real* gas is given, in terms of pressure p, volume V and absolute temperature T, by van der Waals' equation

$$\left(p + \frac{a}{V^2}\right)(V - b) = RT$$

where a has the value **α** in kg m^5 s^{-2} mol^{-2}, b has the value **β** in m^3 mol^{-1}, and R = 8.31 J K^{-1} mol^{-1} is the universal gas constant. If the gas is kept in a container with rigid walls, whose volume is 1 m^3, the minimum temperature T (in K) that the gas can be cooled to is

A) α (1- β) / 8.31

B) (1- β) / 8.31

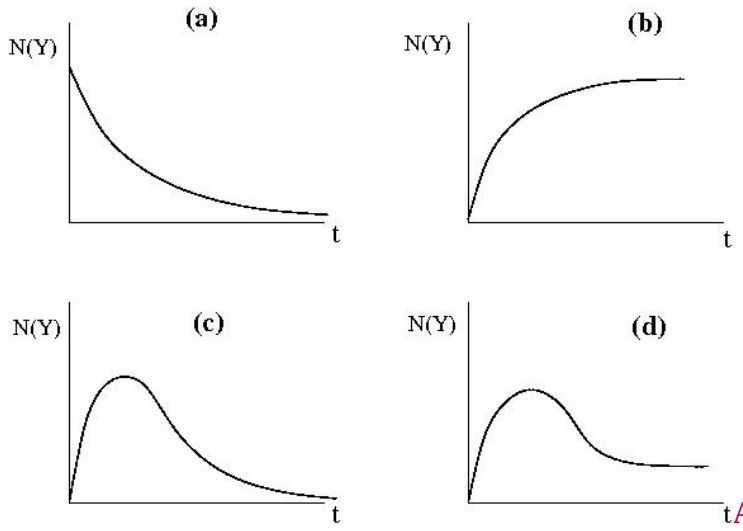
C) α / 8.31

D) Zero

Solution : (a) corresponds to p = 0. Then solve for T and put V = 1, a = α, b = β

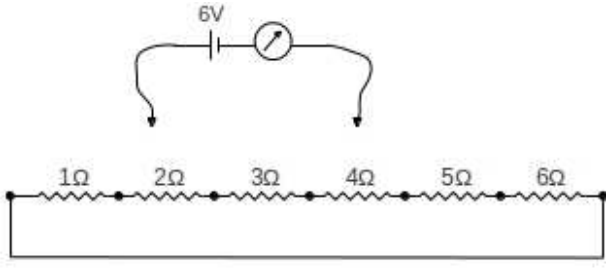
Multiple Choice Questions

6. An element is called radioactive if its atoms decay to another element at a rate proportional to the number of atoms of the first element. Consider that a radioactive element X decays to another radioactive element Y, which further decays to a stable (non-radioactive) element Z. If you start with a pure sample of element X, the plot of number of atoms of Y as a function of time will look like



Answer : C

7. Consider six resistances connected in series with the extreme ends shorted as shown in the figure below. A circuit element consisting of a 6 V battery and an ammeter can be connected across any two of the different points marked by dots in the resistance network to enable you to measure the current. What would be the *minimum* value of the current that you measure?



A) 0.29 A
B) 1.15 A
C) 1.17 A
D) 1.41 A

Answer B

8. Playing with a lens one morning, Rita discovers that if she holds the lens 0.120 m away from a wall opposite to a window, she can see a sharp but upside-down picture of the outside world on the wall. That evening she covers a lighted lamp with a piece of card on which she has pierced a small hole, 0.005 m in diameter. By placing the lens between the illuminated card and the wall, she manages to produce a sharp image of diameter 0.020 m on the wall. What is the distance between the card and the wall?

A) 0.450 m

B) 0.750 m

C) 0.600 m

D) 0.300 m

Solution :
We assume the sign convention where distance measured in the direction of light propagation are positive, and in opposite direction, negative.
For the morning experiment, since the image of the outside world (object distance $u \approx$ inf) is real, sharp and inverted, the lens must be converging one, and the image distance (v) is equal to the focal length (f) of the lens. Thus $f = 0.120$m. for the evening experiment, the hole in the card serves as the object of size 0.005m. The image size on the wall is 0.020m.

- Distance between the lens and the card $u = -uc$ $(uc > 0)$
- Distance between the lens and the wall $v = +vc$ $(vc > 0)$

- Distance between the lens and wall (question) $d = uc + vc$
- Magnification = $\frac{vc}{-uc}$ = 0.020 / -0.005 = -4 (real images by converging lenses always have negative magnification, i., inverted image).

Thus, applying the lens formula

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{vc} + \frac{1}{uc} = \frac{1}{f}$$

$$\frac{1}{4uc} + \frac{1}{uc} = \frac{1}{f}$$

$$\frac{5}{4uc} = \frac{1}{f}$$

$$uc = 5f / 4 = 5 \text{ x } 0.120\text{m}/4 = 0.150\text{m}$$

$$vc = 4\,uc - 4 \text{ x } 0.150\text{m} = 0.600\text{m}$$

Therefore, the distance between the lens and the wall is

$$d = uc + vc = (0.15\ 0 + 0.600)\text{m} = \mathbf{0.750m}$$

9. Equal amounts of ice at 0 C are placed in three containers P, Q and R, and kept at constant temperature. Identical heating elements are placed inside each container. These heating elements are powered with different voltages: 100 V, 200 V and 300 V in containers P, Q and R, respectively. It was found that it took 20 minutes to melt all the ice in container Q, and it took 4 minutes to melt all the ice in container R. Assume that, at any instant, heat is uniformly dissipated in each container throughout its volume. Which of the following is correct?

A) It will take (approximately) 80 min to melt all the ice in container P.

B) It will take (approximately) 100 min to melt all the ice in container P.

C) It will take (approximately) 132 min to melt all the ice in container P.

D) It will not be possible to melt all the ice in container P with the given power source.

Solution:

$V_1 = 300$ V $\quad t_1 = 5$ min
$V_2 = 200$ V $\quad t_2 = 20$ min
$V_3 = 100$ V $\quad t_3 =$ ¿ ?

Rate of heat supplied by heating container = $\frac{V^2}{R}$

For first and second container (resistance R is same)

$$\frac{t_1}{t_2} = \frac{1}{4} \neq \frac{V_1^2}{V_2^2} = \frac{4}{9}$$

Second container should take 2.25 times that of container one but it is taking four times that of container one. There is some heat loss (P_{loss}) to the environment which is at lower temperature than ice temperature (0^0 C).

Same amount of heat is being melt in both containers, that means amount of heat supplied is same.

$$\left(\frac{V_1^2}{R} - P_{loss}\right)_1 = \left(\frac{V_2^2}{R} - P_{loss}\right)_2$$

which gives $P_{loss} R = \frac{5}{3} \times 10^4 = V_{loss}^2 > V_3^2 = 10^4$.

Container will loose all heat given by 100 V power supply and ice will cool down instead of melting.

Additional:

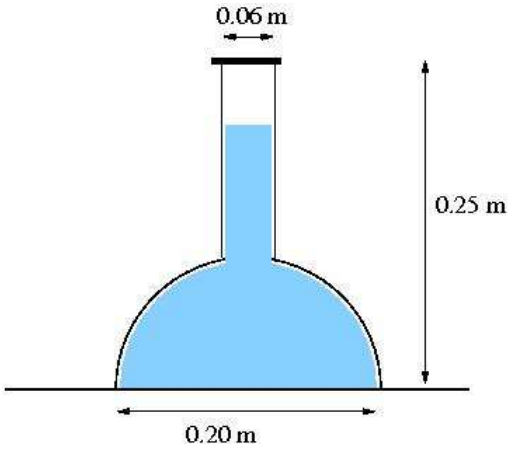
Say outside temp is T_0 and final temperature of ice is T_f .

$$k(0 - T_0) = 10^4 \times \frac{5}{3}$$

$$k(T_f - T_0) = 10^4 \times 1$$

which gives $T_f = \frac{2}{3} T_0$

10. The figure below shows the cross-section of a glass flask whose hemispherical base is of diameter 0.20 m. The diameter of the cylindrical neck of the flask is 0.06 m. When 2.5 litres (1 litre = 10^{-3} m^3) of water is poured into the flask, the level of water is 0.25 m above the bottom.



What is the approximate magnitude of the total vertical force exerted by the water on the curved surface of the flask? (Take the acceleration due to gravity, *g*, to be 10 ms^{-2}).

a) 0 N
b) 78.5 N
c) **53.5 N**
d) 25.0 N

Multiple Choice Questions

11. You have an element with 7 electrons. These electrons were arranged in 1s, 2s and 2p orbitals in four different ways, as shown below.

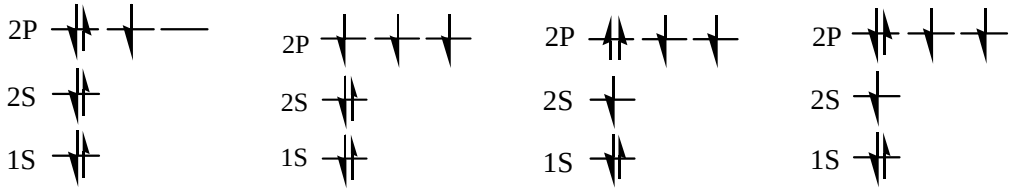


Fig 1 Fig 2 Fig 3 Fig 4

Choose the *incorrect* statement from the following.

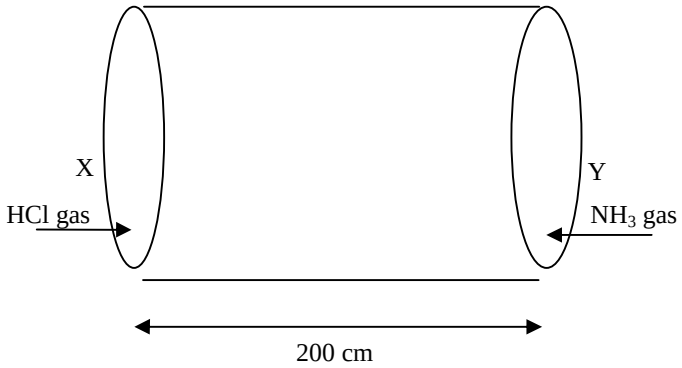
A) Fig 1 violates the Aufbau principle and Hund's rule.

B) Fig 2 violates Pauli's exclusion principle and Hund's rule.

C) Fig 3 violates Pauli's exclusion principle and the Aufbau principle.

D) Fig 4 violates the Aufbau principle, Pauli's exclusion principle, and Hund's Rule.

12. A glass cylinder of length 200 cm has two inlets, X and Y, centered at its two ends. HCl gas is allowed to flow into the cylinder through inlet X and, at the same time, NH_3 gas through inlet Y.



White fumes first appear at a point P along the long axis of the cylinder. The distance of point P from X is

A) 100 cm

B) 118.9 cm

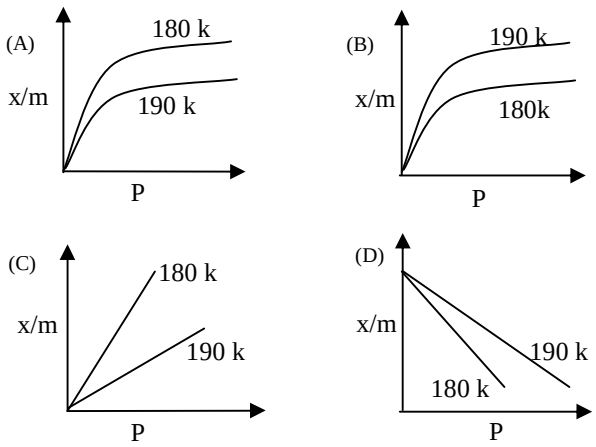
C) 81.1 cm

D) 162.2 cm

Solution : Grahams law of diffusion

$$\frac{r_{HCl}}{r_{NH_3}} = \frac{\sqrt{m_{HCl}}}{\sqrt{m_{NH_3}}} or \frac{a}{200-a} = \frac{\sqrt{17}}{\sqrt{36.5}} = 81.12cm$$

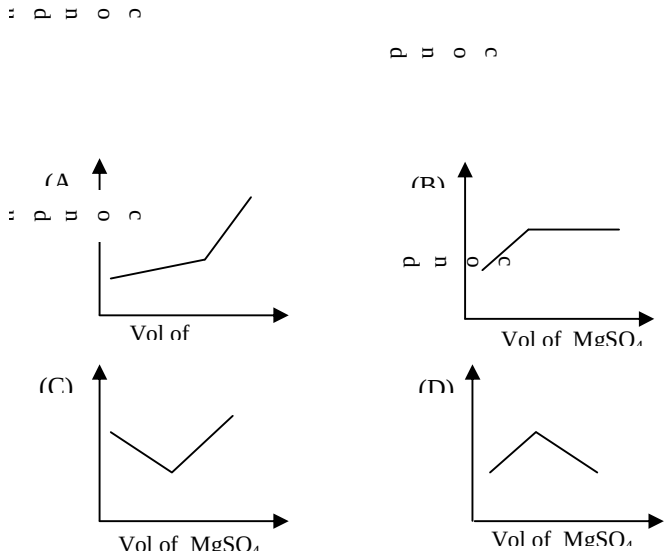
13. The physical adsorption of 'x' g of Neon gas on mass 'm' g of activated charcoal adsorbent at pressure 'p' is correctly represented by



Ans A

Frendlich isotherms: (lower the temp higher is the adsorption)

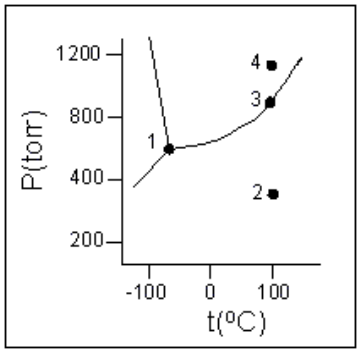
14. During the conductometric titration of $Ba(OH)_2$ against $MgSO_4$, the correct variation of conductance of the reaction mixture with titration volume is represented by



Answer : C

Solution : The conductivity that is measured in an electrolyte solution depends on the type and concentration of the ions. As long as the reaction is taking its course the conductivity drops, when the standard solution is in surplus the conductivity rises again

15. The phase diagram (Pressure against Temperature) for compound Y is given below.



Consider the following statements for compound Y:

(i) at point 4, Y(gas) will spontaneously convert to Y(liquid).

(ii) at point 1, Y(solid) will spontaneously convert to Y(gas) and no Y(liquid) is possible.

(iii) at point 3, Y(liquid) will start boiling to Y(gas).

(iv) at point 2, Y(liquid)) is in equilibrium with Y(gas).

Which of the following is correct for compound Y?

A) Statements (ii) and (iv) are correct

B) Statements (i) and (ii) are correct

C) Statements (iii) and (iv) are correct

D) Statements (i) and (iii) are correct

Correct answer (D)

16. In the pharmaceutical industry, an assay of aspirin involves the following reaction

$$5Br^{-}(aq) + BrO_3^{-}(aq) + 6H^{+}(aq) \rightarrow 3Br_2(aq) + 3H_2O(liquid)$$

In one such trial it was found that the rate of formation of Br_2 at a particular instant was 0.25 moles/s. This indicates that the rate of disappearance of Br^{-} (in moles/s) will be

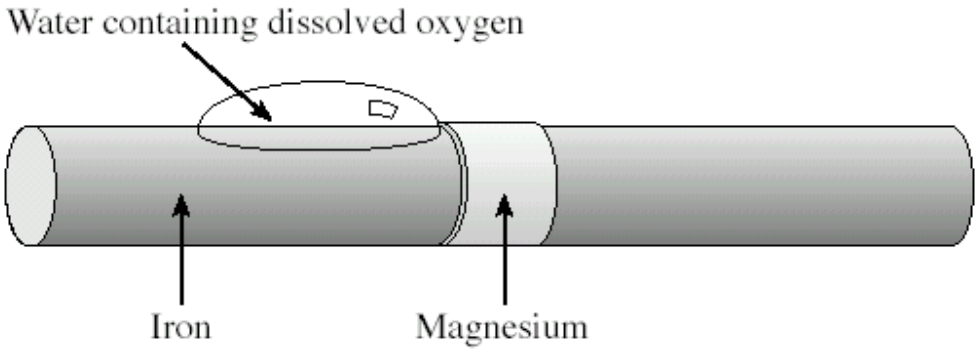
A) 0.050

B) 0.0416

C) 0.125

D) 0.0830

17. Corrosion of iron pipes occurs in the presence of water, as shown in the figure below. To prevent corrosion such iron pipes are normally coated with an element like magnesium using electrochemical methods.



How does this process work?

A. Iron acts as the anode and water is oxidized.

B. Iron acts as the cathode and oxygen is reduced.

C. Magnesium acts as the anode and iron is oxidized.

D. Magnesium acts as the cathode and iron is reduced.

18. Acid and base react in water (H_2O) as indicated below.

$HCl \rightarrow H^+ + Cl^-$; $NaOH \rightarrow Na^+ + OH^-$; and
$H^+ + OH^- \rightarrow H_2O$ is a neutralization reaction.

If liquid NH_3 was to be used as solvent, the role of NH_4Cl and KNH_2 would be best described as:

I) NH_4Cl acts as an acid and KNH_2 acts as a base.
II) NH_4Cl acts as a base and KNH_2 acts as an acid.
III) The reaction of NH_4^+ and NH_2^- will be a neutralization reaction.
IV) The reaction of K^+ and Cl^- will be as neutralization reaction.

A) I and III are correct

B) II and III are correct

C) I and IV are correct

D) II and IV are correct

19. The solubility product of $PbBr_2$ is $K_{sp} = 6.3 \times 10^{-6}$. If 50 ml of 0.02M $Pb(NO_3)_2$ are mixed with 50 ml of 0.01M $CaBr_2$, then

(A) $PbBr_2$ will precipitate and excess Br_2^- will remain in solution.
(B) $Ca(NO_3)_2$ will precipitate.
(C) $PbBr_2$ will precipitate and excess Pb^{2+} will remain in solution.
(D) no precipitate will form.

Solution:

Correct answer: (D)

$[Pb^{+2}] = 1 \times 10^{-3}$

$[Br^-] = 5 \times 10^{-4}$

Ionic product = $[Pb^{+2}] [2Br^-]^2$

Ionic product = $[1 \times 10^{-3}] [2x5 \times 10^{-4}]^2$

10^{-3+2-8}

10^{-9} As K_{sp} > ionic product, **no precipitate will form.**

20. Consider the three compounds NH_3, PH_3 and AsH_3. All of the statements below are correct **except:**

A) each of the 3 molecules has a pair of unshared valence electrons.

B) each of the molecules is polar.

C) all three compounds illustrate p^3 bonding.

D) **each of the molecules is planar and triangular.**

21. Nucleic acids can be double stranded (ds) or single stranded (ss). The following table gives the composition of bases in four different nucleic acid samples.

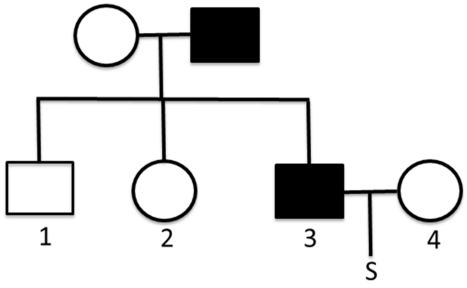
	Amount of base (%)				
	A	T	G	C	U
Sample 1	40	40	10	10	0
Sample 2	10	40	40	10	0
Sample 3	40	0	40	10	10
Sample 4	40	0	20	10	30

Using the information given above deduce if the samples are dsRNA, ssRNA, dsDNA or ssDNA.

A) Sample1 is dsDNA; Sample 2 is ssDNA; Sample 3 is ssRNA; Sample 4 is ssRNA.
B) Sample1 is dsDNA; Sample 2 is ssRNA; Sample 3 is dsDNA; Sample 4 is ssDNA.
C) Sample1 is ssDNA; Sample 2 is dsDNA; Sample 3 is ssRNA; Sample 4 is dsRNA.
D) Sample1 is dsDNA; Sample 2 is ssRNA; Sample 3 is ssDNA; Sample 4 is ssDNA.

Solution: T is present only in DNA, while U is present only in RNA. If A≠T or U it is single stranded. If A = T it is most likely to be double stranded. Sample 1 could possibly be single stranded. However, it is not one of the choices in the correct answer (A).

22. The following is a pedigree of a family from a marriage between first cousins. The family shows a very *rare X-linked trait* whose inheritance pattern is shown below. The son (denoted individual 3) showing the trait marries outside the family.



The following statements were made regarding the above trait:

i. The trait is recessive.
ii. The trait is dominant.
iii. The probability that the daughter (individual 2) is a carrier is zero.
iv. The probability that the daughter (individual 2) is a carrier is unity.
v. The probability that a son (S) born to individuals 3 and 4 will show the trait is zero.
vi. The probability that a son (S) born to individuals 3 and 4 will show the trait is ½.

Which of the above statements are correct?

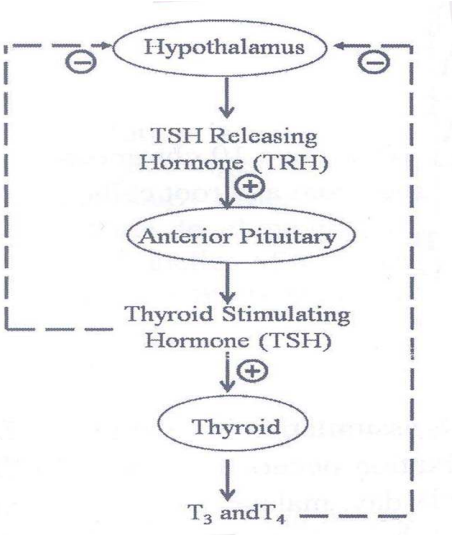
A) (i), (iii) and (vi)
B) (i), (iv) and (v)

C) (ii), (iii) and (vi)
D) (ii), (iv) and (v)

Solution:

- If trait is dominant then daughter would show the trait as it would inherit the father's X-chromosome. Since son shows the trait, X chromosome inherited from the mother carried the recessive trait (carrier).
- As the daughter would inherit the father's X-chromosome the daughter is bound to be a carrier.
- As the trait is RARE, marriage outside the family ensures that the mother is likely to not carry the trait. Hence the son will have '0' probability of inheriting the trait as the X-chromosome will come from the mother.

23. The following flow chart represent the feedback loops that regulate the secretion of thyroid hormones (T3 and T4). Such secretion essentially regulates the basic metabolism rate in mammals. The '+' and '-' signs represent positive and negative regulation, respectively.



Multiple Choice Questions

Three disease conditions are being studied where (a) the hypothalamus fails to secrete TRH, (b) the anterior pituitary fails to produce TSH, and (c) the thyroid fails to produce T3 and T4. In the Table below, match the hormone levels in column A with the disease conditions in column B.

Column A		Column B	
(i)	Low TRH, Low TSH and Low T3 and T4	(x)	Anterior pituitary fails to produce TSH
(ii)	High TRH, High TSH and Low T3 and T4	(y)	Thyroid fails to produce T3 and T4
(iii)	High TRH, Low TSH and Low T3 and T4	(z)	Hypothalamus fails to secrete TRH

Which the following is the correct match for the above?

A) (i) and (x); (ii) and (y); (iii) and (z)

B) (i) and (z); (ii) and (y); (iii) and (x)

C) (i) and (y); (ii) and (x); (iii) and (z)

D) (i) and (z); (ii) and (x); (iii) and (y)

Solution: It based on analysis. No prior knowledge is needed.

- In case of 'x' level of T_3 and T_4 will be low. As T_3 and T_4 has a negative effect on TRH levels, there will be an increase in the levels of TR . Thus 'x' matches with 'iii'
- In case of 'y' T_3 and T_4 is low, so TRH levels are high (as explained above). As TRH positively regulates TSH, TSH levels will increase. Thus 'y' matches with 'ii'
- In case of 'z' TRH levels are low, thus TSH levels will be low and finally T_3 and T_4 levels will be low. Thus 'z' matches with 'i'.

24. DNA replicates in semi-conservative manner in which each strand is copied to form a new molecule of DNA. The two strand can be isotopically labelled using substrates that contain either normal ^{14}N or its heavy isotopes ^{15}N. In an experiment, one strand of DNA is labelled with ^{14}N and other with ^{15}N (hybrid DNA). The hybrid DNA was then allowed to replicate in the presence

of the ^{14}N-labelled substrate. If one started with a single molecule of hybrid DNA and allowed it to replicate over 4 cycles, what would be the proportion of DNA molecules labelled with ^{15}N?

A) 1/4

B) 1/8

C) 1/16

D) 1/32

Solution: ^{14}N: ^{15}N (start); after 1 cycle two molecules of DNA, ^{14}N: ^{15}N and ^{14}N: ^{14}N; after 2 cycle four molecules of DNA, one ^{14}N: ^{15}N and three ^{14}N: ^{14}N; after 3rd cycle we will have 8 molecules of DNA, one ^{14}N: ^{15}N and rest 7 ^{14}N: ^{14}N. Finally after the 4th cycle there will be 16 molecules of DNA of which only one will be hybrid ^{14}N: ^{15}N in nature.

25. Assimilation of CO_2 by photosynthesis in cacti growing in arid regions occurs in two stages. In stage 1, CO_2 uptake and fixation occurs at night and CO_2 is stored in the form of malate in vacuoles. In stage 2, during the day the malate moves to the chloroplast which is decarboxylated, and the released CO_2 is re-fixed by RuBP carboxylase. The main reason for this is:

A) Cacti require light for RuBP carboxylase activity

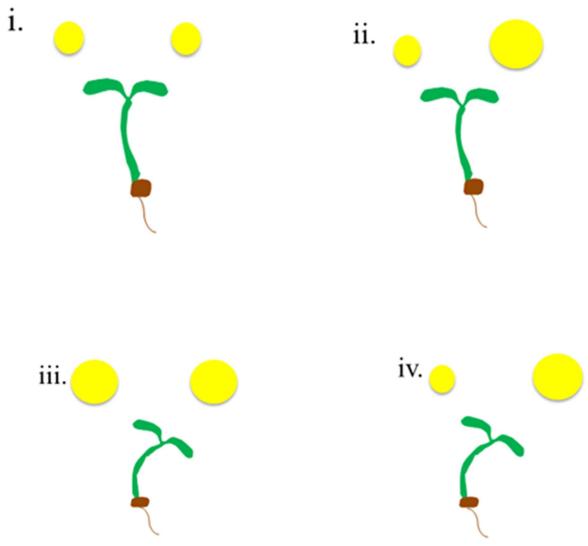
B) Cacti close their stomata during the day, so availability of CO_2 for RuBP carboxylase activity is low during the day.

C) Cacti can fix CO_2 only at an acidic pH that is provided by malate.

D) Cacti have chloroplasts that are impermeable to CO_2 but are permeable to malate.

Solution: To conserve water during the hot days, cacti close stomata during the day. This reduces the CO_2 concentration in the leaf, which cannot support RuBPcase activity.

26. Charles Darwin observed that seedlings grew towards light. He called this response 'phototropism.' In an experiment two light sources are used to illuminate each seedling. Each source is indicated by a yellow circle in the diagrams below. The larger yellow circle represents a light source with twice the illumination than the light source represented by the smaller yellow circle.



Which of the above responses would be observed?

A) Only iv

B) Only ii

C) iii and iv

D) i and iv

Solution: 'i' has equal illumination so the seedling does not bend. In 'iv' the seedling bends towards the higher illumination.

27. In a eukaryotic cell, mitochondria and chloroplasts are thought to have originated through endosymbiosis, a process in which an organism engulfs another and the two continue to exist in a mutually beneficial arrangement. Which of the following observations best supports this theory?

A) These organelles exchange metabolites with other cellular compartments.

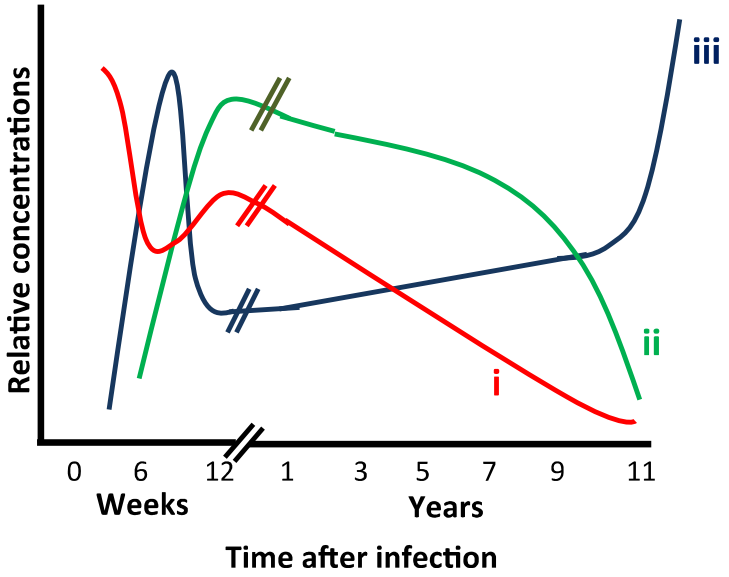
B) These organelles are capable of independent existence outside the cell.

C) These organelles have their own genetic material.

D) These organelles provide energy in the form of ATP to the cell.

Solution: A and C are correct but only C supports the concept of endosymbiosis. B is possible only for a short duration.

28. The Human Immunodeficiency Virus (HIV) infects the type of immune cells that help produce antibodies called T-cells. HIV can cause the disease AIDS. The following graph shows how the concentration of HIV, T-cells, and the antibodies against HIV develops in time in an AIDS patient.



In the above graph, the lines marked i, ii and iii, respectively represent

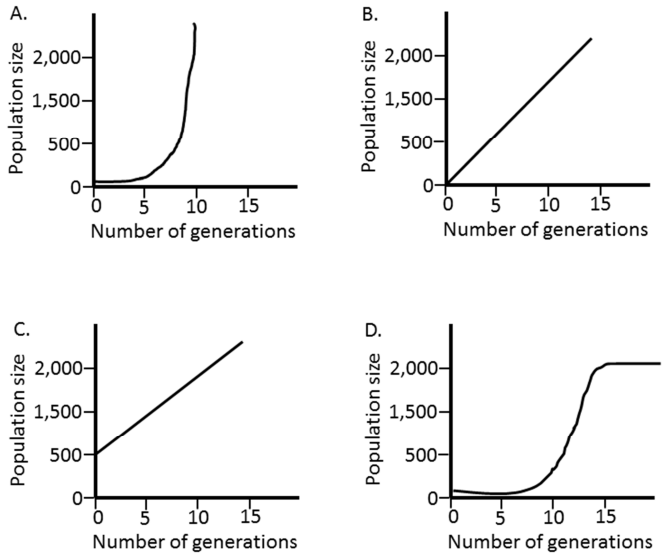
A) HIV, T-cells and antibodies

B) T-cells, HIV and antibodies

C) T-cells, antibodies and HIV

D) Antibodies, HIV and T-cells

29. Consider a population in an ideal condition, where all members have access to abundant food and they are free to reproduce at their physiological capacity. Which of the following curves best represent the population growth expected under such conditions?



Answer : A

Solution: Population increase under these ideal conditions is called exponential population growth, giving rise to what is called a J-shaped growth curve. Curve presented in D is based on logistic model of population growth. B and C are just created as wrong answers.

Comment: Typical growth-curves for populations is a topic mentioned in the syllabus under Systems – Ecology. See Chapter on Population Ecology in Biology 7th Edition, Campbell and Reece for clarification on growth curves.

30. Ammonia, urea and uric acids are toxic, nitrogenous waste products produced by catabolism of protein and nucleic acids. These waste products have to be excreted out of animal bodies. Ammonia is highly toxic and has a high solubility in water. Urea is less soluble and less toxic than ammonia. Uric acid is least toxic and has low solubility. Nitrogenous waste would be mainly removed from a frog's body and a tadpole's body as:

A) Urea in tadpole and ammonia in frog.

B) Ammonia in tadpole and urea in frog.

C) Urea in both tadpole and frog.

D) Uric acid in tadpole and urea in frog.

Solution: As ammonia has maximum solubility in water, thus tadpole has evolved the mechanism to generate ammonia as the waste. On the other hand a land animal would generate urea or uric acid. Frog makes urea.