PHYSICS

1. You have two 6 ohm resistors and one 3 ohm resistor. Which of the following is not a possible value for the net resistance?

   A) 15 ohm
   B) 1.5 ohm
   C) 6 ohm
   D) 1 ohm

   Answer: D

2. A ball is thrown vertically upwards with a speed of 20m/s. Calculate the maximum height it reaches and the total time of flight respectively. Take g = 10m/s^2.

   A) 20, 4
   B) 20, 2
   C) 40, 4
   D) 40, 2

   Answer: A

3. A 2 kg block slides down a smooth incline making an angle of 30 degrees with the horizontal. What is the acceleration of the block? Take g as 10m/s^2

   A) 10
   B) 9
   C) 5
   D) 5/√3

   Answer: C

4. Two cars start from rest and move along a straight road. Car A accelerates uniformly at 2 m/s^2 while car B accelerates at 3 m/s^2. How far apart will the cars be after 5 seconds?

   A) 25
   B) 12.5
   C) 10
   D) 20

   Answer: B

5. A pendulum of length 4m is displaced by a small angle. Calculate its time period. Take g as π^2 m/s^2.

   A) 4
   B) 2
   C) 1.414
   D) 3.14

   Answer: A

6. A 20V battery is connected to a combination of two 10Ω resistor. Find the net maximum current which can be passed through the circuit.

   A) 1 A
   B) 4 A
   C) 10 A
   D) 2 A

   Answer: B

7. A concave mirror has a focal length of 20cm. Where should an object be placed so that its image is formed at the same distance?

   A) 10cm
   B) 20cm
   C) 40cm
   D) 60cm

   Answer: C

8. A ray of light passes from air into water (n= = 1.33) at an angle of 45 degrees. What is the sine of angle of refraction?

   A) 0.53
   B) 0.75
   C) 1
   D) 0.26

   Answer: A

9. A lens has a power of +2D. Find the focal length and state the nature of lens.

   A) 2m, diverging
   B) 5m, converging
   C) 0.5m, converging

D) 2m, converging

Answer: C

10. A circular loop of wire with radius 5cm carries a current of 10A. Treating the loop as a magnetic dipole, calculate the magnetic moment of the loop.

A) 1.0455
B) 0.0785
C) 0.2548
D) 1.5655

Answer: B

11. A dentist uses a small, curved mirror to examine a patient's teeth. What type of mirror is this, and why is it suitable for this purpose?

A) Concave, magnified inverted image
B) Convex, magnified erect image
C) Convex, magnified inverted image
D) Concave, magnified erect image

Answer: D

12. A concave mirror produces a real image twice the size of the object. If the focal length of the mirror is 12cm, find the object distance.

A) 18cm
B) 12cm
C) 6cm
D) 24cm

Answer: A

13. A person is unable to clearly see objects closer than 50cm. Suggest a lens to correct this defect.

A) Convex lens
B) Concave lens
C) Biconcave lens
D) Both (A) and (C)

Answer: A

14. An electric iron of 1000W is used for 2hours daily. Calculate the total energy consumed in 30days in kilowatt-hours (kWh).

   A) 2
   B) 60
   C) 20
   D) 2000

   Answer: B

15. An electric heater is rated 1500 W, 220V. Calculate the current drawn by the heater and its resistance respectively.

   A) 6.82, 32.25
   B) 7.35, 35,12
   C) 4.42, 28.26
   D) None of these

   Answer: A

16. An infinitely long wire is carrying current from west to east. At what point is the direction of magnetic field from north to south?

   A) Top of the wire
   B) Bottom of the wire
   C) There will be no magnetic field
   D) The direction of magnetic field cannot be determined

   Answer: A

17. A convex mirror of focal length f produces an image 1/n th of the size of the object. Calculate the distance of the object from the mirror.

   A) (n+1)/nf
   B) (n+1)f
   C) (n-1)f
   D) (n-1)/nf

   Answer: C

18. An air bubble in a glass slab (n=3/2) is 6 cm deep when viewed from one face and 3 cm deep when viewed from the opposite face. Determine the thickness of the slab.

   A) 9cm
   B) 13.5cm

C) 15cm

D) 18cm

Answer: B

19. When a ray of light falls on a transparent glass plate, a part of it is reflected and a part of it is refracted. The reflected and refracted rays can be perpendicular to each other for……

A) Angle of incidence equal to 90 degrees

B) Angle of incidence equal to 0 degrees

C) Only one angle of incidence

D) More than one angle of incidence

Answer: C

20. It is possible to measure the passage of 50 electrons per sec with a certain sensitive device. This corresponds to a current of?

A) 8 x 10^(-18) A

B) 1.6 x 10^(-20) A

C) 8 x 10^(-20) A

D) 1.6 x 10^(-19) A

Answer: A

CHEMISTRY

1. Which of the following is a chemical reaction

A) Melting of ice

B) Dissolution of salt in water

C) Burning of wood

D) Boiling of water

Answer: C

2. The substance that is oxidized in the reaction is:

A) Sodium

B) Chlorine

C) Both sodium and chlorine

D) None of the above

Answer: A

3. Which of the following is a strong acid?

A) Hydrochloric acid (HCl)

B) Acetic acid (CH_3COOH)

C) Citric acid ($C_6H_8O_7$)

D) Formic acid (HCOOH)

Answer: A

4. Which of the following is a neutral salt?

A) Sodium chloride (NaCl)

B) Potassium nitrate (KNO_3)

C) Ammonium chloride (NH_4Cl)

D) Copper sulfate ($CuSO_4$)

Answer: A

5. The property of metals that makes them good conductors of electricity is:

A) Malleability

B) High density

C) Free electrons

D) Lustrous appearance

Answer: C

6. Which of the following metals does not react with cold water?

A) Sodium

B) Calcium

C) Magnesium

D) Potassium

Answer: C

7. Which of the following is an example of an unsaturated hydrocarbon?

A) CH_4

B) C_2H_6

C) C_2H_4

D) C_3H_8

Answer : C

8. The process used to convert vegetable oils into ghee or margarine is called:

A) Hydrogenation

B) Combustion

C) Fermentation

D) Saponification

Answer: A

9. Which of the following elements has the highest electronegativity?

A) Oxygen

B) Chlorine

C) Fluorine

D) Nitrogen

Answer: C

10. Which group of the periodic table contains the noble gases?

A) Group 1

B) Group 17

C) Group 18

D) Group 2

Answer: C

11. In an ionic bond, electrons are:

A) Shared between atoms

B) Donated by one atom and accepted by another

C) Transferred from one atom to another

D) None of the above

Answer: C

12. The bond formed between two chlorine atoms in a chlorine molecule (Cl_2) is:

A) Ionic bond

B) Covalent bond

C) Hydrogen bond

D) Metallic bond

Answer: B

13. The solubility of a substance is defined as:

A) The mass of solute that can dissolve in a solvent at a given temperature

B) The volume of the solution

C) The boiling point of the solution

D) The density of the solution

Answer: A

14. When a sugar solution is heated, it:

A) Evaporates

B) Becomes saturated

C) Becomes diluted

D) Crystallizes

Answer: A

15. The number of protons in an atom determines its:

A) Atomic number

B) Mass number

C) Neutron number

D) Electron configuration

Answer: A

16. Which of the following particles constitutes the nucleon(s)?

A) Proton

B) Electron

C) Neutron

D) Both proton and neutron

Answer: D

17. Which of the following is obtained in its purest form by the reaction of sugar and sulphuric acid?

A) Water

B) Carbon

C) Oxygen

D) Hydrogen

Answer: A

18. Arrange the following in the increasing order of ease of oxidation.

a) sulphate ion b) fluoride ion c) bromide ion d) hydroxide ion

A) abdc

B) bcda

C) cdba

D) abcd

Answer: D

19. Which of the following is a major greenhouse gas?

A) Oxygen

B) Nitrogen

C) Carbon dioxide

D) Neon

Answer: C

20. The main cause of acid rain is the presence of:

A) Carbon dioxide in the atmosphere

B) Sulphur dioxide and nitrogen oxides in the atmosphere

C) Ozone in the atmosphere

D) Methane in the atmosphere

Answer: B

MATHS

1. The remainder when 7^{100} is divided by 5 is:

a) 1

b) 2

c) 3

d) 4

Answer: b) 2

2. If a and b are the roots of the quadratic equation $3x^2-4x+1$, find the value of $1/a +1/b$.

a) 1

b) 4/3

c) 3/4

d) 3

Answer: c) 3/4

3. For what value of k will the system of equations kx+y=1 and 3x-2y=5 have a unique solution?

a) k≠3/2

b) k≠2/3

c) k=3/2

d) k=2/3

Answer: b) k≠2/3

4. A quadratic equation has roots 2/3 and -3/4. The equation is:

a) $12x^2-x-6=0$

b) $12x^2+x-6=0$

c) $12x^2+x+6=0$

d) $12x^2-x+6=0$

Answer: b) $12x^2+x-6=0$

5. The sum of the first n terms of an AP is $5n^2+3n$. The common difference of the AP is:

a) 5

b) 10

c) 3

d) 6

Answer: b) 10

6. The length of the chord of a circle with radius 10 cm and subtending a central angle of 120° is:

a) 10 cm

b) 20 cm

c) 10√3 cm

d) 15 cm

Answer: c) 10√3 cm

7. If $\sin\theta + \cos\theta = 5/4$, then the value of $\sin2\theta$ is:

a) 9/16

b) 7/16

c) 15/16

d) 3/4

Answer: b) 7/16

8. The mean of 20 observations is 50. If the value of one observation is changed from 25 to 75, the new mean is:

a) 52.5

b) 50.5

c) 55

d) 53

Answer: a) 52.5

9. A bag contains 3 red balls, 5 black balls, and 2 white balls. Two balls are drawn at random. What is the probability that they are of the same color?

a) 7/45

b) 1/5

c) 4/15

d) 14/45

Answer: d) 14/45

10. If A(3,4), B(5,6), and C(9,8) are the vertices of a triangle, the area of the triangle is:

a) 0

b) 10

c) 4

d) 2

Answer: a) 0 (Collinear points)

11. If $\cot\theta=7/24$, the value of $\csc\theta$ is:

a) 25/7

b) 25

c) 25/24

d) 24/25

Answer: a) 25/7

12. A triangle has sides of lengths 13, 14, and 15 units. The radius of its incircle is:

a) 5

b) 6

c) 7

d) 4

Answer: a) 5

13. A hemisphere has a curved surface area of 462cm². Its radius is:

a) 7 cm

b) 14 cm

c) 10 cm

d) 9 cm

Answer: a) 7 cm

14. A card is drawn from a standard deck of 52 cards. The probability that it is either a king or a red card is:

a) 7/13

b) 15/26

c) 4/13

d) 3/26

Answer: a) 7/13

15. If the polynomial $6x^4-7x^3+3x^2-4x+5$ is divided by x-2, the remainder is:

a) 29

b) 31

c) 30

d) 32

Answer: a) 29

16. The coordinates of the points A(2,3) and B(6,7) form the diameter of a circle. Find the equation of the circle.

a) $x^2+y^2-8x-10y+30=0$

b) $x^2+y^2-8x-10y+25=0$

c) $x^2+y^2-6x-8y+30=0$

d) x²+y²-6x-8y+25=0

Answer: a) x²+y²-8x-10y+30=0

17. The mean of 10 observations is 25. If each observation is increased by a random variable , and the probability of x=5 is 0.6 and x =10 is 0.4, the expected new mean is:

a) 30

b) 35

c) 37

d) 32

Answer: b) 35

18. A tangent is drawn to a circle of radius 5 cm from a point at a distance of 13 cm from its center. Find the length of the tangent.

a) 12 cm

b) 13 cm

c) 5√2 cm

d) 10√2 cm

Answer: a) 12 cm

19. A line 2x+y=6 intersects the parabola y=x². Find the x-coordinates of the points of intersection.

a) 2, -3

b) 3, -2

c) 2, 3

d) -2, 3

Answer: d) -2, 3

20. The sum of the first 4 terms of an AP is 40. If the first term is a=5, form a quadratic equation in terms of the common difference d.

a) 2d²-3d-15=0

b) 2d²+3d-15=0

c) 2d²+7d-15=0

d) 2d²-7d-15=0

Answer: b) $2d^2+3d-15=0$

BIOLOGY

1. If salivary amylase is lacking in the saliva, which of the following events in the mouth cavity will be affected?

(a) Proteins breaking down into amino acids

(b) Starch breaking down into sugars

(c) Fats breaking down into fatty acids and glycerol

(d) Absorption of vitamins

Answer: b

2. We test for starch and not glucose to prove that photosynthesis has taken place because:

(a) Glucose is not produced during photosynthesis in variegated leaves

(b) Glucose formed during photosynthesis gets stored as sucrose

(c) Glucose formed during photosynthesis gets stored as starch

(d) Glucose is a stable product and cannot be tested

Answer: c

3. Which of the following statement(s) is (are)true about the heart?

(i) The left atrium receives oxygenated blood from different parts of the body while the right atrium receives deoxygenated blood from lungs.

(ii) Left ventricle pumps oxygenated blood to different body parts while right ventricle pumps deoxygenated blood to lungs.

(iii) Left atrium transfers oxygenated blood to the right ventricle which sends it to different body parts.

(iv) The right atrium receives deoxygenated blood from different parts of the body while the left ventricle pumps oxygenated blood to different parts of the body.

(a) (i)

(b) (ii)

(c) (ii) and(iv)

(d) (i) and (iii)

Answer: c

4. Which of the following statement(s) is (are) true about respiration?

(i) During inhalation, ribs move inward and diaphragm is raised

(ii) In the alveoli, exchange of gases takes place i.e., oxygen from alveolar air

diffuses into blood and carbon dioxide from the blood into the alveolar air

(iii) Haemoglobin has a greater affinity for carbon dioxide than oxygen

(iv) Alveoli increase surface area for exchange of gases

(a) (i) and (iv)

(b) (ii) and (iii)

(c) (i) and (iii)

(d) (ii) and (iv)

Answer: d

5. What is the full form of ATP?

(a) Adenisyne tri-phosphate

(b) Adenosine tri-phosphate

(c) Adenosine tetraphosphate

(d) Adenosine monophosphate

Answer: b

6. Male reproductive organ in flowering plant is ?

(a) Ovary

(b) Stamen

(c) Corolla

(d) Carpel

Answer: b

7. The embryo in humans gets nutrition from the mother's blood with the

help of a special tissue called?

(a) Womb

(b) Uterus

(c) Placenta

(d) Villi

Answer: c

8. A pair of duct arising from testis, which carry sperms are ?

(a) Urethra

(b) Oviduct

(c) Vas deferens

(d) Fallopian tube

Answer: c

9. The correct sequence of reproductive stages seen in flowering plants is ?

(a) Gametes, embryo, zygote, seedling

(b) Seedling, embryo, zygote, gametes

(c) Gametes, zygote, embryo, seedling

(d) Zygote, gametes, embryo, seedling

Answer: d

10. The fertilisation of human egg by the sperm takes place in ?

(a) Oviduct

(b) Ovary

(c) Vagina

(d) Uterus

Answer: a

11. Which gland secretes the growth hormone ?

(a) Pituitary gland

(b) Hypothalamus

(c) Adrenal

(d) Thyroid

Answer: a

12. Electrical impulse travels in a neuron from ?

(a) Axonal end -> Axon -> Cell body -> Dendrite

(b) Dendrite -> Cell body -> Axon -> Axonal end

(c) Cell body -> Dendrite -> Axon -> Axonal end

(d) Dendrite -> Axon -> Axonal end -> Cell body

Answer: b

13. The gap between two neurons is called

(a) Axon

(b) Dendron

(c) Synthesise

(d) Synapse

Answer: d

14. Posture and balance of the body is controlled by ?

(a) Cerebrum

(b) Cerebellum

(c) Medulla oblongata

(d) Pons

Answer: b

15. Any change in the environment to which an organism responds is

called ?

(a) Hormone

(b) Response

(c) Coordination

(d) Stimulus

Answer: d

16. What is the difference between genetic drift and change due to natural selection ?

(a) Genetic drift does not involve competition between members of a species.

(b) Genetic drift does not require the presence of variation.

(c) There is no difference.

(d) Genetic drift never occurs in nature, natural selection does.

Answer: a

17. What are alleles ?

(a) Linked genes

(b) Chromosome that have crossed over

(c) Homologous chromosome

(d) Alternate forms of gene

Answer: d

18. The physical manifestation of an organism's genes is its ?

(a) Phenotype

(b) Genotype

(c) Environment

(d) Genetic code

Answer: a

19. Blue eye colour in human is recessive to brown eye colour. The expected children of a marriage between blue-eyed woman and brown-eyed male who had a blue-eyed mother are likely to be ?

(a) Three blue-eyed and one brown-eyed

(b) Two blue-eyed and two brown-eyed

(c) All brown-eyed

(d) All blue-eyed

Answer: b

20. A zygote which has an X-chromosome inherited from the father will

develop into a ?

(a) Girl

(b) Boy

(c) Either boy or girl

(d) X-chromosome does not influence the sex of a child

Answer: a

MENTAL ABILITY

1. What comes next in the series: 2, 3, 5, 8, 12, 17, ?

a) 21

b) 23

c) 25

d) 27

Answer: b) 23 (The difference increases by 1 each time: +1, +2, +3, +4, +5).

2. If "MANGO" is coded as "OCPIR" and "APPLE" is coded as "CRRNH," how will "GRAPE" be coded?

a) ITCRC

b) HTBRF

c) ITBRF

d) ITBRC

Answer: c) ITBRF (Each letter is shifted by +2, -1 alternately)

3. A is the son of B, but B is not the father of A. C is the father of A. How is B related to C?

a) Mother

b) Sister

c) Wife

d) Daughter

Answer: c) Wife

4. A man walks 10 km north, then turns left and walks 7 km, then turns right and walks 5 km, and finally turns left and walks 7 km. How far is he from his starting point?

a) 10 km

b) 15 km

c) 18 km

d) 20 km

Answer: c) 18 km

5. Pointing to a photograph, a man said, "I have no brothers and sisters, but the father of the man in the photo is my father's son." Who is the man in the photograph?

a) The speaker himself

b) The speaker's father

c) The speaker's son

d) The speaker's uncle

Answer: c) The speaker's son

6. In a certain code language, BRAIN is written as 5-2-18-9-14, and MIND is written as 13-9-14-4. What is the code for THINK?

a) 20-8-9-14-11

b) 20-9-8-14-11

c) 20-8-14-9-11

d) 20-8-9-11-14

Answer: a) 20-8-9-14-11 (Corresponding to positions in the English alphabet).

7. Which of the following does not belong to the group?

a) 343

b) 512

c) 729

d) 125

Answer: c) 729 (It is not a cube of a prime number).

8. If 3 + 5 = 16, 7 + 9 = 64, and 11 + 13 = 144, find the value of 15 + 17.

a) 200

b) 196

c) 256

d) 225

Answer: d) 225 (The average of the numbers squared: $(15 + 17)^2 = 225$).

9. Find the missing number in the sequence: 1, 2, 6, 24, 120, ?

a) 600

b) 720

c) 504

d) 1440

Answer: b) 720 (Factorial sequence: 1!, 2!, 3!, 4!, 5!, 6!).

10. At what time between 4:00 and 5:00 will the hands of the clock be at right angles?

a) 4:15

b) 4:10

c) 4:20

d) 4:16

Answer: d) 4:16 (Calculation shows this is when the angle between the hands is 90°).

11. If A × B means A is to south of B ; A + B means A is to the north of B ; A

% B means A is to the east of B ; A − B means A is to west of B, then in P %

Q + R − S, S is in which direction with respect to Q ?

a. South-West

b. South-East

c. North-East

d. North-West

Answer: b

12. Ruben was born on Feb 29th of 2012 which was a Wednesday. If he lives

to be 101 years old, how many birthdays would he celebrate on a

Wednesday?

a. 1

b. 3

c. 4

d. 5

Answer: c

13. What should come in the place of question mark (?) in the following alpha-

numeric series? C-3, E-5, G-7, I-9, ?, ?

a. X-24, M-21

b. K-11, M-13

c. O-15, X-24

d. M-18, K-14

Answer: b

14. Statements :

No giraffe is a leopard

All leopards are kangaroos

All kangaroos are wolfs

Conclusions :

All kangaroos can never be giraffes.

All giraffes are definitely wolfs

a. Only conclusions (A) follows

b. Only conclusion (B) follows

c. Either conclusion (A) or conclusion (B) follows

d. Both conclusions (A) and (B) follow

Answer: a

15. In a code, CORNER is written as GSVRIV. How can CENTRAL be written
in that code ?

a. DFOUSBM

b. GNFJKER

c. GIRXVEP

d. None of these

Answer: c

16. CIRCLE is related to RICELC in the same way as SQUARE is related to?

a. QSUERA

b. QUSERA

c. UQSAER

d. UQSERA

Answer: d

17. In code language, ASTARK is written as LBFMG and MOBILE is written as
TNRSPJ. How is BLAME written in that code?

a. TSFRJ

b. RPFTJ

c. NJFTP

d. TSFGJ

Answer: b

18. Which number would replace question mark in the series 7, 12, 19, ? 39

a. 28

b. 29

c. 26

d. 24

Answer: a

19. If PAINT is code as 74128 and EXCEL is coded as 93596, then how would
ACCEPT be coded?

a. 455978

b. 547978

c. 554978

d. 735961

Answer: a

20. Pointing towards a person in a photograph, Anjali said, "He is the only
son of the father of my sister's brother". How is the person related to Anjali

a. Mother

b. Father

c. Maternal Uncle

d. Brother

Answer: d