# PART-I

## IQ (MENTAL ABILITY)

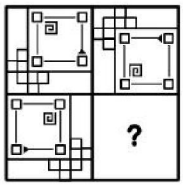
This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

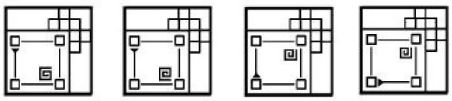
**1.** In certain code, BOXER is written as AQWGQ. How VISIT is written in that code?

(1) UKRKU (2) UKRKS

(3) WKRKU (4) WKRKS

**2.** Find which shape should fill the empty square.



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

**3.** In the following question on multiplication, Each letter always stand for same digit

$$\begin{array}{cccc} & A & M & D \\ \times & & D & A \\ \hline & M & P & R \\ J & M & S & \\ \hline B & P & S & R \end{array}$$

For which digit D stands ?

(1) 3 (2) 8

(3) 9 (4) 7

**4.** There are 16 secret agents who each know a different piece of secret information. They can telephone each other and exchange all the information they know.After the telephone call, they both know everything that either of them knew before the call.

What is the minimum number of telephone calls requied so that all of them know everything?

(1) 28 (2) 53

(3) 120 (4) None of these

**5.** Rahul told Anand, "Yesterday I defeated the only brother of the daughter of my grandmother". Whom did Rahul defeat ?

(1) Son (2) Father

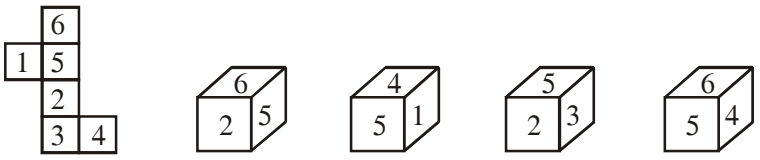
(3) Brother (4) Father-in-law

**6.** Find the missing term ?

| | | |
|---|---|---|
| 7 | 11 | 14 |
| 8 | ? | 10 |
| 9 | 10 | 16 |
| 6 | 10 | 8 |

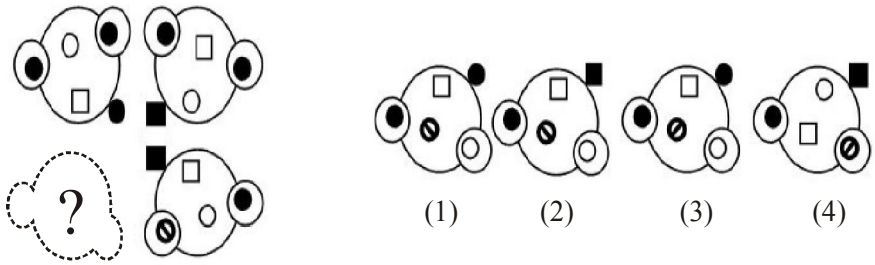
(1) 8 (2) 12 (3) 9 (4) 11

**7.** The figure given on the left hand side, in each problem, is folded to form a cube .Choose from amongst the alternatives (1), (2), (3), (4) and the cubes that are similar to the cube formed.




(X) (1) (2) (3) (4)

**8.** For the following question, select the option which most logically and simply completes the diagram:




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

**9.** Each question consists of five statements followed by options consisting of three statements put together in a specific order. Choose the option which indicates a valid argument, that is, where the third statement is conclusion drawn from the preceding two statements.

(A) Migration of people augments housing problem in urban areas.

(B) Increase in housing problem is urban areas in detrimental to economic growth.

(C) Migration of people is detrimental to economic growth.

(D) Some migration does not cause increase in urban housing problem.

(E) Some migration is not detrimental to economic growth.

(1) CBA (2) BDE

(3) CDE (4) BAC

**10.** A clock is set at 10 a.m. The clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 3 a.m on 4th day?

(1) 4 a.m. (2) 10 a.m.

(3) 11 p.m. (4) 4 p.m.

**Direction : (Q. 11 & Q.12):** The Vice Chancellor of a University wants to select a team of five members as the organizing commitee for the next convocation of the University to be held in March 2015. The committee members are to be selected from five short listed professors (Prof. Ahuja, Prof. Banerjee, Prof, Chakravarty, Prof. Equbal, Prof. Das) and four short listed students (Prakash, Queen, Ravi and Sushil). Some conditions for selection of the commitee members are given below :

(i) Prof. Ahuja and Sushil have to be together

(ii) Prakash cannot be put with Ravi

(iii) Prof. Das and Queen cannot go together

(iv) Prof. Chakravarty and Prof. Equbal have to be selected

(v) Ravi cannot be selected with Prof. Banerjee.

**11.** If two members of the commmitee are students and Prof. Das is one of the members of the commitee, who are the other committee members ?

(1) Prof.Benerjee, Prof.Chakravarty, Prakash and Queen

(2) Prof.Ahuja, Prof.Banerjee, Sushil and Prakash

(3) Prof.Chakravarty, Prof.Equbal, Prakash and Sushil

(4) None of the above

**12.** In case Prof. Ahuja and Prof. Chakravarty are members, who are the other members who cannot be selected for the committee ?

(1) Prof. Benerjee, Prof. Equbal and Sushil

(2) Prof. Equbal, Sushil and Prakash

(3) Prof. Equbal, Prakash and Queen

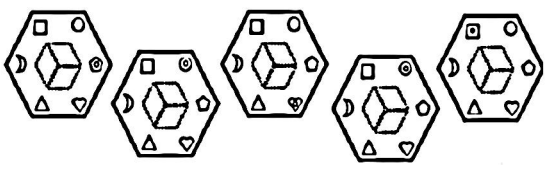
(4) None of the above

**13.** Find the missing term in the given series

10000, 11000, 9900, 10890, 9801,?

(1) 10241 (2) 10423 (3) 10781 (4) 10929

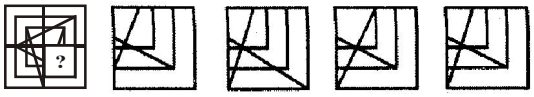
**14.** For the following question, re-arrange the diagrams and select the option which most logically and simply fits the middle of the sequence:



A B C D E

(1) A (2) C (3) E (4) D

**15.** In the following question, select a figure from amongst the four alternatives, which when placed in the blank space of fig. (X) would complete the pattern.



(X) (1) (2) (3) (4)

**Direction : (Q.16 to Q.18)** Cubes of similar size are arranged in the form of a bigger cube (5 cubes on each side, i.e., 5 × 5 × 5). From one corner of the top layer of this cube, four smaller cubes (2 × 2 × 1) are removed. From the column on the opposite side, two cubes (1 × 1 × 2) are removed, and from the third corner, three cubes (1 × 1 x 3) are removed and from the fourth column four cubes (1 × 1 × 4) are removed. All exposed faces of the block thus formed are coloured red.

**16.** How many small cubes are left in the block ?

(1) 109 (2) 114 (3) 112 (4) 110

**17.** How many cubes do not have any coloured face ?

(1) 38 (2) 44 (3) 25 (4) 35

**18.** How many cubes have only two coloured faces ?

(1) 33 (2) 36 (3) 18 (4) 29

**19.** A game consists of tossing a coin successively. There is an entry fee of Rs. 10 and an additional fee of Re.1 for each toss of the coin. The game is considered to have ended normally when the coin turns a heads an two consective throws. In this case the player is paid Rs. 100. Alternatively, the player can choose to terminate the game prematurely after any of the tosses. Ram has incurred a loss of Rs. 50 by playing this game. How many times did he toss the coin ?

A. The game ended normally

B. The total number of tails obtained in the game was 138.

(1) if the question can be answered by one of the statement alone but not by the other.

(2) if the question can be answered by using either statement alone.

(3) if the question can be answered by using both the statements together but cannot be answered using either statement alone.

(4) if the question cannot be answered even by using both the statments A and B

**20.** If in a particular year 'X' there are 53 Sundays, then how many Sundays will be there in a period of four years X to X + 3 year.

(1) 208 (2) 209

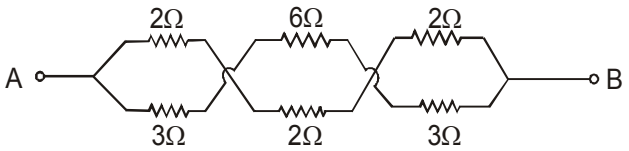
(3) 208 or 209 (4) None of these

# PART-II

## SECTION-A : PHYSICS

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

**21.** Find the equivalent resistance between points A and B of the given circuit.

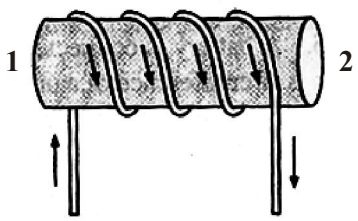



(1) 3.6 Ω (2) 4 Ω (3) 4.45 Ω (4) 6 Ω

**22.** A block of metal is made in the cuboid form with all edges of unequal lengths such that the shortest length is one third the longest one. If $R_{max}$ and $R_{min}$ are the maximum and minimum resistances between parallel faces then choose the correct relation.

(1) $\frac{R_{max}}{R_{min}} = \frac{3}{2}$ (2) $\frac{R_{max}}{R_{min}} = \frac{3}{1}$ (3) $\frac{R_{max}}{R_{min}} = \frac{9}{1}$ (4) $\frac{R_{max}}{R_{min}} = \frac{2}{1}$

**23.** A stream of electrons is flowing in a solenoidal conductor as indicated in the given figure.




(1) The entire solenoid behaves like the north pole of magnet.

(2) The entire solenoid behaves like the south pole of a magnet.

(3) Face-1-behaves like the north pole and face-2 like the south pole.

(4) Face-1 behaves like the south pole and face-2 like the north pole.

**24.** The brushes of a simple D.C. motor

(1) connect the armature to the permanent magnet.

(2) prevent sparking within the motor.

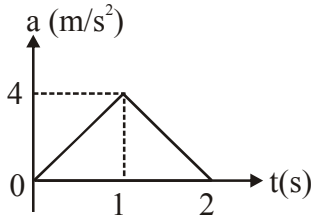
(3) reverse the polarity of the armature at regular intervals.

(4) allow the armature to rotate while still being connected to the battery.

**25.** Tanuj rode his bike on a road for a 2 hr period. On average, he passed a 1 km marker every 3 min during this period. Which of the following was his average speed for this 2 hr period ?

(1) 10 km/hr (2) 15 km/hr (3) 20 km/hr (4) 25 km/hr

**26.** The acceleration-time graph of a particle moving in a straight line is as shown in figure. The velocity of the particle at time t = 0 is 2 m/s. The velocity after 2 seconds will be




(1) 6 m/s (2) 4 m/s (3) 2 m/s (4) 8 m/s

**27.** An object A of mass 2 kg is moving with a velocity of 3 m/s and collides head-on with an object B of mass 1 kg moving in opposite direction with a velocity of 4 m/s. After collision, both objects coalesce so that they move with a common velocity equal to

(1) 3/2 m/s (2) 2 m/s (3) 10/3 m/s (4) 2/3 m/s

**28.** A wooden box kept on a rough horizontal surface is pushed by Jai and Samarth from the same side in such a way that the force applied by Samarth is twice that applied by Jai. The frictional force acting between the surface of the box and the ground is one-tenth of the total force applied by Jai and Samarth. As a result, the box experiences a net unbalanced force of 27 N. What is the force applied by Samarth?

(1) 15 N (2) 20 N (3) 27 N (4) 10 N

**29.** The mass of a bicyclist and a bicycle together is 53.0 kg. How much work has been done if the bicyclist slows the bicycle from a speed of 3 m/s to 1 m/s?

(1) +212 J (2) +424 J (3) –212 J (4) –424 J

**30.** A ball of mass 0.1 kg is dropped from a height of 10 m at a place where g = 10 $ms^{-2}$. On striking the ground, it loses 30% of its energy. Then the height to which it will rise after bouncing from ground is (Neglect air friction)

(1) 3 m (2) 6 m (3) 7 m (4) 10 m

**31.** A sound wave has a frequency of 2 kHz and wavelength 35 cm. How long will it take to travel 1.4 km ?

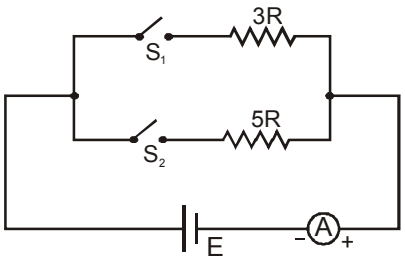
(1) 0.5 sec (2) 1 sec (3) 1.5 sec (4) 2 sec

**32.** Match the columns and choose correct option.

| Column-I | | Column-II | |
|---|---|---|---|
| A. | Sound wave in air | p. | Must be a transverse wave |
| B. | Sound wave in steel rod | q. | Must be a longitudinal wave |
| C. | Light wave in vacuum | r. | May be a transverse wave or a longitudinal wave |
| D. | Light wave in water | | |

(1) A-r; B-r; C-p; D-p (2) A-q; B-r; C-r; D-r (3) A-q; B-r; C-p; D-p (4) A-q; B-q; C-p; D-r

**33.** In the circuit shown in figure, reading of ammeter is $I_1$ when only $S_1$ is closed, reading of ammeter is $I_2$ when only $S_2$ is closed, reading of ammeter is $I_3$ when both $S_1$ and $S_2$ are closed. Then

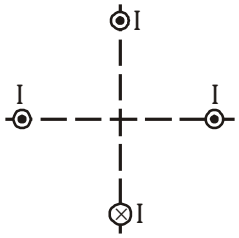



(1) $I_1 > I_2 > I_3$ (2) $I_2 > I_1 > I_3$ (3) $I_1 < I_2 < I_3$ (4) $I_2 < I_1 < I_3$

**34.** If the monthly electricity bill for November for a household is Rs. 600.00, how much energy units were consumed per day on an average? Assume the cost is Rs. 5.00 per unit.

(1) 4 (2) 30 (3) 40 (4) 120

**35.** What will be the magnitude of resultant magnetic field at origin due to current-carrying four infinite length wires placed perpendicular to the plane of paper at the same distance from origin as shown in the figure, if due to each wire, magnitude of magnetic field at the origin is B ?

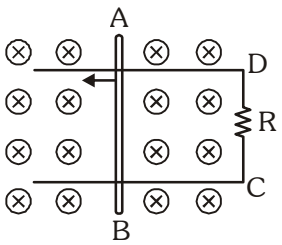



(1) 4B (2) 3B (3) 2B (4) Zero

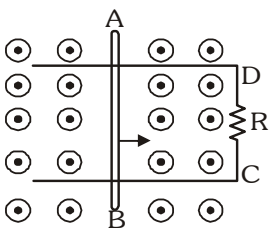
**36.** A metallic rod AB is sliding on conducting rails as shown in figure. Match the direction of induced current in resistor 'R' given in Row–II with different cases shown in Row–I.

**Row-I**

(a)




(b)




**Row-II** (p) from C to D (q) from D to C

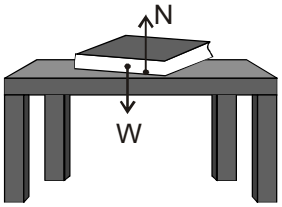
(1) a–p, b–q (2) a–p, b–p (3) a–q, b–p (4) a–q, b–q

**37.** Two cars start off to race with velocities 4 m/s and 2 m/s and travel in straight line with uniform accelerations

1 m/s$^2$ and 2 m/s$^2$ respectively. If they reach the final point at the same instant, then the length of the path is

(1) 30 m (2) 32 m (3) 20 m (4) 24 m

**38.** A book is lying on the surface of table as shown in the figure.




W = weight of book & N = Normal reaction of table on book

(1) W and N are action-reaction pair

(2) W and N are not action-reaction pair

(3) W and N may or may not be action-reaction pair

(4) W and N are of unequal magnitudes

**39.** Two girls with weights in the ratio 5 : 3 run up a staircase in times in the ratio 11 : 9. The ratio of power of first girl to that of second girl is

(1) $\frac{15}{11}$ (2) $\frac{11}{15}$ (3) $\frac{11}{9}$ (4) $\frac{9}{11}$

**40.** A man noticed that if the rate of clapping is 100 per minute, the original sound cannot be distinguished from the sound reflected from a wall. If the speed of sound is 330 m/s then the distance of wall from the man is

(1) 33 m (2) 99 m (3) 132 m (4) 198 m

## SECTION-B : CHEMISTRY

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

**41.** Identify true and false statement ?
(A) The relationship between pH and hydrogen ion concentration is inverse one.
(B) By the dilution of an acidic solution concentration of $H^+$ ion increases continuously
(C) pH of aqueous solution of basic salt is always greater than 7.
(1) TFT (2) TFF (3) FFT (4) TTF

**42.** Which of the following is not a compound ?
(1) Marble (2) Washing soda (3) Quick lime (4) Brass

**43.** Suppose the temperature of surroundings is –2°C. then
(1) The substance having melting point 5°C exits as both liquid and gas.
(2) The substance having boiling point –3°C exists as only solid.
(3) The substance having melting point –5°C exits as liquid.
(4) None of these

**44.** How much water should be added to 50 gm of glucose so as to obtain 12% glucose solution ?
(1) 366.67 gm (2) 416.66 gm (3) 350 gm (4) 376.67 gm

**45.** Bleeding from a cut can be immediately stopped by applying ferric chloride because
(1) Ferric chloride block the surface of cut.
(2) Blood contain negative charged colloidal particle and they are precipitated with $FeCl_3$.
(3) $FeCl_3$ prepare the membrane over the cut.
(4) None of these

**46.** Cloud is an example of
(1) Solid dispersed in gas (2) Liquid dispersed in gas
(3) Liquid dispersed in solid (4) Solid dispersed in liquid

**47.** The compound whose aqueous solution has highest pH is
(1) NaCl (2) $NH_4Cl$ (3) $CH_3COONH_4$ (4) $Na_2CO_3$

**48.** X and Y are two elements which form $X_2Y_3$ and $X_3Y_4$. If 0.20 mol of $X_2Y_3$ weighs 32.0 g and 0.4 mol of $X_3Y_4$ weighs 92.8 g, the atomic masses of X and Y are, respectively
(1) 16.0 u and 56.0 u. (2) 8.0 u and 28.0 u. (3) 56.0 u and 16.0 u. (4) 28.0 and 8.0 u

**49.** For the following reaction

$$2Pb(NO_3)_{\underline{P}} \xrightarrow{\Delta} 2PbO_{\underline{Q}} + \underline{R}NO_2 + \underline{Z}O_2$$

$\frac{P \times R}{Q+Z}$ is

(1) 3 (2) 4 (3) 1 (4) 5

**50.** Colour of blue vitriol and green vitriol compound is because of
(1) Anhydrous nature of compound. (2) Loss of water when they are heated.
(3) Water molecule of Crystallisation. (4) They are naturally coloured.

**51.** Ratio of two unknown gases which released on heating aqueous solution of ferrous sulphate is :

(1) 2 : 1 (2) 1 : 2 (3) 1 : 3 (4) 1 : 1

**52.** Which of the following is neither Arrhenius acid nor Bronsted acid ?

(a) $NH_3$ (b) $HSO_4^-$ (c) $HPO_3^{2-}$ (d) $HPO_4^{2-}$

(1) Only a (2) a & c (3) a & d (4) b & d

**53.** Four students were asked to study the reaction between barium chloride and sodium sulphate. They reported their experiment as follows. Which one is a correct report ?

(1) On mixing the powder of barium chloride and sodium sulphate, the colour of the mixture changes to brown.

(2) On adding powdered sodium sulphate to barium chloride solution; solution becomes white.

(3) On adding the powder of barium chloride and sodium sulphate solution; solution turns white.

(4) On mixing solution of barium chloride and sodium sulphate, white solid substance is formed.

**54.** A metal compound 'A' react with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. The balanced chemical equation for the above reaction is :

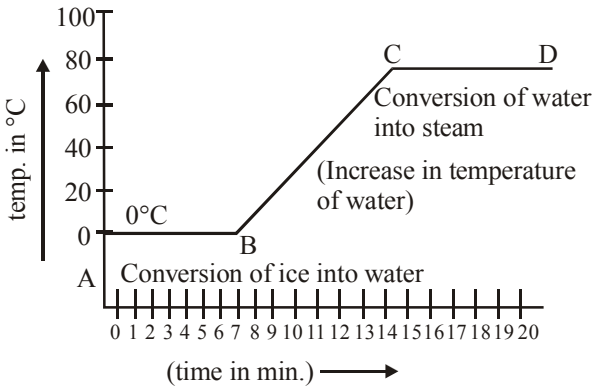
(1) $NaHCO_3 + HCl\ (dilute) \rightarrow NaCl + H_2O + CO_2$ (2) $Na_2CO_3 + HCl\ (dilute) \rightarrow NaCl + H_2\ (\uparrow) + CO_2$

(3) $CuSO_4 + 2HCl \rightarrow CuCl_2 + H_2SO_4$ (4) None of these

**55.** The ratio of number of electrons in N shell of A and M shell of B with atomic numbers 40 and 32 respectively is

(1) 5 : 3 (2) 9 : 5 (3) 5 : 9 (4) 5 : 4

**56.** The inference drawn by the temperature versus time graph are:




(1) During the melting, temperature of substance does not change

(2) Temperature rises after all amount of ice melts.

(3) At a specific temperature, water starts boiling and temperature remains the same during the conversion of water into steam.

(4) All of these

**57.** 100 gm of ethylene polymerizes to polythene according to the equation

$$n\,CH_2 = CH_2 \longrightarrow \{CH_2 - CH_2\}_n$$

The mass of polythene produced will be

(1) 100 n gm (2) 100/n gm

(3) 100 n/2 gm (4) 100 gm

**58.** As we increase the temperature of liquid, its properties change. Which of the following would not be an expected change in the properties of a typical liquid as we increase its temperature ?

(1) Decrease in viscosity.

(2) Decrease in molecular force.

(3) Increase in surface tension.

(4) Increase in vapour pressure.

**59.** Calculate the number of oxygen atoms required to combine with 7.0 g of $N_2$ to form $N_2O_3$ if 80% of $N_2$ is converted into products?

$$N_2 + \frac{3}{2}O_2 \longrightarrow N_2O_3$$

(1) $3.24 \times 10^{23}$

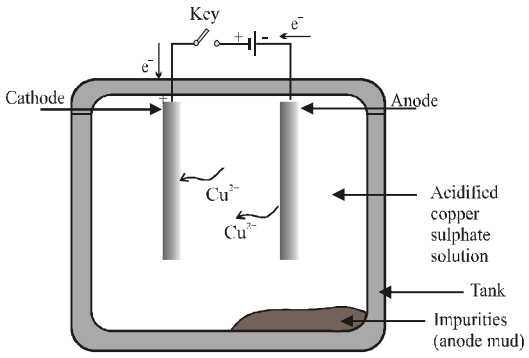
(2) $3.6 \times 10^{23}$

(3) $18 \times 10^{23}$

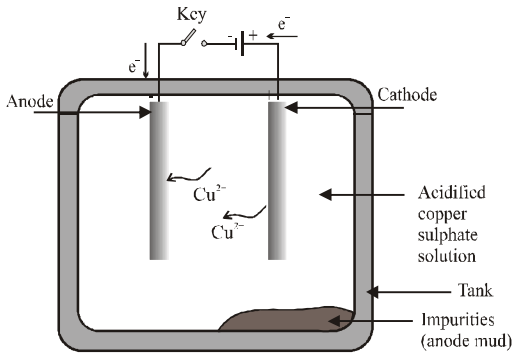
(4) $6.02 \times 10^{23}$

**60.** Which one of the following figures correctly describes the process of electrolytic refining ?

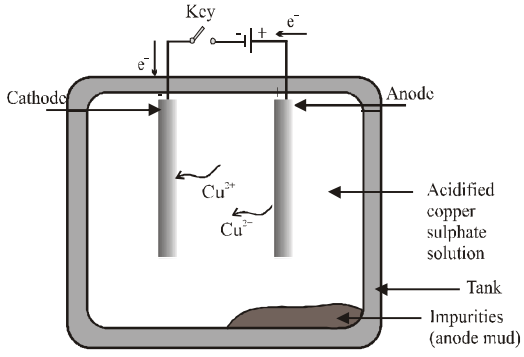
(1)



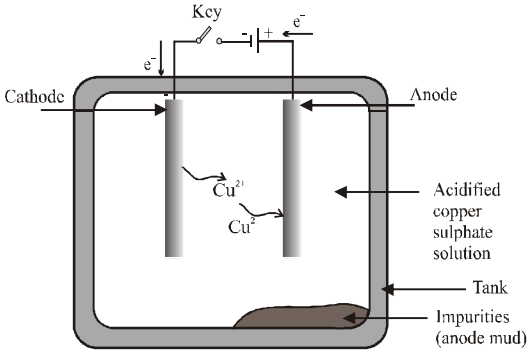

(2)




(3)




(4)

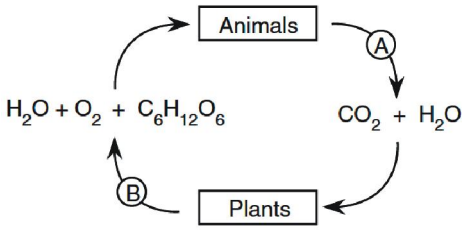


## Attempt any one of the section C or D

## SECTION-C : BIOLOGY

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

**61.** In the material cycle shown below, which processes are represented by letters A and B?



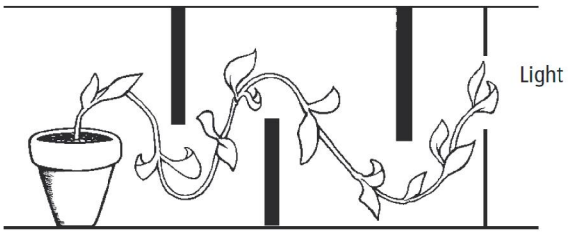

(1) A—excretion, B—respiration

(2) A—transpiration, B—excretion

(3) A—photosynthesis, B—transpiration

(4) A—respiration, B—photosynthesis

**62.** A student conducted an experiment using the setup below. Overall, what was the plant's response an example of ?




(1) Gravitropism

(2) Nastic response

(3) Phototropism

(4) Thigmotropism

**63.** What is true of alternation of generations in the plant kingdom?

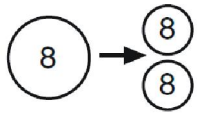
(1) Gametophytes become larger as plants become more complex.

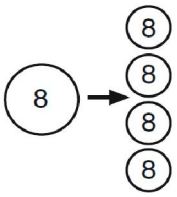
(2) Sporophytes become less important as plants become more complex.

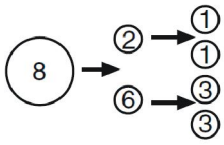
(3) Gametophytes become smaller as plants become more complex.

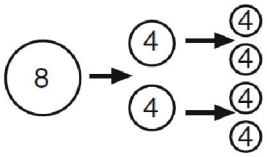
(4) Sporophytes are more obvious in smaller plants.

**64.** Which diagram represents the process of sperm formation in an organism that has a diploid chromosome number of eight?

(1) 


(2) 


(3) 


(4) 


**65.** Each of the following is an example of fermentation EXCEPT
(1) a working muscle cell toward the end of a marathon run
(2) a brain cell used while reading a magazine
(3) yeast used to make beer
(4) an organism used to turn milk into cheese

**66.** Diameter of the renal afferent arteriole is
(1) Same as that of efferent arteriole
(2) Smaller than that of efferent arteriole
(3) Larger than that of efferent arteriole
(4) There is no efferent arteriole

**67.** Non-keratinised stratified squamous epithelium is found in
(1) Epidermis of skin of land vertebrates
(2) Oral cavity and pharynx
(3) Vagina and cervix
(4) Both (2) and (3)

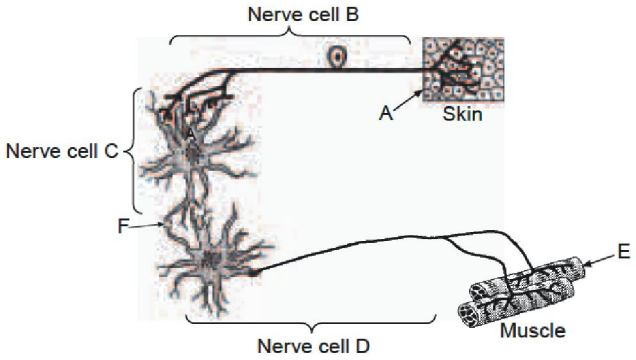
**68.** Which structures form when Rhizopus reproduces sexually?
(1) Ascospores (2) Basidiospores (3) Conidiospores (4) Zygospores

**69.** Which is not a pathway by which plants obtain atmospheric nitrogen?
(1) manure (2) lightning (3) photosynthesis (4) symbiotic bacteria

**70.** Biochemical Oxygen Demand (BOD) is a measure of
(1) Amount of oxygen needed by green plants during night
(2) Amount of carbon monoxide inseparably combined with haemoglobin
(3) Industrial wastes poured into water bodies
(4) Extent to which water is polluted with organic compounds

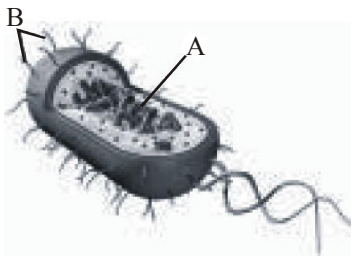
**71.** Origin of heart beat and its conduction is correctly represented by
(1) AV node → Bundle of His → SA node → Purkinje fibres
(2) SA node → Purkinje fibres → AV node→ Bundle of His
(3) Purkinje fibres → AV node → SA node→ Bundle of His
(4) SA node → AV node → Bundle of His→ Purkinje fibres

**72.** In the diagram below, if a stimulus is received by the cells at A, the cells at E will most likely use energy obtained from a reaction between




(1) fats and enzymes
(2) ATP and pathogens
(3) glucose and oxygen
(4) water and carbon dioxide

**73.** How do the structures labelled as B help increase the diversity of prokaryotes and contribute to resistance to antibiotics?




(1) They help the bacterium move.
(2) They attach to other bacteria cells to exchange genetic material.
(3) They help in respiration.
(4) They keep the cell from drying out.

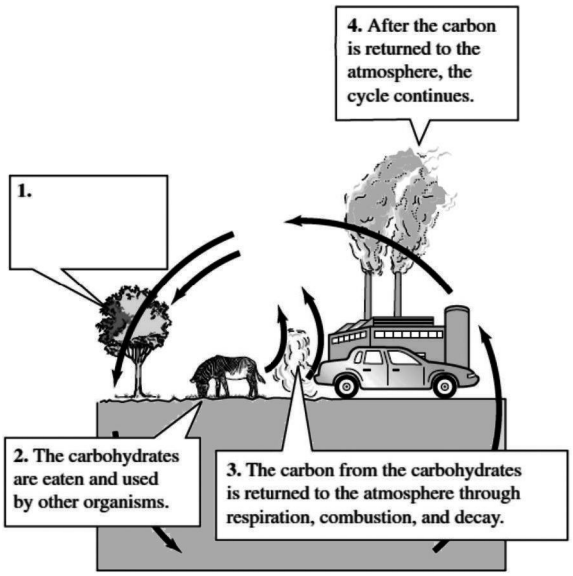
**74.** Which statement is true for both meiosis and mitosis?

(1) Both are involved in asexual reproduction.
(2) Both occur only in reproductive cells.
(3) The number of chromosomes is reduced by half.
(4) DNA replication occurs before the division of the nucleus.

**75.** Collagen and elastin fibres are produced by

(1) Macrophages
(2) Fibroblasts
(3) Mast cells
(4) Chondrocytes

**76.** Study the diagram below. Which of the following would be the best caption for step 1?



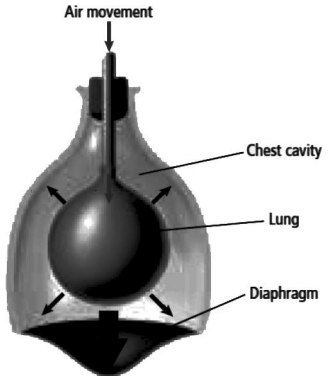

(1) Plants release carbon into the air in the form of carbohydrates.
(2) Plants absorb carbohydrates from the air and store them in their leaves.
(3) Plants remove carbon dioxide from the air and use it to make carbohydrates.
(4) Plants convert carbon into carbohydrates through the process of transpiration.

**77.** The primary acceptor during $CO_2$ fixation in $C_3$ plants is
(1) Ribulose bisphosphate (2) Glycolate
(3) Phosphoenolpyruvate (4) Triose phosphate

**78.** What would happen when pH of blood decreases ?
(1) Binding of oxygen with haemoglobin increases
(2) Red blood corpuscles are formed in higher number
(3) Binding of oxygen with haemoglobin decreases
(4) There is no change in oxygen binding nor in number of RBCs

**79.** What do crocodiles and alligators have in common with birds and mammals but not with other reptiles?
(1) a four-chambered heart (2) ability to control body temperature
(3) amniotic egg (4) Jacobson's organ

**80.** Which structure, modeled in the diagram below and found only in mammals, helps them to maintain a high intake of oxygen?




(1) Lungs (2) Kidneys (3) Diaphragm (4) Caecum

## SECTION-D : MATHEMATICS

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

**81.** The gong shown below is 30 cm in diameter and hangs by a chain from a nail. The total length of the chain is 18 cm. The lengths of chain on each side of the nail are equal to each other and form a tangent to the gong.

Note : The diagram shown above has not been drawn to scale.

How far above the top of the gong is the nail, to the nearest tenth of a centimetre ?

(1) 2.3 cm (2) 2.5 cm

(3) 12.0 cm (4) 17.5 cm

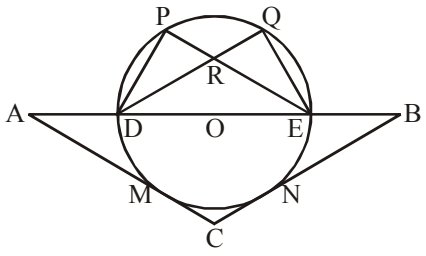
**82.** P, Q and R are on AB, BC and AC of the equilateral triangle ABC respectively.

AP : PB = CQ : QB = 1: 2. G is the centroid of the triangle PQB and R is the mid point of AC.

Find BG : GR

(1) 1 : 2 (2) 2 : 3 (3) 3 : 4 (4) 4 : 5

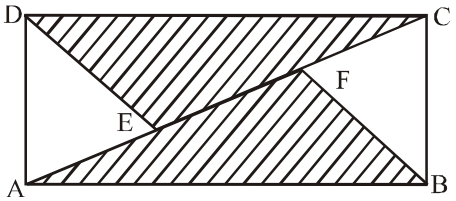
**83.** ABC is an isosceles triangle and AC, BC are the tangents at M and N respectively. DE is the diameter of the circle. $\angle ADP = \angle BEQ = 100°$. What is value of $\angle PRD$ ?




(1) 60° (2) 50°

(3) 20° (4) Can't be determined

**84.** ABCD is a rectangle of dimensions 6 cm × 8 cm. DE and BF are the perpendiculars drawn on the diagonal of the rectangle. What is the ratio of the area of shaded to that of unshaded region?




(1) 7 : 3 (2) 16 : 9

(3) 4 : $3\sqrt{2}$ (4) data insufficient

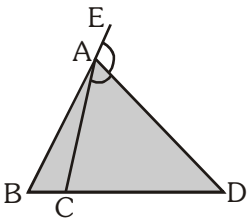
**85.** The value of tan 100° + 4 sin 100° is equal to

(1) $-\sqrt{3}$ (2) $\sqrt{3}$ (3) 2 (4) $\sqrt{3}$ tan 10°

**86.** If n is any positive integer, then $(3^{4n} - 4^{3n})$ is always divisible by :

(1) 7 (2) 17 (3) 112 (4) 145

**87.** In the figure AD is the external bisector of ∠EAC, intersects BC produced to D. If AB = 12 cm, AC = 8 cm and BC = 4 cm, find CD.




(1) 10 cm

(2) 6 cm

(3) 8 cm

(4) 9 cm

**88.** The quadratic equation $3x^2 + 2(a^2 + 1)\,x + a^2 - 3a + 2 = 0$ possesses roots of opposite sign then a lies in :

(1) $(-\infty, 0)$ (2) $(-\infty, 1)$

(3) (1, 2) (4) (4, 9)

**89.** If a, b, c are all positive integers, then the minimum value of the expression

$$\frac{(a^2+a+1)(b^2+b+1)(c^2+c+1)}{abc}$$ is :

(1) 3 (2) 9 (3) 27 (4) 1

**90.** A confused bank teller transposed the rupees and paise when he cashed a cheque for Shailaja, giving her rupees instead of paise and paise instead of rupees. After buying a toffee for 50 paise, Shailaja noticed that she was left with exactly three times as much as the amount on the cheque.

Which of the following is a valid statement about the cheque amount ?

(1) Over rupees 22 but less than rupees 23 (2) Over rupees 18 but less than rupees 19

(3) Over rupees 4 but less than rupees 5 (4) Over rupees 13 but less than rupees 14

**91.** $f(x) = ax^2 + bx + c$, where $abc(a - b)(b - c)(c - a) \neq 0$
If $f(a) = b$, $f(b) = c$, $f(c) = a$, then given $c > 0$

| Column-I | | Column-II | |
|---|---|---|---|
| (P) | a | (1) | $\frac{3}{2}$ |
| (Q) | b | (2) | $\frac{1}{2}$ |
| (R) | c | (3) | –1 |
| (S) | a + b+ c | (4) | 2 |

**Code :**

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

**92.** If $\sin\alpha + \sin\beta = 2$, Then the value of $\cos^2\alpha + \cos^2\beta$ =

(1) 0 (2) 1 (3) 2 (4) 3

**93.** If the orderd pair $(\sin\theta, \cos\theta)$ satisfies the system of equations $mx + ny + a + b = a - b$ and $nx + my + 2b = 0$, then find the value of $\theta$ where $0 \leq \theta \leq 90^o$ $(m \neq n)$

(1) $30^o$ (2) $45^o$

(3) $50^o$ (4) Can't be determined

**94.** If a, b and c are roots of $x^3 - 6x^2 + 11x - 6 = 0$ and the roots of the equation $x^3 - px^2 + qx - r = 0$ are a + b, b + c and c + a, then r equals

(1) 40 (2) 50 (3) 60 (4) 70

**95.** Along a road lie an odd number of stones placed at intervals of 10 metres. These stones have to be assembled around the middle stone. A person can carry only one stone at a time. A man carried the job with one of the end stones by carrying them in succession. In carrying all the stones he covered a distance of 3 km. Find the number of stones.

(1) 20 (2) 24 (3) 25 (4) 27

**96.** An electrician can be paid under two schemes as given below:

**Scheme I** : Rs. 500 and Rs. 70 per hour.

**Scheme II** : Rs. 120 per hour.

If the job takes x hours, for what value of x does the scheme I give the electrician better wages ?

(1) 5 (2) 11 (3) 13 (4) 12

**97.** Two identical right circular cones each of height 2 cm are placed as shown in diagram (each is vertical, apex downward). At the start, the upper cone is full of water and lower cone is empty. Then water drips down through a hole in the apex of upper cone into the lower cone. The height of water in the lower cone at the moment when height of water in upper cone is 1 cm is.

(1) 1 cm

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

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

(4) $\sqrt[3]{7}$ cm

**98.** The remainder obtained when $5^{2009} + 13^{2009}$ is divided by 18 is

(1) 0 (2) –1 (3) 10 (4) None

**99.** If $x = \frac{1}{2-\sqrt{3}}$, the value of $x^3 - 2x^2 - 7x + 10$ is equal to:

(1) $2+\sqrt{3}$ (2) 10 (3) $7+2\sqrt{3}$ (4) 8

**100.** If a and b are positive integers such that $\frac{1}{a}+\frac{1}{b}=\frac{1}{5}$ then total number of pair of (a,b) are?

(1) 3 (2) 2 (3) 1 (4) 0

**SPACE FOR ROUGH WORK**

SPACE FOR ROUGH WORK

TALLENTEX 2015
ALLEN'S Talent Encouragement Exam

# REVISED ANSWER KEY : CLASS - 10th (X)

## (Held on : 16-11-2014)

| Q. No. | Ans. |
|---|---|
| 1 | 2 |
| 2 | 2 |
| 3 | 1 |
| 4 | 1 |
| 5 | 2 |
| 6 | 3 |
| 7 | 4 |
| 8 | 4 |
| 9 | 4 |
| 10 | 1 |
| 11 | 4 |
| 12 | 4 |
| 13 | 3 |
| 14 | 3 |
| 15 | 4 |
| 16 | 3 |
| 17 | Bonus |
| 18 | 1 |
| 19 | 2 |
| 20 | 2 |
| 21 | 2 |
| 22 | 3 |
| 23 | 3 |
| 24 | 4 |
| 25 | 3 |

| Q. No. | Ans. |
|---|---|
| 26 | 1 |
| 27 | 4 |
| 28 | 2 |
| 29 | 3 |
| 30 | 3 |
| 31 | 4 |
| 32 | 3 |
| 33 | 4 |
| 34 | 1 |
| 35 | 3 |
| 36 | 2 |
| 37 | 4 |
| 38 | 2 |
| 39 | 1 |
| 40 | 2 |
| 41 | 2 |
| 42 | 4 |
| 43 | 3 |
| 44 | 1 |
| 45 | 2 |
| 46 | 2 |
| 47 | 4 |
| 48 | 3 |
| 49 | 2 |
| 50 | 3 |

| Q. No. | Ans. |
|---|---|
| 51 | 4 |
| 52 | 2 |
| 53 | 4 |
| 54 | 1 |
| 55 | 3 |
| 56 | 4 |
| 57 | 4 |
| 58 | 3 |
| 59 | 2 |
| 60 | 3 |
| 61 | 4 |
| 62 | 3 |
| 63 | 3 |
| 64 | 4 |
| 65 | 2 |
| 66 | 3 |
| 67 | 4 |
| 68 | 4 |
| 69 | 3 |
| 70 | 4 |
| 71 | 4 |
| 72 | 3 |
| 73 | 2 |
| 74 | 4 |
| 75 | 2 |

| Q. No. | Ans. |
|---|---|
| 76 | 3 |
| 77 | 1 |
| 78 | 3 |
| 79 | 1 |
| 80 | 3 |
| 81 | 2 |
| 82 | 4 |
| 83 | 3 |
| 84 | 2 |
| 85 | 1 |
| 86 | 2 |
| 87 | Bonus |
| 88 | 3 |
| 89 | 3 |
| 90 | 2 |
| 91 | 1 |
| 92 | 1 |
| 93 | 2 |
| 94 | 3 |
| 95 | 3 |
| 96 | 1 |
| 97 | 4 |
| 98 | 1 |
| 99 | 4 |
| 100 | 1 |