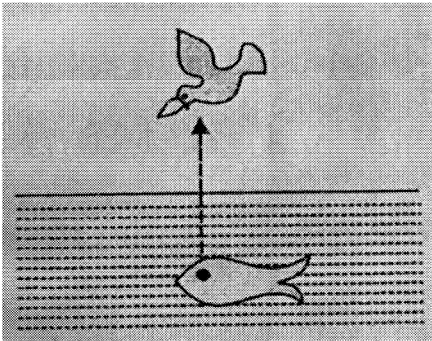


PHYSICS

Q. 1) A bird and a fish are at positions as shown. The bird observes a fish moving vertically upward towards the water surface. The fish will appear to the bird to be :



- A) moving faster than its real speed and also away from the real distance
- B) moving faster than its real speed and nearer than its actual position
- C) moving slower than its real speed and also nearer than its real distance
- D) moving slower than its real speed and away from the real distance

Q. 2) A region may consist of electric field only or magnetic field only or both electric and magnetic fields or none of the fields. A proton passes through this region. Match column I and column II (neglect gravity)

Column I

- a) acceleration of the particle is zero
- b) kinetic energy of the particle changes and it also suffers deflection
- c) kinetic energy of the particle remains constant
- d) kinetic energy of the particle changes but it suffers no deflection

Column II

- p) The region has electric field only
- q) The region has magnetic field only
- r) The region contains no field
- s) under special conditions, this is possible when both electric and magnetic fields are present

- A) a \rightarrow r, s ; b \rightarrow p, s ; c \rightarrow q, r ; d \rightarrow p, s
- B) a \rightarrow r, s ; b \rightarrow p, s ; c \rightarrow p, r ; d \rightarrow p, q
- C) a \rightarrow r, s ; b \rightarrow p, s ; c \rightarrow q, r, s ; d \rightarrow p, s
- D) a \rightarrow r, s ; b \rightarrow p, s ; c \rightarrow q, p ; d \rightarrow p, r

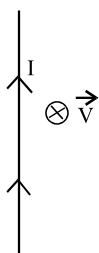
Q.3) Identify the correct statements :

- A) Average velocity and average speed are always equal when the speed of the object is uniform
- B) If the displacement of the body is directly proportional to the time of the journey, then the object is moving with uniform acceleration
- C) The speed of the object always changes when the object has acceleration
- D) An object in motion can have non-uniform velocity and uniform speed.

Q.4) Identify the correct statements

- A) work done by a person when lifting a box from the floor and keeping it on a stool depends on the path followed by the box
- B) work done by the frictional force on a moving object is always non-zero
- C) work done by a force is independent of reference frame
- D) Net force acting on a body is independent of reference frame

Q. 5) A steady current flows through an infinitely long straight current carrying conductor. A proton is projected with a velocity u in a direction perpendicular to the plane containing the conductor as shown, then



- A) magnetic force on the proton is always zero
- B) Initial magnetic force acting on the proton is towards right
- C) Initial magnetic force acting on the proton is zero and proton moves along a straight line path
- D) Initial magnetic force acting on the proton is zero and it moves along a curved path

Q. 6) An object floats in water on a planet with 10% of the object outside the water. If the container containing water falls freely then, the percentage of volume of the object inside the water is :

- A) 10%
- B) <10%
- C) <90%
- D) 90%

Q. 7) A swimmer overcame a raft of wooden block at a point B, when he was in downstream motion. 50 minute later he turned back and after some time passed the wooden block at a distance 3km from the point B. Find the stream velocity assuming the swimming speed is constant.

- A) $\frac{1}{2}$ m / s
- B) 1 m/s
- C) 2 m/s
- D) $\frac{1}{4}$ m / s

Q. 8) A person of mass 30kg pushes another person of mass 40kg due to which the first man starts moving with an acceleration of 2m/s^2 . The acceleration of the second person at that instant is : (They are standing on a smooth horizontal surface)

A) 2m/s^2

B) $\frac{3}{2}\text{m/s}^2$

C) $\frac{2}{3}\text{m/s}^2$

D) $\frac{4}{3}\text{m/s}^2$

Q. 9) Which of the following statements are correct?

A) pressure exerted by the air on the walls of an open room is zero since the weight of the air acts downward

B) pressure of air on the floor equal the weight of air column inside the room (from floor to ceiling) per unit area, when the room is open.

C) pressure exerted by air in an open room is nearly same on the floor, the walls and ceiling

D) pressure of air on the floor of an open room equals the atmospheric pressure but the air pressure on the ceiling is zero.

Q. 10) Volume of an ideal gas is halved and pressure and temperature are doubled. The number of molecules of the gas :

A) remains constant

B) becomes half

C) become two times

D) become four times

Q. 11) Which of the following equation is correct in uniformly accelerated motion : [u = initial velocity, a = acceleration, t = time, s = displacement, v = velocity at a time t]

A) $v = u + at$

B) $v = u + at^2$

C) $s = u + at$

D) $v = u + 2as$

Q. 12) Force per unit area is called :

A) Thrust

B) Pressure

C) Power

D) Momentum

Q.13) Mass of an object is 2kg and resultant force acting on it is 10N. The acceleration of the object is :

A) 20 m/s^2

B) $\frac{1}{5} \text{ m/s}^2$

C) 5 m/s^2

D) 2 m/s^2

Q. 14) Identify the wrong statement :

A) A refrigerator transfers heat from lower temperature to higher temperature

B) Woolen clothes keep the body warm in winter

C) Air is a good conductor of heat

D) Atomic mass of helium is more than that of hydrogen

Q. 15) In S.I system unit of electric current is :

A) ampere

B) coulomb

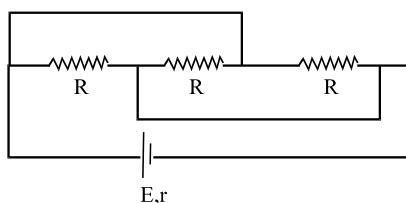
C) coulomb - second

D) ampere / second

Numerical type questions

Q.16) A uniform wire of 10cm length and resistance 3Ω is stretched such that its radius become $\frac{1}{3}$ times the initial value. New resistance of the wire in ohm is :

Q. 17) A battery of emf 2V and internal resistance 1Ω is connected across a circuit as shown in figure. Find out the current through the battery: ($R = 3\Omega$)



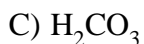
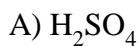
Q. 18) Frequency of a sound wave in air is 200 Hz and speed is 330m/s. The same sound travels through water with speed 1500m/s, the frequency of the wave in water is :

Q. 19) Mass of an object at the surface of the earth is 10kg. The mass of the same object at the surface of the moon is : (Answer is in kg)

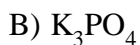
Q. 20) The change in magnetic flux associated with a coil in 2 seconds is 10 weber. The magnitude of induced emf produced in the coil in volts is :

CHEMISTRY

Q. 21) Which among the following is a weak acid?



Q. 22) **X** is a crystalline substance. It dissolves in water to form a colourless solution. On adding methyl orange the solution develops yellow colour. On adding Barium nitrate to the solution a precipitate is formed. The crystalline substance **X** is most likely to be



Q. 23) 6022 molecules of Neon gas are present in a tiny discharge tube. How many moles of Neon are present in the discharge tube?

A) 1×10^3

B) 1×10^{-3}

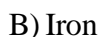
C) 1×10^{-23}

D) 1×10^{-20}

Q. 24) A non metal that liberates hydrogen gas from steam is



Q. 25) Which metal among the following is least reactive compared to others?



Q. 26) Which crystalline allotrope of carbon is very hard, not a conductor of electricity but has high thermal conductivity?

- A) Diamond
- B) Graphite
- C) Fullerene (C₆₀)
- D) Graphine

Q. 27) Which compound among the following is not in the same homologous series as C₇H₁₆?

- A) CH₄
- B) C₂H₆
- C) C₆H₁₂
- D) C₈H₁₈

Q.28) The hydrocarbon that help the ripening of fruits is

- A) Methane
- B) Ethane
- C) Ethene
- D) Propyne

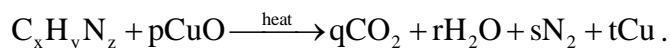
Q.29) Which among the following salt dissolve in water to form colourless solution?

- A) Cobalt nitrate
- B) Potassium nitrate
- C) Potassium permanganate
- D) Ferrous sulphate

Q. 30) Which among the following reactions do not occur under the given set of conditions?

- A) $2\text{HgO}(\text{s}) \xrightarrow{\text{heat}} 2\text{Hg}(\text{l}) + \text{O}_2(\text{g})$
- B) $2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \xrightarrow{\text{heat}} 6\text{Cu}(\text{s}) + \text{SO}_2(\text{g})$
- C) $\text{Ca}(\text{OH})_2(\text{aq}) + \text{CO}_2(\text{g}) \xrightarrow{298\text{K}} \text{CaCO}_3(\text{s}) + \text{H}_2\text{O}(\text{l})$
- D) $\text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq}) \xrightarrow{298\text{K}} \text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq})$

Q. 31) Select the correct set of co-efficients, p, q, r, s, t for the balanced chemical equation



A) $p = \left(2x - \frac{y}{2}\right)$ $q = x$ $r = \frac{y}{2}$ $s = z$ $t = \left(2x - \frac{y}{2}\right)$

B) $p = \left(x - \frac{y}{2}\right)$ $q = \frac{x}{2}$ $r = \frac{y}{2}$ $s = \frac{z}{2}$ $t = \left(x - \frac{y}{2}\right)$

C) $p = \left(2x + \frac{y}{2}\right)$ $q = x$ $r = \frac{y}{2}$ $s = \frac{z}{2}$ $t = \left(2x + \frac{y}{2}\right)$

D) $p = \left(x + \frac{y}{2}\right)$ $q = x$ $r = y$ $s = \frac{z}{2}$ $t = \left(x + \frac{y}{2}\right)$

Q. 32) Match the compounds in List-I with structural formulae in List-II and functional groups in List-III and select the correct match from choices given

List-I (Compounds)

List-II (Structural formula)

List-III (Functional groups)

1) Methanol

i) CH_3COCH_3

p) aldehyde

2) Methanal

ii) CH_3OH

q) Ketone

3) Propanone

iii) $HCHO$

r) Alcohol

A) (1) → (iii), (r); (2) → (ii), (p); (3) → (i), (q)

B) (1) → (iii), (r); (2) → (i), (p); (3) → (ii), (q)

C) (1) → (ii), (r); (2) → (iii), (p); (3) → (i), (q)

D) (1) → (ii), (r); (2) → (iii), (q); (3) → (i), (p)

Q. 33) Match the type of elements in List-I with the elements given in List-II and atomic number in List-III and select the correct match

List-I (Type of element)

List-II (Element)

List-III (Atomic number)

1) Transition element

i) Neon

p) 19

2) Noble gas

ii) Potassium

q) 29

3) Alkali metal

iii) Copper

r) 10

A) (1) → (iii), (q); (2) → (ii), (r); (3) → (i), (p)

B) (1) → (i), (r); (2) → (ii), (p); (3) → (iii), (q)

C) (1) → (ii), (p); (2) → (i), (r); (3) → (iii), (q)

D) (1) → (iii), (q); (2) → (i), (r); (3) → (ii), (p)

Q. 34) Match the name of the substances given in List-I with the formula of compounds in List-II and uses given in List-III and select the correct match

List-I (Substance)	List-II (Formulae)	List-III (Uses)
1) Table salt	i) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$	p) fungicide
2) Blue vitriol	ii) NaCl	q) making freezing mixtures
3) Washing soda	iii) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	r) manufacture of glass

A) (1) \rightarrow (ii), (q); (2) \rightarrow (iii), (p); (3) \rightarrow (i), (r)

B) (1) \rightarrow (ii), (q); (2) \rightarrow (iii), (r); (3) \rightarrow (i), (p)

C) (1) \rightarrow (i), (r); (2) \rightarrow (iii), (p); (3) \rightarrow (ii), (q)

D) (1) \rightarrow (i), (p); (2) \rightarrow (iii), (q); (3) \rightarrow (iii), (r)

Q. 35) Match the ions in List-I with the reagents used for detecting their presence in List-II and the observations in the detection test given in List (III) and select the correct match

List-I (ions in aqueous solution)	List-II (reagents)	List-III (Observation)
1) Sulphate	i) Barium chloride	p) Scarlet precipitate
2) Ammonium	ii) Sulphuric acid and ferrous sulphate	q) white precipitate
3) Nitrate	iii) Nessler's reagent	r) Brown ring

A) (1) \rightarrow (i), (p); (2) \rightarrow (iii), (r); (3) \rightarrow (ii), (q)

B) (1) \rightarrow (i), (q); (2) \rightarrow (ii), (r); (3) \rightarrow (iii), (p)

C) (1) \rightarrow (i), (q); (2) \rightarrow (iii), (p); (3) \rightarrow (ii), (r)

D) (1) \rightarrow (iii), (r); (2) \rightarrow (i), (q); (3) \rightarrow (ii), (p)

Numerical type questions

Q. 36) Give the sum of protons, neutrons and electrons present in an atom of radioactive isotope of carbon.

Q. 37) How many hydrogen atoms are there in a molecule of decyne?

Q. 38) Give the group number of the element with electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$.

Q. 39) How many grams of dihydrogen (H_2) are required to react completely with 490 g dinitrogen to form ammonia (atomic mass of $\text{H} = 1$, $\text{N} = 14$)

Q. 40) How many co-valent bonds are there in a molecule of cyclohexane?

MATHEMATICS

$$\frac{1 + \frac{2}{3}}{1 - \frac{3}{8}} = \frac{8 - \frac{5}{3}}{1 - \frac{1}{3}}$$

Q. 41) The value of

- A) 17/12
- B) 21/19
- C) 19/21
- D) 19/12

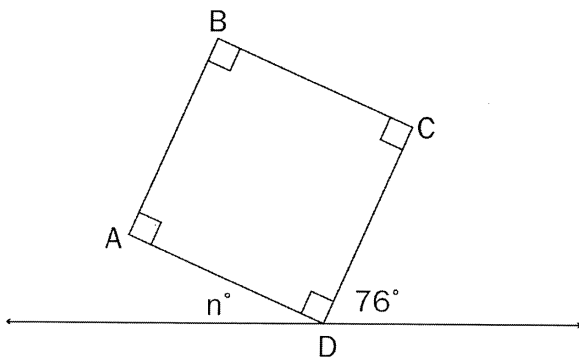
Q. 42) If A(-1, 7), B(2, 7) C(2, 11) D(-1, 11) . Then perimeter of WABCD is :

- A) 11
- B) 16
- C) 18
- D) 14

Q. 43) What is the greatest common factor of 90, 126, 180 and 990?

- A) 18
- B) 9
- C) 36
- D) 16

Q. 44) ABCD is a square. Find the value of n.



- A) 24
- B) 16
- C) 14
- D) 26

Q. 45) Marin spends 28% of her monthly income for a loan payment. Her loan payment is ` 1, 736. What is her monthly income?

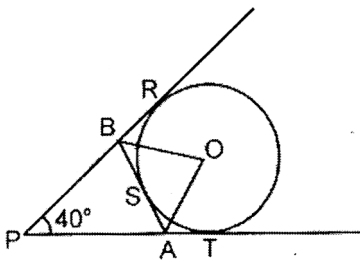
A) ` 6800

B) ` 6200

C) ` 8600

D) ` 9000

Q. 46) In the figure, $\triangle APB$ is formed by three tangents to the circle with centre O. If $\angle APB = 40^\circ$, then the measure of $\angle BOA$ is :



A) 50°

B) 55°

C) 60°

D) 70°

Q. 47) $(1 - 2x + 2x^2)^2 = a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4$. Then sum of the coefficient $a_1 + a_2 + a_3 + a_4$ is :

A) 0

B) 1

C) 73

D) 18

Q. 48) If $x = \sqrt{3}$ and $y = \sqrt{2}$ then $\frac{x^4 + y^4}{(x + y)(x - y)}$ is :

A) 5

B) 14

C) 13

D) 15

Q. 49) If $x^2 = 18x + y$ and $y^2 = x + 18y$ with $x \neq y$, then the value of $\sqrt{x^2 + y^2 + 1}$ is :

- A) 17
- B) 18
- C) 19
- D) None of these

Q. 50) The sum of sixteen consecutive even integers is 544. Then the difference between second one and second last one is :

- A) 20
- B) 24
- C) 26
- D) 28

Q. 51) The side lengths of a triangle are 15, 20, and 25 units. Then the length of shortest altitude of the triangle is :

- A) 12
- B) 10
- C) 14
- D) 16

Q. 52) Raju made 3 different equilateral triangular frams, with side lengths of each are in the ratio 1 : 2 : 3 from a wire of length 72 cm and Gopi made 3 different square frams whose sides are in the same ratio 1 : 2 : 3 respectively from same length of 72cm wire. Then the ratio of the total area of the figure formed by Raju and Gopi is :

- A) $4:3\sqrt{3}$
- B) $4\sqrt{3}:7$
- C) $4\sqrt{3}:11$
- D) $4:7\sqrt{3}$

Q. 53) If $3x^2 + 2y^2 - 2z^2 - 9x + 2y + 8 = 0$;

$$2x^2 - y^2 + 5z^2 + 4x - 8y + 12z - 3 = 0$$

and $6z^2 - 4x^2 + 3y^2 - x + 2y + 9 = 0$. Then the value of $5x + 4y - 3z$ is (x, y, z are real numbers)

- A) 16
- B) 17
- C) 18
- D) 19

Q. 54) What is the mean of 17, 23, 35, 64 and 102?

A) 44.2

B) 46.2

C) 48.2

D) 47.2

Q. 55) If $\sin \theta = \frac{\sqrt{3}-1}{2}$ then the approximate value of $\frac{\sec \theta(\sec \theta + \tan \theta)}{(1 + \tan^2 \theta)}$ is :

A) 7.326

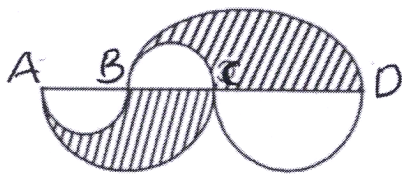
B) 1.366

C) 1.116

D) 0.216

Numerical type questions

Q. 56) 5 semicircles are drawn as shown in figure. If $AB : BC : CD = 3 : 2 : 6$ then the ratio of area of shaded region to that of unshaded region is $76 : \lambda$, then λ is :

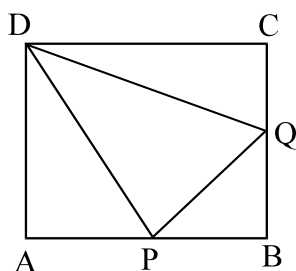


Q. 57) Let D be a point inside of equilateral $\triangle ABC$, and E be a point outside of equilateral $\triangle ABC$ such that $\angle BAD = \angle ABD = \angle CAE = \angle ACE = 10^\circ$. What is $\angle EDC$?

Q. 58) Number of terms in the expansion of $(a + b + c)^2$ is :

Q. 59) The value of $\left(\sqrt{4 + \sqrt{4^2 \times 2^4 \times 2} - 3^2} \right)^2 =$

Q. 60) ABCD is a square. P and Q are points on AB and BC respectively such that the area of triangle APD = 5, area of triangle PBQ = 4 and area of triangle QCD = 6, all areas in square units. Then the square of the area of the triangle DPQ, is :



Date : 26th December 2020

PHYSICS

1. C
2. C
3. D
4. D
5. D
6. D
7. A
8. B
9. C
10. B
11. A
12. B
13. C
14. C
15. A
16. 243
17. 1
18. 200
19. 10
20. 5

CHEMISTRY

21. C
22. B
23. D
24. C
25. C
26. A
27. C
28. C
29. B
30. D
31. C
32. C
33. D
34. A
35. C
36. 20
37. 18
38. 6
39. 105
40. 18

MATHEMATICS

41. D
42. D
43. A
44. C
45. B
46. D
47. A
48. C
49. B
50. C
51. A
52. A
53. D
54. C
55. B
56. 49
57. 40
58. 6
59. 9
60. 105