Section A - MATHEMATICS

To be attempted only by Engineering aspirants

1. If x, y, z belongs to R and $\Delta = \begin{vmatrix} x & x+y & x+y+z \\ 2x & 5x+2y & 7x+5y+2z \\ 3x & 7x+3y & 9x+7y+3z \end{vmatrix} = -16$ then value of x is

   A. 3
   B. -2
   C. 2
   D. -3

2. $\int |1+2\cos x|\, dx$ is equal to, if the lower limit is 0 and upper limit is π

   A. $\pi/3 + 2\sqrt{3}$
   B. $2\pi/3$
   C. 2
   D. π

3. The equation of a plane which passes through (2, -3, 1) & is perpendicular to the line joining the points (3, 4, -1) & (2, -1, 5) is given by :

   A. $x + 5y + 6z + 19 = 0$
   B. $x + 5y - 6z + 19 = 0$
   C. $x - 5y - 6z - 19 = 0$
   D. $x - 5y + 6z - 19 = 0$

4. The total number of distinct terms in the expansion of, $(x+a)^{100} + (x-a)^{100}$ after simplification is

   A. 51
   B. 202
   C. None of these
   D. 50

5. The value of $\int (\cos 2x/\cos x)\, dx$ is equal to

   A. $2\sin x - \ell n\, |\sec x - \tan x| + C$
   B. $2\sin x + \ell n\, |\sec x + \tan x| + C$
   C. None of these
   D. $2\sin x - \ell n\, |\sec x + \tan x| + C$

6. The equation of normal to the circle $x^2 + y^2 - 4x + 4y - 17 = 0$ which passes through (1, 1) is

   A. $x - y = 0$
   B. $x + y = 0$
   C. $3x + y - 4 = 0$
   D. None

7. If the slope of one line of the pair of lines represented by $ax^2 + 10xy + y^2 = 0$ is four times the slope of the other line, then a =

   A. 1
   B. 4
   C. 16
   D. 2

8. A triangle ABC is such that sin(2A + B) = 1/2 . If A, B, C are in A. P. then the angle A, B, C, are respectively.

    A. $\pi/3$, $5\pi/12$, $\pi/4$

                                B. $\pi/4$, $\pi/3$, $5\pi/12$

    C. $\pi/3$, $\pi/4$, $5\pi/12$

                                D. $5\pi/12$, $\pi/4$, $\pi/3$

9. Line L passes through (1, 1) and (2, 0) and other line L' passes through (1/2, 0) and perpendicular to L . Find the area of △ formed by these lines and y - axis ?

    A. 5/16

                                B. 5/4

    C. 25/16

                                D. 25/4

10. If $\sin^{-1}x + \sin^{-1}y = 2\pi/3$, then $\cos^{-1}x + \cos^{-1}y =$

    A. $2\pi/3$

                                B. π

    C. $\pi/3$

                                D. $\pi/6$

11. The order of the differential equation whose general solution is given by $Y = (C_1 + C_2) \sin (x + C_3) - C_4 e^{x + C_5}$ is

    A. 2

                                B. 5

    C. 3

                                D. 4

12. An extreme value of $1 + 4 \sin\theta + 3 \cos\theta$ is :

    A. -4

                                  B. -3

    C. 8

                                D. 5

13. If $\dfrac{2^x}{\sqrt{1 - 4^x}}\, dx = K \sin^{-1}(2^x) + C$, then the value of K is equal to

    A. $\ell n\, 2$

                                B. $1/\ell n\, 2$

    C. $0.5\, \ell n\, 2$

                                D. 1/2

14. The roots of the equation $(b - c) x^2 + (c - a) x + (a - b) = 0$ are

    A. (c-a)/(b-c), 1

                                  B. (b-c)/(a-b), 1

    C. (c-a)/(a-b), 1

                                  D. (a-b)/(b-c), 1

15. The line $3x + 5y + 9 = 0$ with respect to the circle $x^2 + y^2 - 4x + 6y + 5 = 0$ is

    A. Diameter

    B. Chord

    C. Tangent

    D. None

16. If $A = \begin{vmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{vmatrix}$ then adj A =

    A. A^2

    B. A'

    C. I

    D. O

17. The reflection of the point $(2, -1, 3)$ in the plane $3x - 2y - z = 9$ is:

    A. $(15/7, 26/7, -17/7)$

    B. $(26/7, 17/7, -15/7)$

    C. $(26/7, 15/7, 17/7)$

    D. $(26/7, -15/7, 17/7)$

18. Find points on line $3x + 4y = 2$ which are at 5 unit distance from point $(2, -1)$.

    A. $(6, 4), (-2, -2)$

    B. $(6, -4), (2, 2)$

    C. $(6, 4), (-2, 2)$

    D. $(6, -4), (-2, 2)$

19. Entries of a 2×2 determinant are chosen from the set $\{-1, 1\}$. This probability that determinant has zero value is

    A. 1/3

    B. 1/4

    C. None of these

    D. 1/2

20. If $\int(\sin2x - \cos2x)\, dx = (1/\sqrt{2}) \sin(2x-a) + b$, then

    A. $a = \pi/4$, b belongs to R

    B. None of these

    C. $a = 5\pi/4$, b belongs to R

    D. $a = -5\pi/4$, b belongs to R

21. If $A + B = 225^0$, then the value of

$$\left(\frac{\text{Cot A}}{1 + \text{Cot A}}\right) \cdot \left(\frac{\text{Cot B}}{1 + \text{Cot B}}\right) \text{ is}$$

    A. 1/2

    B. 2

    C. 3

    D. 1/3

22. If $f(x+y) = f(x) \cdot f(y)$, for all x and y belongs to Natural Number set and $f(1) = 2$ then find $\Sigma\, f(n)$ from n=1 to n=10

    A. 2066

    B. 2046

    C. 2036

    D. 2056

23. The value of

$$\frac{Sin24°Cos6° - Sin6°Sin66°}{Sin21°Cos39° - Cos51°Sin69°} \text{ is}$$

    A. None

    B. 1

    C. -1

    D. 2

24. If $a^2 + b^2 = 1$ then $(1+b+ia)/(1+b-ia)$ is equal to

    A. a + ib

    B. 1

    C. b + ia

    D. 2

25. The number of permutations that can be formed by arranging all the letters of the word 'NINETEEN' in which no two 'E' occur together, is

    A. $8!/(3!\,3!)$

    B. $8!/5! \times {}^6C_3$

    C. $5!/3! \times {}^6C_3$

    D. $5!/(3! \times {}^6C_2)$

Section A - BIOLOGY

To be attempted only by Medical aspirants

1. Study the given flow chart and identify P, Q, R and S.
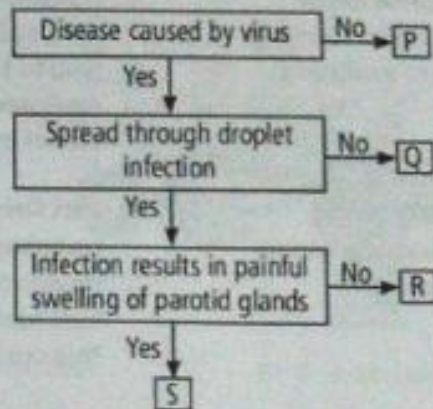
A. P - Typhoid , Q - Measles, R - Parotiditis, S - SARS

B. P - dengue fever, Q - Tetanus, R - SARS, S - Rubella

C. P - Tetanus, Q - Yellow fever, R - SARS, S - Mumps

D. P - Diphtheria, Q - Bubonic plague, R - Chicken pox, S - SARS

2. Phylum protozoa is classified on the basis of

A. Locomotory organelles

B. Mode of nutrition

C. Mode of reproduction

D. Mode of feeding

3. Statement A : Extra oxygen consumption in human body is known as oxygen debt.

Statement B : The extra oxygen is required by the body to oxidise the accumulated lactic acid produced during strenuous exercise.

A. Both statements A and B are incorrect.

B. Both statements A and B are correct and B is the correct explanation of A.

C. Statements A is correct but statement B is incorrect.

D. Both statements A and B are correct but B is not the correct explanation of A.

4. The rate of evolution varies in different lineages. For example: It is higher in rat lineage than in human lineage. Which of the following statements is correct?

A. Errors during DNA replication of somatic cells are the major source of mutations that leads to evolution.

B. Humans show lower rate of metabolism than rats. This would lead to fewer errors during DNA replication thereby reducing the rate of evolution.

C. Rate of evolution would be the same for the coding and non-coding regions for a given species.

D. Rats have shorter generation time as compared to humans. Thus, more rounds of germ cell divisions would lead to more DNA replication errors. This can hasten rate of evolution.

5. The pedigree given below is for a dominant trait, caused by a gene A. The possible genotype/s for the circled individual in the pedigree would be
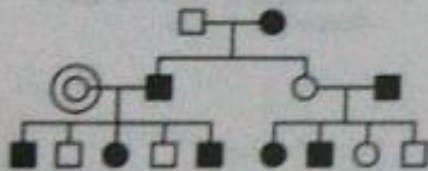
A. AA or Aa only

B. AA only

C. Aa only

D. aa only

6. The given figure shows ovulation, fertilization, cleavage and implantation of the zygote. Identify the parts labelled as P, Q, R and S and select the correct option. Also, at which day implantation occurs?
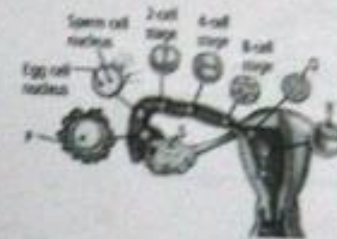

A. P → Primary oocyte Q → Morula
R → Blastocyst
S → Corpus luteum
Day → 8

B. P → Secondary oocyte
Q → Morula
R → Blastocyst
S → Corpus luteum
Day → 7

C. P → Secondary oocyte
Q → Blastocyst
R → Morula
S → Graafian follicle
Day → 2

D. P → Secondary oocyte
Q → Blastocyst
R → Morula
S → Graafian follicle
Day → 7

7. A nucleic acid extracted form animal liver is loaded and run on agarose gel. After staining it shows following pattern. If the remaining sample is treated with RNA se and loaded in gel, what result would you get ?

Sample loading well

A.

B.

C.

D.
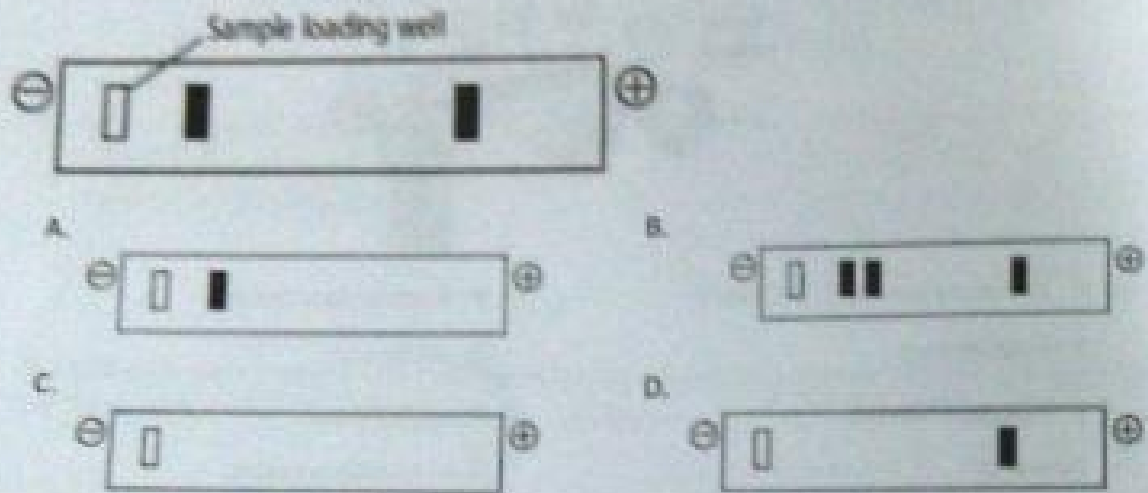
8. The given figure shows stages in the development of sperm form spermatogonia in human male. Identify the cells labelled (A-D) and select the option the correctly represents chromosome number per cell.
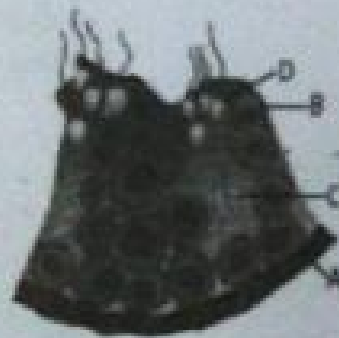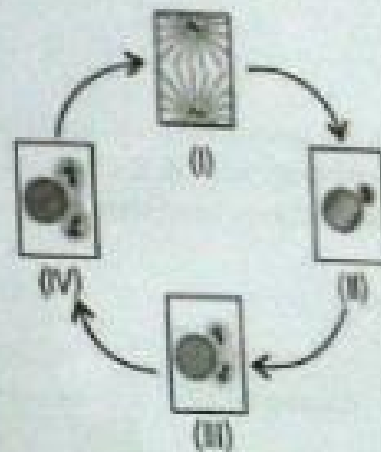
A. A- 23, B -46 , C- 23, D- 46

B. A- 23, B -23, C- 46, D- 46

C. A- 46, B -23, C- 46, D- 23

D. A- 46, B -46, C- 23, D- 23

9. Given below are four structures of nitrogenous bases. Identify the incorrect one.

A.
Cytosine

B.
Guanine

C.
Thymine

D.
Adenine
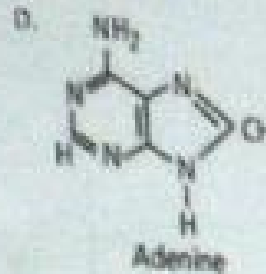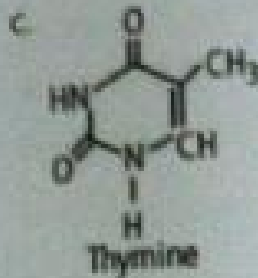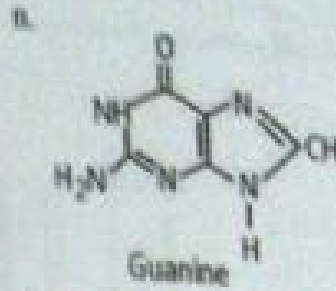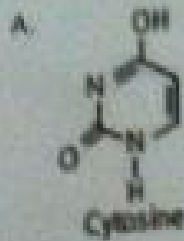
10. Refer to the given figure of centrosome cycle during cell division. Identify the stages of cell cycle to which these corresponds.

(I)

(IV)

(II)

(III)

A. $I \to M, II \to G_1, III \to S, IV \to G_2$

B. $I \to M, II \to S, III \to G_2, IV \to G_1$

C. $I \to S, II \to G_1, III \to M, IV \to G_2$

D. $I \to M, II \to G_1, III \to G_2, IV \to S$

11. If the respiratory rate of 'A' is 35 breaths/min and tidal volume 185 cc/breath and of 'B' is 25 breaths/min and tidal volume 259cc/breath, then

A. Alveolar ventilation of 'A' is greater than 'B'

B. Alveolar ventilation of 'A' and 'B' is same

C. Pulmonary ventilation of 'A' and 'B' is same

D. Pulmonary ventilation of 'A' is greater than 'B'

12. The following figure represents the concentrations of solutes P, Q, R, and S in the two compartments A and B which are separated by a semi-permeable membrane. The molecule that is actively transported across the membrane is :

A. P

B. R

C. S

D. Q
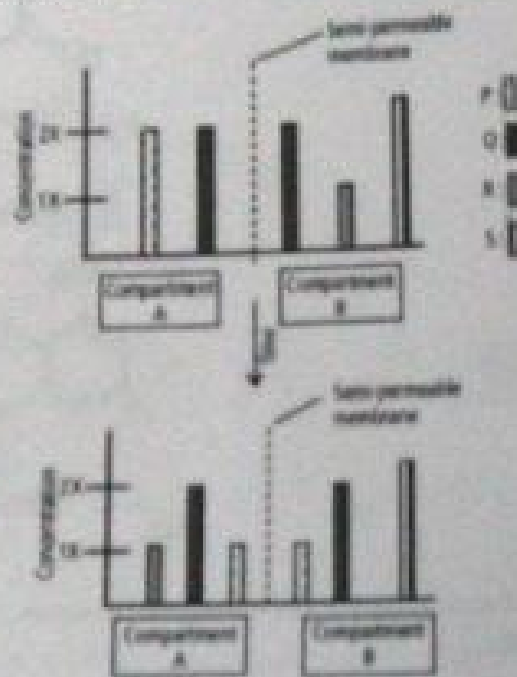
13. During the stages of succession in a given ecosystem, the following changes in characteristics may be observed. Which one of the characteristics, A, B, C or D is responsible for the apparent high degree of stability associated with a climax ecosystem?

| | Characteristic | ecosystem in development | |
		Early	Late
A.	Total organic Matter	Low	High
B.	Species diversity	Low	High
C.	Size of organism	Small	Large
D.	Food chains	Small	Large

A. A

B. C

C. D

D. B

14. No virus can evolve to target mammalian red blood cell because of the

   A. High concentration of oxygen

   B. Lack of nuclear material.

   C. Lack of aerobic pathway to generate ATP

   D. Small size with a biconcave shape

15. The ABO blood grouping in human beings is an example of

   (i) Dominance

   (ii) Incomplete dominance

   (iii) Co-dominance

   (iv) Multiple alleles

   A. (iii) and (ii) only

   B. (i), (iii) and (iv)

   C. (i) and (ii) only

   D. (ii), (iii) and (iv)

16. Match column I with column II and select the correct option.

Column - I	Column - II
A. Dinoflagellates	(i) Physarum
B. Chrysophytes	(ii) Amphipleura
C. Acellular slime moulds	(iii) Polysphondylium
D. Cellular slime moulds	(iv) Ceratium

   A. A - (iv), B - (ii), C - (i), D - (iii)

   B. A - (iii), B - (i), C - (ii), D - (iv)

   C. A - (ii), B - (iii), C - (i), D - (iv)

   D. A - (iv), B - (i), C - (iii), D - (ii)

17. Read the following description.

   "In these autotrophs, sporophyte is the dominant generation. Gametophyte is also photosynthetic and not dependent on sporophyte for nutrition."

   These autotrophs are :

   A. Bryophytes

   B. Angiosperms

   C. Pteridophytes

   D. Gymnosperms

18. Read the given statements and select the correct option.

Statement 1 : Out - crossing refers to the mating of animals of two different species.

Statement 2 : Interspecific hybridisation refers to the mating of superior males of one breed with superior females of the same breed.

A. Statement 1 is true but statement 2 is false.

B. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.

C. Both statements 1 and are false.

D. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.

19. There genes 'a', 'b' and 'c' are located on the same chromosome. The distance between 'a' and 'b' was 20 mu, 'b' and 'c' was 10 mu while 'a' and 'c' was 30 mu. In one member of a population, it was noticed that the expression of gene 'b' was missing. When the map distance between 'a' and 'c' was calculated, it still showed 30 mu. Choose the probable explanations.

i. The gene 'b' had a point mutation.

ii. The gene 'b' was silenced epigenetically.

iii. Segmental inversion occurred in the gene 'b'.

iv. The gene 'b' was replaced by another DNA segment of the same size.

A. i, III and IV only

B. II and IV only

C. I, II, III and IV

D. I and II only

20. Consider the following four statements (i-IV) regarding kidney transplant and select the two correct ones out of these.

   I. Even if a kidney transplant is proper the recipient my need to take immune-suppressants for a long time.

   II. The cell-mediated immune response is responsible for the graft rejection.

   III. The B-lymphocytes are responsible for rejection of the graft.

   IV. The acceptance or rejection of a kidney transplant depends on specific interferons.

        The two correct statements are

   A. I and III

   B. II and III

   C. II and IV

   D. I and II

21. Refer to the given graph showing relation between pH and activity of four enzymes. Identify P, Q, R and S and select incorrect statement regarding them.
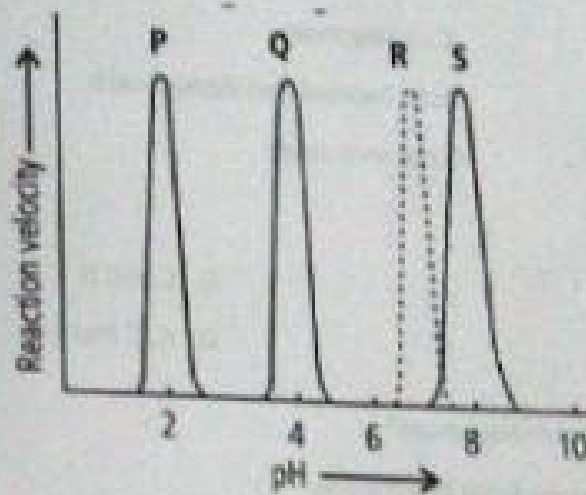
   A. Q could be found in intestinal juice and helps in digestion of carbohydrates.

   B. S could be found in pancreatic juice and helps in activation of a proenzyme.

   C. P could be found in stomach and helps in digestion of proteins.

   D. R could be found in oral cavity and is responsible for digestion of 60% of starch.

22. Match the column I with column II and select the correct option.

Column - I   Column - II

A. Statins   i) Trichoderma polysporum

B. SCP   ii) Monascus purpureus

C. Lipase   iii) Pseudomonas

D. Biogas   iv) Methylophilus methylotrophus

                     v) Candida lipolytica

A. A - (ii), B - (iv), C - (v), D - (iii)   B. A - (i), B - (iv), C - (v), D - (iv)

C. A - (v), B - (i), C - (iv), D - (iii)   D. A - (ii), B - (iv), C - (i), D - (iv)

23. Select the correct match.

    A. S phase   -   DNA replication

    B. Zygotene   -   Synapsis

    C. Diplotene   -   Crossing over

    D. Meiosis   -   Both haploid and diploid cells

    E. Gap - 2 phase   -   Quiescent stage

    A. A and B   B. C and D

    C. C and E   D. A, C and E

24. What is true about the deuterostomes?

    (i)   Mesoderm develops from blastopore.

    (ii) Mouth develops from blastopore.

    (iii) Cleavage is radial.

    (iv) Cleavage is indeterminate.

    A. (i), (iii) and (iv)   B. Only (i) and (ii)

    C. Only (iii) and (iv)   D. Only (i) and (iv)

Section B
LOGICAL REASONING

1. [illegible text] ...
    A. A   B. E
    C. None of these   D. F

2. In a certain code language,
    (i) [illegible] means 'you are good'
    (ii) [illegible] means 'good and bad'
    (iii) [illegible] means 'they are bad'
    In the above language, which word stands for 'they' ?
    A. [illegible]   B. pit
    C. tok   D. tan

3. If Anita is taller than Surjit but shorter than Kusum and Surjit is just as tall as Kalpana but taller than Kamla, then Kalpana is
    A. Shorter than Surjit   B. Just as tall as Anita
    C. Shorter than Anita   D. Taller than Kusum

4. Here are some words translated from an artificial language.
    'ali nro ktl' is 'clouds pour down'
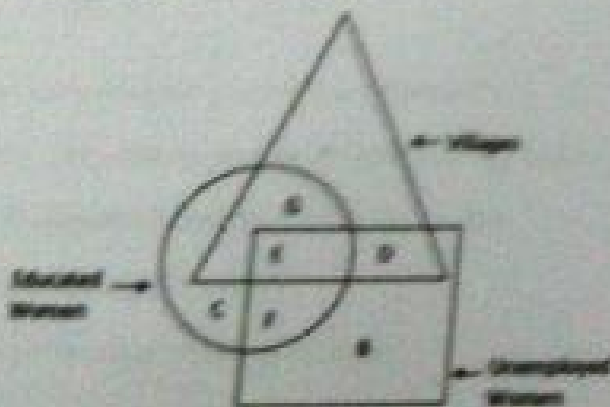   'nro boi mel' is 'down he goes'
    'boi nro sgi' is 'died down he'

    Which word could possibly mean 'he died' ?
    A. nro boi   B. sgi boi
    C. ktl boi   D. ali ktl

5. Study the diagram given below to answer the question.
    What does letter D represent ?

    ← Village
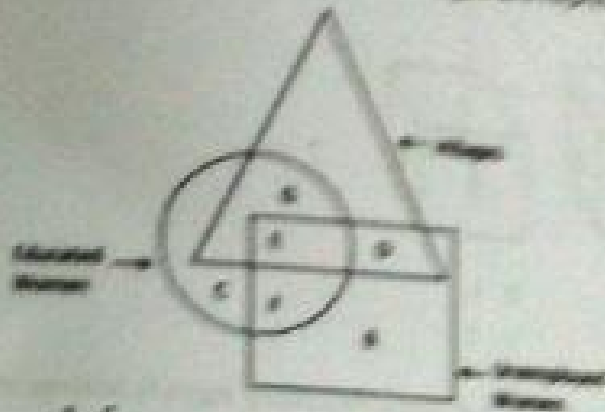Educated Women →
← Unemployed Women

    A. Educated employed women   B. Uneducated employed women in village
    C. Uneducated unemployed women   D. Uneducated women in villages

6. In which answer figure the problem figure is embedded?

7. Study the diagram given below to answer the question. Educated employed women in villages are represented by

A. E

C. G

B. S

D. D

8. A, B, C, D, E, F and G are sitting around a circle facing at the centre having dinner not necessarily in same order. E is neighbour of A and D. G is not between F and C. F is to the immediate right of A.

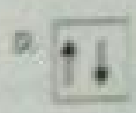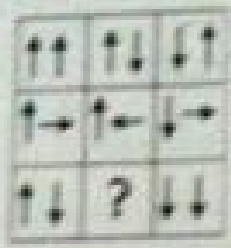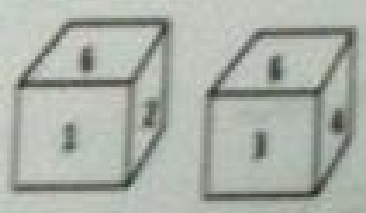Which of the following does not have the pair of persons sitting adjacent to each other

A. DE

C. GD

B. CB

D. BA

9. Which figure will replace the 'question mark' from the options to complete the figure ?

↑↑	↑↓	↓↑
↑→	↑←	↓→
↑↓	?	↓↓

A ↑↑

B ↓↑

C ↑→

D ↑↓

10. Two positions of a block are shown below.
When six is at bottom , what number come at the top?

A. 5

B. 4

C. 2

D. 1

11. Take the given statement(s) are true and decide which of the conclusions logically follows from the statements.
Statements: All vegetables are fruits. No vegetables are cereals. All Cereals are fruits. Some cereals are healthy.
Conclusion:
1. Some fruits are healthy
2. No vegetable is healthy
3. All healthy are fruits

A. Both conclusions 2 and 3 follows

B. Only conclusion 3 follows

C. Only conclusion 2 follows

D. Only conclusion 1 follows

12. In the following question, there is same relationship between the two terms of the left of ':'
and the same relationship holds between the two terms to the right. Find out the missing term from the given alternatives.
SLPH : HPLS :: NBAD : ?

A. DABN

B. ADBN

C. ADAB

D. BADN

Answer the question based on the following information:

In a family of 6, there are 3 men X,Y and Z and 3 women A, B and C. The six are Architect, Lawyer, Chartered Accountant (CA), Professor, Doctor and Engineer by profession but not in the same order.

1. There are two married couples and 2 unmarried persons.
2. Z is not A's husband
3. The doctor is married to the lawyer.
4. A's father is a professor.
5. Y is not X's son, nor is he an architecte or professor.
6. The lawyer is C's daughter-in-law
7. X is married to the CA

16. Which of the following is a married couple ?

    A. Y and A   B. Z and A

    C. X and B   D. X and C

17. Which of the given statements is superfluous and can be dispensed with ?

    A. 2   B. 6

    C. 3   D. 7

18. Which of the following combinations of person and profession is correct ?

    A. C - Chartered Accountant   B. Y - Professor

    C. B - Doctor   D. Z - Lawyer

19. Who are the two unmarried persons ?

    A. Y and A   B. Z and B

    C. Z and A   D. Y and B

20. Who is the Architect ?

    A. B   B. X

    C. A   D. Z

$X \rightarrow E$

$Y \rightarrow L$

$Z \rightarrow CA$

$A \rightarrow P$

$B \rightarrow D$

$C \rightarrow A$

21. Today, the age of Mother is thrice as that of her daughter. After 12 year, the age of the mother will be twice that of her daughter. The present age of the daughter is

   A. 14 year

   C. 16 year

          B. 12 year

          D. 16 year

22. Rewrite the word VOCALIST in the numeric from by writing its first four letters in the reverse order and then the next four letters in the reverse order by substituting I by 8, O by 1, L by 3, T by 2, V by 5, S by 7, A by 9 and C by 6.

   A. 96252783

   C. 92157683

          B. 92156873

          D. 92516783

23. I have a few sweets to be distributed. If I keep 2,3 or 4 in a pack, I am left with none. What is the minimum number of sweets I can pack and distribute ?

   A. 25

   C. 37

          B. 54

          D. 65

24. 'A+B' means 'A is the son of B' , 'A-B' means 'A is the wife of B'. What does P+R-Q means ?

   A. Q is the brother of P

   C. Q is the son of P

          B. Q is the father of P

          D. Q is the uncle of P

25. In a row of 40 boys, Satish was shifted 10 places to the right of Rohan and Kewal was shifted 10 places to the left of Vilas. If Vilas was twenty sixth from the left and there were three boys between Kewal and Satish after shifting. What was the position of Rohan in the row ?

   A. Data inadequate

   C. 26

          B. 25

          D. 27

Section- C
PHYSICS

1. On placing a dielectric slab between the plates of an isolated charged condenser its -

   A. Capacitance - decreases, Charge - remains unchanged, potential Difference - decrease, Energy stored - increases, Electric field - increases.

   B. Capacitance - increases, Charge - remains unchanged, potential Difference - increase, Energy stored - increases, Electric field - decreases.

   C. Capacitance - increases, Charge - remains unchanged, potential Difference - decrease, Energy stored - decreases, Electric field - decreases.

   D. Capacitance - decreases, Charge - remains unchanged, potential Difference - decrease, Energy stored - increases, Electric field - remains unchanged.

2. The cross the river in shortest distance, a swimmer should swim making angle θ with the upstream. What is the ratio of the time taken to swim across in the shortest time to that in swimming across aver shortest distance. [Assume speed of swimmer in still water is greater than the speed of river flow]

   A. cosθ

   B. sin θ

   C. tan θ

   D. cot θ

3. Ratio of intensities of two light waves is given by 4 : 1. The ratio of the amplitudes of the waves is :

   A. 2:1

   B. 1:2

   C. 4:1

   D. 1:4

4. A ray of light strikes a plane mirror at an angle of incidence 45^0 as shown in the figure. After reflection, the ray passes through a prism of refractive index 1.50, whose apex angle is 4^0. The angle through which the mirror should be rotated if the total deviation of the ray is to be 90^0 is :
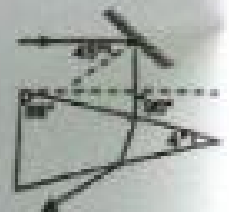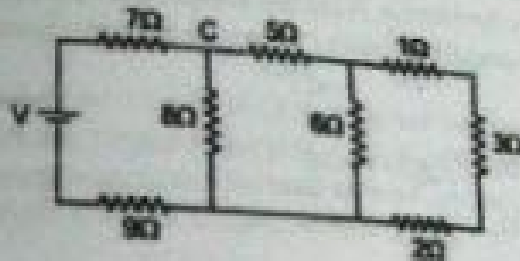

   A. 1^0 clockwise

   B. 1^0 anticlockwise

   C. 2^0 clockwise

   D. 2^0 anticlockwise

5. What should be the value of distance d so that final image is formed on the object itself. (focal lengths of the lenses are as given in the figure).
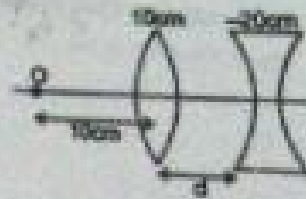
A. 10 cm

C. 5 cm

B. 20 cm

D. None of these

6. In the ladder network shown, current through the resistor 3Ω is 0.25 A. The input voltage 'V' is equal to

A. 10 V

C. 5 V

B. 20 V

D. 7.5 V

7. In a Young's double-slit experiment, the fringe width is β. If the entire arrangement is now placed inside a liquid of refractive index μ, the fringe width will become

A. μβ

B. β/μ

C. β/(μ+1)

D. β/(μ-1)

8. In a photoelectric experiment, the frequency and intensity of a light source are both doubled. Then consider the following statements.

(i) The saturation photocurrent remains almost the same.

(ii) The maximum kinetic energy of the photoelectrons is doubled.

A. Both (i) and (ii) are true

B. (i) is true but (ii) is false

C. (i) is false but (ii) is true

D. both (i) and (ii) are false

15. A particle is executing SHM. Then the graph of acceleration as a function of displacement is

    A. A straight line

    C. An ellipse

    B. A circle

    D. A hyperbola

16. A rectangular loop carrying a current I is situated near a long straight wire such that the wire is parallel to one of the sides of the loop and the plane of the loop is same of the left wire. If a steady current I is established in the wire as shown in the (fig) the loop will -
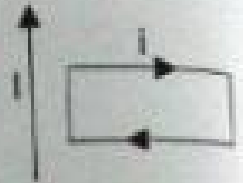
    A. Rotate about an axis parallel to the wire

    C. Move towards the wire

    B. Move away from the wire

    D. Remain stationary.

17. The frequency of oscillation of current in the inductor is :
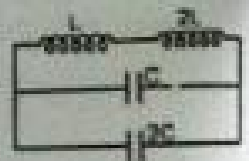
    A. $\dfrac{1}{3\sqrt{LC}}$

    B. $\dfrac{1}{6\pi\sqrt{LC}}$

    C. $\dfrac{1}{\sqrt{LC}}$

    D. $\dfrac{1}{2\pi\sqrt{LC}}$

18. A long straight wire carries a current I. at distance a and b = 3a from it there are two other wires, parallel to the former one, which are interconnected by a resistance R (figure). A connector slides without friction along the wires with a constant velocity v. Assuming the resistances of the wires, the connector, the sliding contacts, and the self - inductance of the frame to be negligible,;
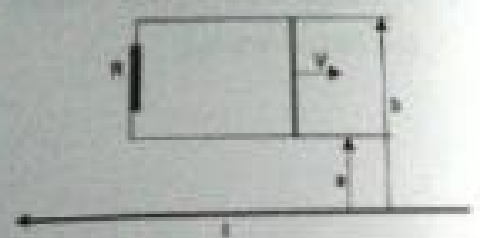
The point of application (distance from the long wire) of magnetic force on sliding wire due to the long wire is $2a/lnx$ from long wire. then findout value of x.
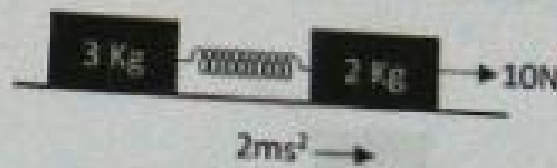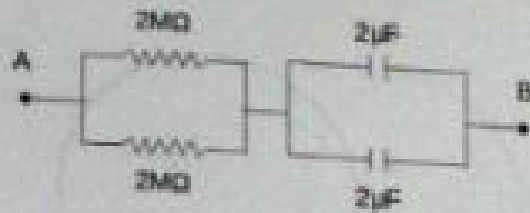

    A. 3

    C. 12

    B. 6

    D. 24

19. Find the acceleration of 3 kg mass when acceleration of 2kg mass is $2ms^{-2}$ as shown in figure.

A. $3 ms^{-2}$

B. $2 ms^{-2}$

C. $0.5 ms^{-2}$

D. zero

20. At time $t=0$, a battery of 10 V is connected across points A and B in the given circuit. If the capacitors have no charge initially, at what time (in seconds) does the voltage across them become 4 V? [Take : $\ln 5 = 1.6$, $\ln 3 = 1.1$]

A. 1 sec

B. 2 sec

C. 3 sec

D. 4 sec

21. In the figure shown a thin parallel beam of light is incident on a plane mirror m_1 at small angle 'θ'. M_2 is a concave mirror of focal length 'f'. after three successive reflections of this beam the x and y coordinates of the image is :
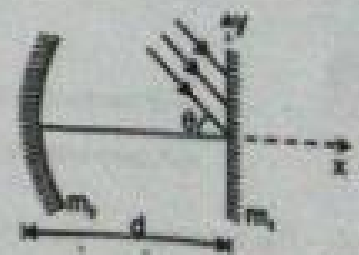

A. $x = f - d, y = f\theta$

B. $x = d + f, y = f\theta$

C. $x = f - d, y = - f\theta$

D. $x = d - f, y = - f\theta$

22. A battery is connected between two points A and B the circumference of a uniform conducting ring of radius r and resistance R. One of the arcs AB of the ring subtends and angle θ at the centre. The value of the magnetic induction at the centre due to the current in the ring is:

A. zero, only if $\theta = 180^0$

B. zero for all values of θ

C. proportional to $2(180^0 - \theta)$

D. inversely proportional to r

9. The current I in the circuit of figure is -
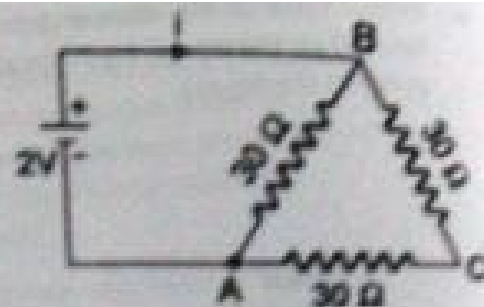
A. 1/45 A

B. 1/15 A

C. 1/10 A

D. 1/5 A

10. A plane surface is inclined making an angle θ with the horizontal. From the bottom of this inclined plane, a bullet is fired with velocity v. The maximum possible range of the bullet on the inclined plane is

A. v^2/g

B. $v^2/[g(1+\sin\theta)]$

C. $v^2/[g(1-\sin\theta)]$

D. $v^2/[g(1+\cos\theta)]$

11. Charges 2Q and - Q are placed as shown in figure. The point at which electric field intensity is zero will be :


A. Somewhere between - Q and 2Q

B. Somewhere on the left of - Q

C. Somewhere on the right of 2Q

Q. Somewhere on the perpendicular bisector of line joining - Q and 2Q

12. Eight point charges (can be assumed as uniformly charged small spheres and their centres at the corner of the cube) having value q each are fixed at vertices of a cube. The electric flux through square surface ABCD of the cube is
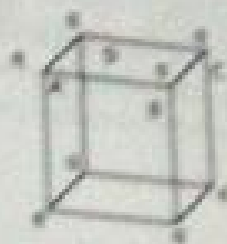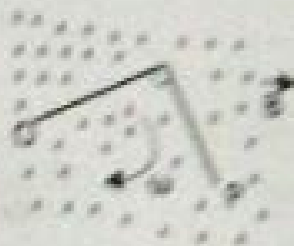

A. $q/24\varepsilon_0$

B. $q/12\varepsilon_0$

C. $q/6\varepsilon_0$

D. $q/8\varepsilon_0$

13. When an "L" shaped conducting rod is rotating in its own plane with constant angular velocity ω as shown, hinged about point O, in a uniform magnetic field B directed normally into the plane. The magnitude of emf induced across it will be:
Note: Both the linear parts have length "ℓ"

A. $0.5\,B\omega\ell^2$

B. $B\omega\ell^2$

C. $B\omega\ell^2$

D. $1.5\,B\omega\ell^2$

14. The given figure gives electric lines of force due to two charges q_1 and q_2. What are the signs of the two charges?

A. Both are negative

B. Both are positive

C. q_1 is positive but q_2 is negative
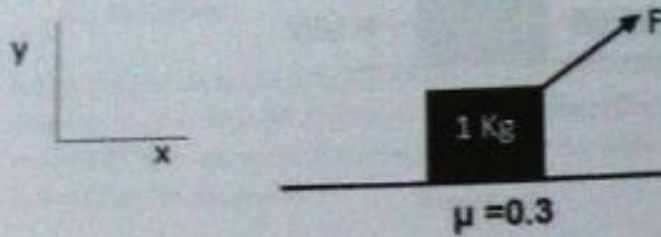
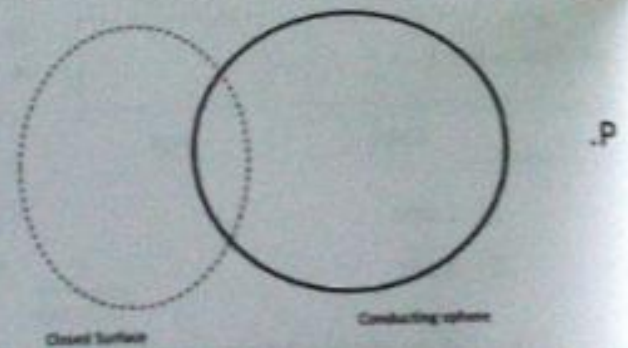D. q_1 is negative but q_2 is positive

23.

A force $\vec{F} = \hat{i} + 4\hat{j}$ acts on block shown. The force of friction acting on the block is:

A. $-\hat{i}$

B. $-1.8\hat{i}$

C. $-2.4\hat{i}$

D. $-3\hat{i}$

24. Figure shows a closed surface which intersects a conducting sphere. If a positive charge is placed at the point P, the flux of the electric field through the closed surface :

A. Will become positive

B. Will remain zero

C. will become undefined

D. will become negative

25. The binding energies of the atom of elements A & B are Ea & Eb respectively. Three atoms of the element B fuse to give one atom of element A. This fusion process is accompained by release of energye .Then Ea, Eb are related to each other as

A. Ea + e = 3Eb

B. Ea = 3Eb

C. Ea - e = 3Eb

D. Ea + 3Eb + e = 0
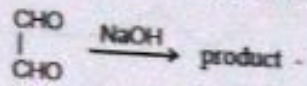
Section- D
CHEMISTRY

1. To coagulate gelatin sol, which of the following is most effective :

   A. Alcohol

   B. NaCl

   C. Na_3PO_4

   D. $AlCl_3$
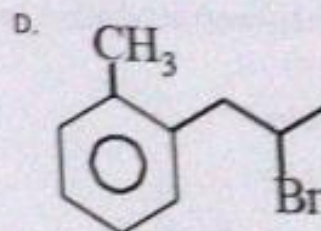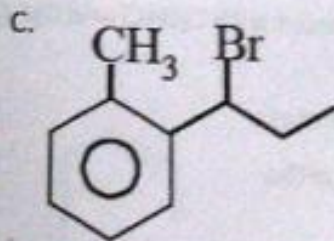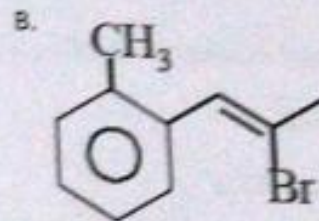
2. The product formed in the following reaction will be -

   $$\begin{matrix} CHO \\ | \\ CHO \end{matrix} \xrightarrow{NaOH} product$$

   A. $\begin{matrix} CH_2OH \\ | \\ CH_2OH \end{matrix}$

   B. $\begin{matrix} CH_2OH \\ | \\ COONa \end{matrix}$

   C. $\begin{matrix} COONa \\ | \\ COONa \end{matrix}$

   D. All of these

3. $\mu = \sqrt{15}$ is true for the pair -

   A. Fe^{+3}, Cr^{+2}

   B. Fe^{+2}, Cr^{+3}

   C. Mn^{+2}, Fe^{+2}

   D. Co^{+2}, Cr^{+3}

4. Which compound undergoes hydrolysis by the S_{N1} mechanism at the fastest rate?

   A.

   B.

   C.

   D.
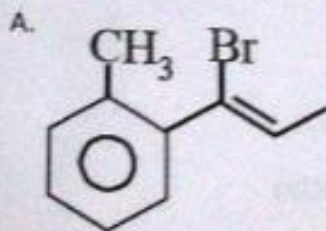
5. For the reaction
   $$2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$$
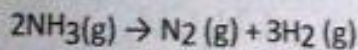
   what is the % of NH_3 converted if the mixture diffuses twice as fast as that of SO_2 under similar conditions.

   A. 6.25 %

   B. 3.125 %

   C. 62.25%

   D. 31.25 %

6. The number of optical active compounds in the isomers of C_4H_9Br is

B. 1

D. 3

A. 4

C. 2

7. The following concentration cell is a close-up cell

$Zn(s) \mid Zn^{2+} (aq, 0.2M) \parallel KCl(sat) \mid Zn^{2+} (aq, 2.0M) \mid Zn(s)$

Choose the correct option:

A. $Zn(s)$ reacts with $Kl(s)$ to form an intermetallic compound

B. Zn^{2+} reacts with Cl^- to form $ZnCl_2$

C. Reduction occurs in the more concentrated compartment and oxidation takes place in the more dilute, according to Le Chatelier's principle

D. Oxidation takes place in the more concentrated compartment and reduction in the more dilute, following Le Chatelier's principle

8.

 $\xrightarrow[\text{NH}_4\text{Cl}]{\text{CH}_3\text{MgX}}$ Product is

A. Meso

B. Enantiomer

C. Achiral

D. Diastereomer

9. The species present in solution when CO_2 is dissolved in water:

A. H_2CO_3, CO_3^{2-}

B. CO_2, H_2CO_3

C. CO_2, H_2CO_3, HCO_3^-

D. CO_3^{2-}, HCO_3^-

10. Which of the set of isomers of $C_6H_4Cl_2$ is having equal dipole moment with C_6H_5Cl and C_6H_6 respectively

A. meta and para

B. ortho and meta

C. ortho and para

D. para and ortho

11. The appropriate reagent for the following transformation:
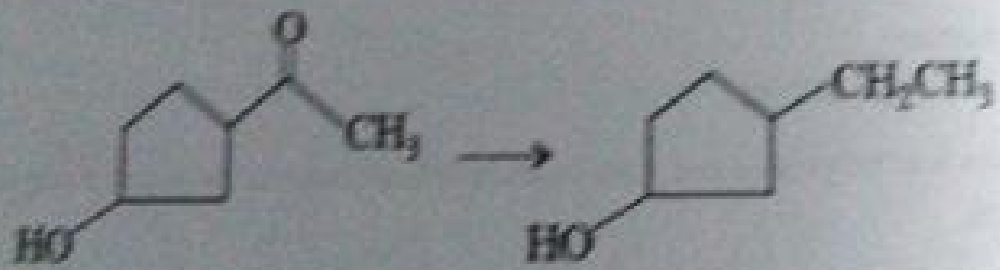
A. H_2/Ni

B. NH_2NH_2, OH^-

C. $Zn(Hg), HCl$

D. $NaBH_4$

12. Nitrate is confirmed by ring test. The brown colour of the ring is due to formation of
    A. FeSO₄NO₂
    B. nitroso ferrous sulphate
    C. ferrous nitrate
    D. ferrous nitrite

13.

$$\xrightarrow[\Delta]{H^+} A \xrightarrow[\text{(ii) } Zn/H_2O]{\text{(i) } O_3} \text{Product(s). Product is/are?}$$

A. + CH₃CHO

B. CH=O

C. OHC ... CHO

D. CHO + HCHO
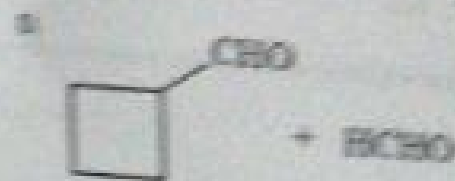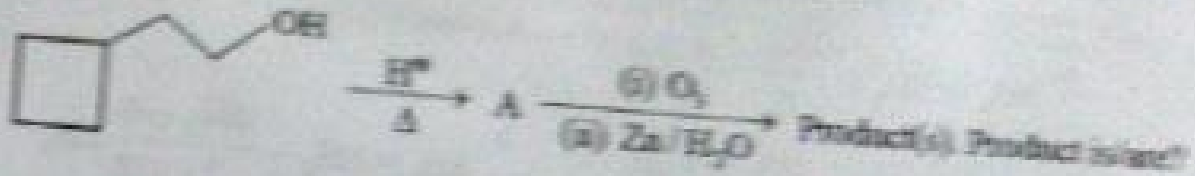
14. Which of the following will undergo sulphonation at fastest rate?

A.

B.

C.

D.
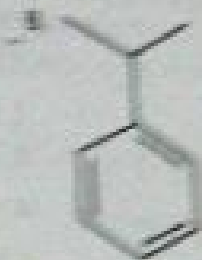
15. The IUPAC name of (CH₃)₂CH-CO-O-CH₂CH₃ is:
    A. Ethyl-2-methyl propanoate
    B. Ethyl isobutyrate
    C. Isopropyl propionate
    D. Isobutyl ethanoate

16. The magnetic moment of a salt containing Zn²⁺ ion is:
    A. 5.92
    B. 0
    C. 2
    D. 1.87

$$A. \ \Delta H_f - \Delta H_1 + \frac{\Delta H_2}{2} - \frac{3}{2}\Delta H_3$$

$$D. \ \Delta H_f = \Delta H_1 - \frac{\Delta H_2}{2} - \frac{3}{2}\Delta H_3$$

$$C. \ \Delta H_f - \Delta H_1 + \frac{\Delta H_2}{2} - \frac{3}{2}\Delta H_3$$

18. In photosynthesis, a compound belonging to which of the following families is formed ?

A. Protein
B. Vitamin
C. Fat
D. Carbohydrate

19. The hybridisation and unpaired electrons in $[Fe(H_2O)_6]^{2+}$ ion are :

A. sp^3d^2, 4
B. sp^3d^2, 2
C. d^2sp^3, 1
D. sp^3d^2, 4

20. Match List I with List II and select the correct answer:

List I (Species)	List II (O N O angle)
A. NO_2^+	1. 180°
B. NO_2	2. 134°
C. NO_2^-	3. 120°
D. NO_3^-	4. 115°
	5. 109°

A. A-1, B-2, C-4, D-3
B. A-1, B-4, C-3, D-2
C. A-5, B-2, C-4, D-3
D. A-5, B-4, C-3, D-2

21. If x is the velocity of an electron in first Bohr's orbit. What would be the velocity of the electron in third Bohr's orbit :

A. x/3
B. 3x
C. x/9
D. 9x

22. Maximum bond energy is in :

A. N_2
B. equal
C. F_2
D. O_2

23. For a hypothetical reaction,

$A + 3B \rightarrow P$ $\Delta H = -2x$ kJ/mole of A

& $M + 2Q \rightarrow R$ $\Delta H = -x$ kJ/mole of M

If these reactions are carried simultaneously in a reactor such that temperature is not changing, if rate of disappearance of B is y M sec^{-1} then rate of formation (in M sec^{-1}) of Q is:

A. $(3/4)y$

C. $(3/2)y$

B. $(4/3)y$

D. $(2/3)y$

24. For the following three reactions 1, 2 and 3, equilibrium constants are given:

(1) $CO(g) + H_2O(g) \leftrightarrow CO_2(g) + H_2(g)$; K_1

(2) $CH_4(g) + H_2O(g) \leftrightarrow CO(g) + 3H_2(g)$; K_2

(3) $CH_4(g) + 2H_2O(g) \leftrightarrow CO_2(g) + 4H_2(g)$; K_3

Which of the following relations is correct?

A. $K_3 = K_2^3 K_1^2$

B. $K_1 K_2 = K_3$

C. $K_3 = K_1 K_2$

D. $K_2 K_3 = K_1$

25. Blister copper is refined by stirring molten impure metal with green log-choose because such awood liberates hydrocarbon gases (like CH_4). This process X is called _____ and the metal containsimpurities of Y is _____

A. X = polling, Y = Cu_2O

C. X = cupellation, Y = CuO_2

B. X = polling, Y = CuO

D. X = cupellation, Y = CuO

1. A can do a piece of work in 10 days and B can do it in 16 days. Number of days to complete the work, if they work together is

   A. 6

   B. 5

   C. 8

   D. 7

2. Vinod covers a distance of 75 KM in 40 min with a speed of x km/hrs for 8 min, x/2 km/hr for next 12 min, x/2 km/hr for next 20 min, the value of x is

   A. 172.5 km/h

   B. 185 km/h

   C. 180 km/h

   D. 187.5 km/h

3. For what value of k, the equations kx - 9y = 66 and 2x - 9y = 8 will have no solution?

   A. None of these

   B. 55/4

   C. -6

   D. 6

4. ABCD is an isosceles trapezium with AB = 10 cm and CD = 6 cm. If EF = 8 cm, what is the perimeter of ABCD?
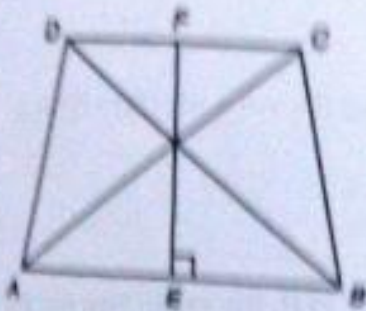
   A. None of the above

   B. 16 + 8 √15 cm

   C. 16 + 2 √11 cm

   D. 16 + 4 √17 cm

The distance between the points (0, 5) and (-5, 0) is

   A. 5

   B. 5√2

   C. 10

   D. 2√5

If ratio the bases of two similar triangles is 2:5, then the ratio of their areas is

   A. 2 : 25

   B. 4 : 9

   C. 4 : 5

   D. 4 : 25

7. 4/11 of a commodity was sold at a loss of 20% and the rest at a profit of 20%. The net gain is ₹ 120.
The cost of the commodity is

    B. ₹ 220

    D. ₹ 2220

A. ₹ 2200

C. ₹ 2020

8. If $\dfrac{a}{2(a-b)}+\dfrac{21}{3a+2b}=\dfrac{10}{3}$ and $\dfrac{16}{3a+2b}-\dfrac{7}{3a+2b}=1$. The value of $(3a+2b)$ is

    B. None of these

    D. 13/3

A. 3/13

C. 47/28

9. Ram buys a scooter at 13/15 of its value and sells it for 10% more than its value. His gain percentage
is

    B. $29\dfrac{13}{3}$ %

A. $3\dfrac{13}{23}$ %

    D. None of these

C. $29\dfrac{3}{13}$ %

10. If a and b are the roots of the quadratic equation $x^2+2x-3=0$ then the value of $(1/a)+(1/b)$ is

    B. -3/2

A. -2/3

    D. 2/3

C. 3/2

1. The age of Sita is 8 year more than twice the age of Sonu. If after n year, the age of Sita will be twice the age of Sonu, then the value of n is

A. Cannot be determined

    B. 10

C. 6

    D. 8

The distance between the points (2, k) and (-4, 1) is $2\sqrt{10}$ units, then the value of k is

A. -3

    B. -1

C. 1

    D. None of these

The values of x for the equation $x^2+\dfrac{1}{x^2}=6+\dfrac{3}{2}\left(x-\dfrac{1}{x}\right)$ is

A. 0

    B. ±1

C. None of these

    D. ±2

14. $15^3 \cdot 8^3 \cdot 7^3$ is divisible by which of the following

   A. 32

   C. 49

   B. 25

   D. 56

15. If x^2-3x+2 is a factor of x^4-px^2+q, then the value of P and q respectively will be

   A. 5, 4

   C. 5, -4

   B. -5, 4

   D. -5, -4

16. The cost of 3 table and 4 chairs is ₹ 2800 whereas the cost of 2 tables and 3 chairs is just ₹ 1950. What is the cost of 1 table?

   A. 600

   C. None of these

   B. 250

   D. 300

17. In the figure, the value of y is

   A. 120^0

   C. None of these

   B. 30^0
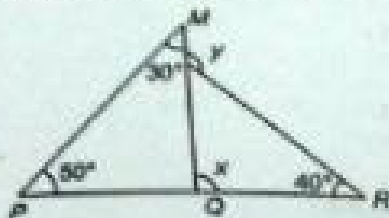
   D. 60^0

18. The value of $\sqrt{42+\sqrt{42+\sqrt{42+\ldots\ldots\ldots}}}\ \infty$ is

   A. 8

   C. 6

   B. 9

   D. 7

19. If $x = 2$, then value of $X - \dfrac{1}{x-\dfrac{1}{x-\dfrac{1}{x}}}$

   A. Cannot be determined

   C. 2

   B. 3

   D. 1

20. If the roots of the quadratic equation kx^2... true for k?

    A. $k < 9/8$

    B. $k < -9/8$

    C. $k > 9/8$

    D. $k < 8/9$

21. If $2^{x+y} = 32$ and $2^{x-y} = 4^2$, then $x^2 + y^2 =$

    A. $19/2$

    B. $17/2$

    C. $41/2$

    D. $29/2$

22. If $\sqrt{9^x} = 81$, then $\dfrac{x^2 - 4}{x}$ is equal to

    A. 11

    B. 8

    C. 7

    D. 10

23. What is the area of the triangle formed by joining the points $(0, 0)$, $(2, 4)$ and $(2, 0)$?

    A. 6 sq units

    B. 8 sq units

    C. 2 sq units

    D. 4 sq units

24. If a, b and c are in AP, then which of the following will also term an AP?

    A. $a+b, b-c, c+a$

    B. $a/2, b/2, (c/2) + 1$

    C. $a-b, b-c, c-a$

    D. None of these

25. What is the value of 11th term of an AP series, if the sum of its first 11 terms is equal to the sum of 1st 10 terms?

    A. 0

    B. None of these

    C. 1

    D. 11

1. In human female the fertilized eggs gets implantation in uterus
   - A. After about 7 days of fertilisation
   - B. After 3 weeks of fertilisation
   - C. After one month of fertilisation
   - D. After two months of fertilisation

2. Germs entering the body through food are mainly killed in the region of alimentary canal where pH may reach the level
   - A. 7
   - B. 10
   - C. Zero
   - D. 2

3. When the hilum, chalaza and micropyle of the ovule lie in the same longitudinal axis, it is known as
   - A. Campylotropous ovule
   - B. Orthotropous ovule
   - C. Amphitropous ovule
   - D. Anatropous ovule

4. The ultimate cause for movement of water against gravity in a tree is
   - A. Imbibition
   - B. Transpiration
   - C. Osmosis
   - D. Photosynthesis

5. Singamy refers to
   - A. Fusion of one of the sperms with synergid
   - B. Fusion of one of the sperms with the egg
   - C. Fusion of one of the sperms with the egg and other with the secondary nucleus
   - D. Fusion of one of the sperms with secondary nucleus

6. Minamata and Itai - Itai are respectively caused by pollution of
   - A. Mercury and lead
   - B. Lead and strontium
   - C. Lead and tin
   - D. Mercury and cadmium

7. Chloride shift is essential for transport of
   - A. CO_2
   - B. CO_2 and O_2
   - C. N_2
   - D. O_2

8. The joint between the atlas and axis vertebrae in man is.
   - A. Ball and socket joint
   - B. Gliding joint
   - C. Saddle joint
   - D. Pivot joint

9. The cells constituting walls of the blood capillaries are known as
   - A. Haemocytes
   - B. Parietal cells
   - C. Endothelial cells
   - D. Oxyntic cells

10. First stable compound in C3 cycle is

    A. Glucose - 6 - phosphate

                                B. Phosphoglyceric acid

    C. Phosphoglyceraldehyde

                                D. Fructose 1-6-biphosphate

11. Bone forming cells are

    A. Osteoclasts

                                B. Chondroclasts

    C. Osteoblasts

                                D. Chondroblasts

12. Analogous organs have a

    A. Common embryonic origin but perform different functions

    B. Different embryonic origin but perform similar functions

    C. Common embryonic origin and perform similar functions

    D. Different embryonic origin and perform different functions

13. Which of the following is used for determining the rate of transpiration in plants?

    A. Potometer

                                B. Porometer

    C. Auxanometer

                                D. Tensiometer

14. Smooth muscle fibres are

    A. Spindle - shaped, unbranched, unstriated, uninucleate and involuntary.

    B. Spindle-shaped, unbranched, non-striated, multinucleate and involuntary.

    C. Cylindrical, unbranched, non-striated, multinucleate and involuntary.

    D. Cylindrical, striated, unbranched, multinucleate and voluntary.

15. DNA replication is

    A. Continuous and conservative

    B. Conservative and semidiscontinuous

    C. Discontinuous and semiconservative

    D. Semidiscontinuous and semiconservative

16. Which of the following wall in the guard cells is thick?

    A. all the three

                                B. inner

    C. outer

                                D. side Wall

17. Which of the following is a weed killer?

    A. ABA

                                B. 2,4 - D

    C. GA3

                                D. NAA

18. When a true breeding tall plant is crossed with a true breeding short plant and the self pollinated to produce F2 ratio of true breeding tall and true breeding short plant in F2 will be

    A. 1:2   B. 1:1

    C. 2:1   D. 1:3

19. A gorilla like man with huge hand and legs. This is due to the abnormal secretion of

    A. Pituitary LH   B. Thyroid

    C. Pituitary FSH   D. Pituitary GH

20. which type of respiratory organs are present in spiders and scorpions?

    A. gill books   B. lungs

    C. gills   D. books lungs

21. Male mosquito does not carry malarial parasite because

    A. It lacks the modified mouth parts   B. Female mosquito is more deadly

    C. It is too small to bite man   D. Malarial parasites cannot reproduce in them

22. Movements of hairs in Drosera is

    A. Thermonastic   B. Seismonastic

    C. Thigmonastic   D. Photonastic

23. A Malpighian tubule empties urine into the

    A. Lymph   B. Gut

    C. Coelom   D. Ureters

24. Dinosaurs were abundant in

    A. Permian   B. Devonian

    C. Jurassic   D. Pleistocene

25. Which of the following tissues in mammals show the least capacity for generation?

    A. Nervous tissue of brain   B. Endothelium of blood vessels

    C. Skeletal tissue of long bones   D. Epithelial tissue

1. In the following questions insert the missing number in place of question mark from the given alternatives.


A. 30

C. 72

B. 90
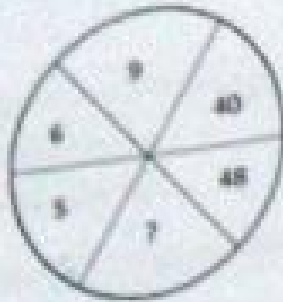
D. 54

2. In a queue, Shikhar is ninth from the back. Arun's place is eight from the front. Nikhil is standing between the two. What could be the minimum number of boys standing in the queue?

A. 8

C. 10

B. 14

D. 12

3. A is B's sister. C is B's mother. D is C's father. E is D's mother. How is A related to D?

A. Daughter

C. Grand daughter

B. Grand father

D. Grand Mother

4. In following question, four numbers are given, out of which three are alike in same manner and the fourth one is different. Choose out the odd one.

A. 49

C. 77

B. 63

D. 93

5. Pointing out a photograph, a man tells his friend, "she is the daughter of the only son of my father's wife". How is the girl in the photograph related to the man?

A. Niece

C. Sister

B. Cousin

D. Daughter

6. Deepak is the brother of Ravi, Reena is the sister of Atul. Ravi is the son of Reena. How is Deepak related to Reena?

A. Nephew

C. Father

B. Son

D. Brother

7. If white is called blue, blue is called red, red is called yellow, yellow is called green, green is called black, black is called violet and violet is called orange. What would be the colour of human blood?

A. Red

C. Violet

B. Green

D. Yellow

8. If BANGALORE is written as EROLAGNAB in a certain code language, how CHANDIGARH will be written in that code language ?

   A. DNAHCIGARH

   C. ACHNDIHRAG

   B. HRAGIDNAHC

   D. ABMFAXNGD

9. In a certain code, MADRAS is coded NBESBT. How is BOMBAY coded in that code?

   A. CPNCBZ

   C. CQOCBZ

   B. CPOCBZ

   D. CPNCBX

10. In the following a letter series is given with one term missing as shown by (?) Choose the missing term out of the given alternatives.
    A,B,D,G, ?

    A. M

    C. H

    B. K

    D. L

11. In a row of girls, there are 16 girls between Priya and Natasha. Priya is thirty-second from the left and of the row. If Priya is nearer than Natasha to the right end of the row, then how far away is Natasha from the left end of the row ?

    A. 16th

    C. Data Inadequate

    B. 14th

    D. 15th

12. In follwoing question, four words have been given, out of which three are alike in some manner and the fourth one is different. Choose out the odd one.

    A. Camel

    C. Donkey

    B. Cow

    D. Mule

13. A is uncle of B, who is the daughter of C and C is the daughter-in-law of P. How is A related to P?

    A. Cousin

    C. Nephew

    B. Brother

    D. None of there

14. Sale:Purchase :: ?

    A. Profit : Loss

    C. Give : Receive

    B. Cash : Credit

    D. Shop : Market

15. The letter and numbers have been arranged under some rule. Based on that rule find the missing number and letter ?

B	D	H	Y	M	?	C	O
2	4	?	25	13	6	3	15

   A. 21 and G

   C. 18 and A

   B. 8 and F

   D. 7 and I

16. In following sequence, four numbers are given, out of which three are alike in some manner and the fourth one is different. Choose out the odd one.

A. 80
B. 85
C. 69
D. 23

17. The diameter of each circle shown in the given figure is 'd' then the area of the square is given by:
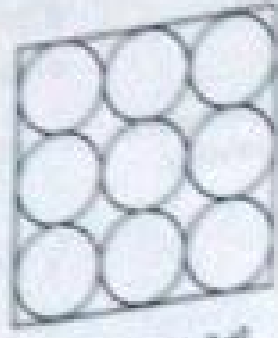
A. 9d
B. $9d^2$
C. $3d^2$
D. $16 d^2$

18. Count the numbers of cubes in the given figure and choose the correct answer out of given alternatives.
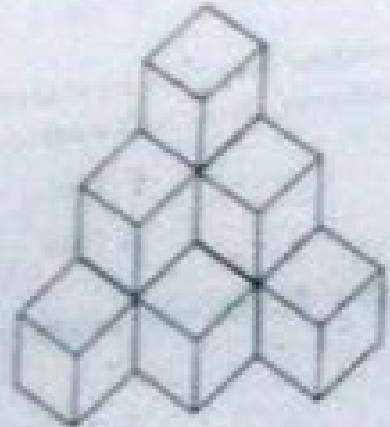
A. 8
B. 9
C. 11
D. 10

19. A number series is given which is accordance with some certain rule. What is the correct answer for the place of sign of interrogation out of given alternatives?

3,7,9,13,21,?

A. 30
B. 37
C. 36
D. 35

20. Deepak said to Nitin, "that boy playing with football is younger of the two brothers of the daughter of my fathere's wife". How is the boy playing football related to Deepak?

A. Father in Law
B. Maternal Uncle
C. Husband
D. Brother

Section- C
PHYSICS

1. The resistance of an ideal ammeter is

   A. low

   C. infinite

   B. zero

   D. high

2. When a body is charged by induction, then the body

   A. loses whole of the charge on it

   C. becomes neutral

   B. loses part of the charge on it

   D. does not lose any charge

3. Starting from rest, when a body moves with uniform acceleration, then distances covered after 1st, 2nd, 3rd, ...seconds are in the ratio

   A. $1:2:3:4$ ....

   C. $2:3:5:7$ ....

   B. $1:4:9:16$ ....

   D. $1:3:5:7$ ....

4. Tow charges are placed a certain distance apart in air. If a brass plate is introduced between them, the force between them will

   A. increase

   C. become zero

   B. decrease

   D. remain the same

5. A body has a negative charge of 1 coulomb. It means that it has

   A. acquired one additional electron

   C. Acquired 6.25×10^{18} additional electrons

   B. lost one electron

   D. lost 6.25×10^{18} electrons

6. The property of metals which allows them to be drawn readily into thin wires beyond their elastic limit without rupture is known as

   A. Hardness

   C. Elasticity

   B. Ductility

   D. Malleability

7. Choose the wrong statement:

   A. The velocity and acceleration of a body may not necessarily be in the same direction

   C. The accelerated motion may be due to change in magnitude of velocity or direction of velocity or both.

   B. When a body falls freely under the action of gravity, its acceleration is zero.

   D. The velocity and acceleration of a body may not be zero simultaneously.

8. The splitting of white light into several colours on passing through a glass prism is due to

    A. none of these

    B. refraction

    C. dispersion

    D. reflection

9. A person walks on a straight road from his home to a market 3km away with a speed of 5 km/h. finding market closed, he instantaneously turns and walks back with a speed of 6 km/h. The magnitude of average velocity is

    A. zero

    B. 2.73 km/h

    C. 5.45 km.h

    D. 5.5 km/h

10. If the electronic charge is 1.6×10^{-19} C, then the number of electrons passing through a section of wire per second, when the wire carries a current of 2A, is

    A. 1.25×10^{19}

    B. 1.6×10^{17}

    C. 1.6×10^{19}

    D. $1.25 \cdot 10^{17}$

11. Watt is equal to

    A. $A\Omega^2 s^{-1}$

    B. $A\Omega$

    C. $A\Omega^2$

    D. $A^2\Omega$

12. Two charges of 10C and -15C are separated in air by 1 m. the ratio of force exerted by one on the other is

    A. 2 : 1

    B. none of these

    C. 1 : 1

    D. 1 : 2

13. If a body is moving with a uniform acceleration a_1 for time t_1 and with uniform acceleration a_2 for time t_2, then its average acceleration is

    A. $\dfrac{a_1 + a_2}{t_1 t_2}$

    B. $\dfrac{a_1 + a_2}{t_1 + t_2}$

    C. $\dfrac{a_1 t_1 + a_2 t_2}{t_1 + t_2}$

    D. $\dfrac{a_1 t_1 + a_2 t_2}{a_1 + a_2}$

14. A body is lying on the surface of earth. Suppose that the earth suddenly loses its power of attraction, then

    A. The body will vanish in air

    B. The weight of body will become infinite

    C. The weight of body will become zero

    D. The mass of the body will become zero

15. The minimum amount of charge observed so far is

    A. 1.6×10^{19} C

    B. 1 C

    C. 1.6×10^{-19} C

    D. 4.8×10^{-13} C

16. As a person moves from pole to equator, the value of its weight will

    A. decrease

    B. increase

    C. remain same

    D. first increase then decrease

17. When a stone is dropped on the surface of still water, waves produced are

    A. transverse and longitudinal both

    B. longitudinal

    C. transverse

    D. neither transverse nor longitudinal

18. Choose the wrong statement:

    A. The value of displacement is always greater than the distance travelled.

    B. The value of distance travelled by a moving body can never be zero or negative.

    C. The value of displacement can be positive, zero or negative.

    D. The displacement of an object between two points has a unique value.

19. The slope of velocity - time graph for motion with uniform velocity is equal to

    A. zero

    B. none of the above

    C. Final velocity

    D. initial velocity

20. The smallest resistance which can be obtained with ten 0.1 ohm resistors is

    A. 0.1 ohm

    B. 0.01 ohm

    C. 1 ohm

    D. 0.001 ohm

21. A particle moves in the direction of east for 2s with velocity of 15 ms^{-1}. Then it moves towards north for 8s with a velocity of 5 ms^{-1}. The average velocity of the particle is (in ms^{-1})

    A. 10

    B. 5

    C. 1

    D. 7

22. The sound heard after reflection from an obstacle is called

    A. none of these

    C. echo

    B. musucal sound

    D. noise

23. A body is acted upon by a constant force, then it will have a uniform

    A. speed

    C. acceleration

    B. momentum

    D. velocity

24. What is the effective resistance between points A and B?
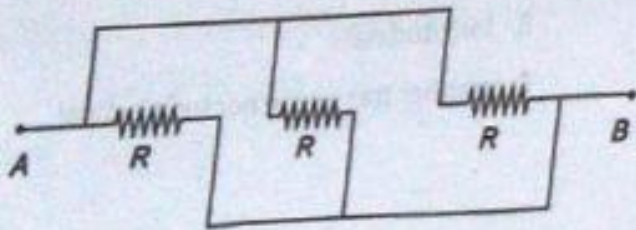
    A. 4R/3

    C. 2R/3

    B. R/2

    D. R/3

25. The area under accleration-time graph represents

    A. Displacement

    C. Velocity

    B. Distance travelled

    D. Change in velocity

CHEMISTRY

1. What happens when dilute Sulphuric acid is added to Zn granules?

   A. No reaction takes place.

   B. Chlorine gas and Zinc hydroxide are produced.

   C. Zinc salt and water are produced.

   D. Hydrogen gas and Zinc chloride are produced.

2. Which of the following are characteristics of isotopes of an element?

   A. Isotopes of an element show same physical properties

   B. Isotopes of an element have same atomic masses

   C. Isotopes of an element have same chemical properties

   D. Isotopes of an element have same atomic number

3. Which of the following hydroxides are most basic:

   A. $Be(OH)_2$

   B. $Ca(OH)_2$

   C. $Ba(OH)_2$

   D. $Mg(OH)_2$

4. The longest and the shortest periods are:

   A. 1 & 7

   B. 2 & 6

   C. 1 & 6

   D. 6 & 1

5. Acids react with bases to form salt and water. This reaction is known as:

   A. reduction

   B. Decomposition

   C. Neutralisation

   D. Combination

6. A solution of a substance 'X' is used for white washing. Name the substance 'X' and write its formula.

   A. Lime , $CaCO_3$

   B. Lime stone, $CaCO_3$

   C. Calcium carbonate , $CaCO_3$

   D. Calcium oxide , CaO

7. How is the concentration of hydronium ions (H_3O^+) affected when a solution of an acid is diluted?

   A. Becomes zero

   B. Decreases

   C. Increases

   D. Remains the same

8. When a gold foil is bombarded by a beam of α particle, only a few of them get deflected whereas most go straight undeflected. This is because

    A. The volume of nucleus is much smaller than that of the atom

    B. The force of repulsion acting on the fast moving α particles is very small

    C. The force of attraction exerted on α particles by the electrons is insufficient

    D. The neutrons have no effect on α particles

9. Which of the following does not have 8 valence electrons:

    A. He

    B. Cl^-

    C. Ar

    D. Ne

10. Molecular weight of $CuSO_4.5H_2O$ is equal to:

    A. 159.5 +10 + 16

    B. 159.5

    C. 249.5

    D. 159.5 X 90

11. Among the following select the metal found free in nature:

    A. Au

    B. Na

    C. Mg

    D. Cu

12. Which of the following represents cyclohexane:

    A. C_6H_{12}

    B. C_6H_6

    C. C_6H_{14}

    D. C_6H_{10}

13. An element X has valency equal to 3. What will be its formula with carbonate ions?

    A. $X(CO_3)_3$

    B. X_3CO_3

    C. XCO_3

    D. $X_2(CO_3)_3$

14. Na^+ has 12 neutrons and 10 electrons. Which of the following statements is correct?

    A. Na^+ has atomic number 10 and mass number 23.

    B. Na^+ has atomic number 11 and mass number 23.

    C. Na^+ has atomic number 10 and mass number 22.

    D. Na^+ has atomic number 11 and mass number 22.

15. The number of covalent bonds in C_5H_{12} is:

    A. 18

    B. 16

    C. 15

    D. 17

16. What type of reaction is respiration
    A. Combination reaction
    C. Reduction reaction
    B. Endothermic
    D. Exothermic

17. An element has 13 protons. The group and period to which it belongs:
    A. 2nd period and 13th group
    C. 3rd period and 13th group
    B. 3rd period and 3rd group
    D. 2nd period and 3rd group

18. Elements with atomic number 15 and mass number 31 is present in:
    A. Group 5 and period 4
    C. Group5 and period 3
    B. Group15 and period 4
    D. Group15 and period 3

19. Sodium carbonate solution is added to dilute ethanoic acid. It is observed that :
    A. A gas evolves
    C. The colour of the mixture
    B. A solid settles at the bottom
    D. The mixture becomes warm

20. A functional group mainly determines the
    A. Physical properties
    C. None of these
    B. Both
    D. Chemical properties

21. Which of the following is a correct statement:
    A. Na_2S is sodium sulphite, Na_2SO_3 is sodium sulphide, Na_2SO_4 is sodium sulphate
    C. Na_2S is sodium sulphide, Na_2SO_3 is sodium sulphate, Na_2SO_4 is sodium sulphite
    B. Na_2S is sodium sulphide, Na_2SO_3 is sodium sulphite, Na_2SO_4 is sodium sulphate
    D. Na_2S is sodium sulphite, Na_2SO_3 is sodium sulphite, Na_2SO_4 is sodium sulphide

22. Which of the following is the correct order of size:
    A. F< Cl< Br< I
    C. Cl< F< Br< I
    B. I<Br< Cl< F
    D. Br< I< Cl< F

23. Sodium is kept immersed in kerosene oil because:
    A. It reacts with moisture in the air
    C. The reaction of sodium with air is very violent.
    B. All of the above.
    D. Immersing in kerosene cuts off the supply of air

24. Which is **not** represented by 1mole of Nitrogen gas?

    A. 28g of N_2

    B. 12.046×10^{23} atoms of N_2

    C. 6.023×10^{23} atoms of N_2

    D. 6.023×10^{23} molecules of N_2

25. The number of valence electrons determines:

    A. Both physical and chemical properties of elements

    B. Chemical properties of elements

    C. Neither physical nor chemical properties of elements

    D. Physical properties of elements