

6 12.2.2024

தினகரன் கல்வி

10th Model Questions & Answers

Time: 3.00 Hrs

Science

Maximum Marks: 75

PART-I

(12×1=12)

Answer all questions

- The value of universal gas constant
a) $3.81 \text{ mol}^{-1} \text{ K}^{-1}$ b) $8.03 \text{ mol}^{-1} \text{ K}^{-1}$ c) $1.38 \text{ mol}^{-1} \text{ K}^{-1}$ d) $8.31 \text{ mol}^{-1} \text{ K}^{-1}$
Ans: d) $8.31 \text{ mol}^{-1} \text{ K}^{-1}$.
- In which of the following reaction, the mass number decreases by four of the daughter nucleus?
a) α decay b) β decay c) γ decay d) Neutron decay
Ans: a) α Decay.
- The gram molecular mass of water is:
a) 2g b) 16g c) 18g d) 8g
Ans: c) 18g.
- A 25% alcohol solution means
a) 25 ml alcohol in 100 ml of water
b) 25 ml alcohol in 25 ml of water
c) 25 ml alcohol in 75 ml of water
d) 75 ml alcohol in 25 ml of water
Ans: d) 75 ml alcohol in 25 ml of water
- The general molecular formula of alkynes is _____
a) $\text{C}_n\text{H}_{2n+2}$ b) C_nH_{2n} c) $\text{C}_n\text{H}_{2n-2}$ d) C_nH_n
Ans: a) $\text{C}_n\text{H}_{2n+2}$
- The heart of amphibians possess _____ chambers.
a) 3 b) 4 c) 2 d) 5
Ans: a) 3.
- Which is the sequence of correct blood flow
a) ventricle - atrium - vein - arteries
b) atrium - ventricle - veins - arteries
c) atrium - ventricle - arteries - vein
d) ventricles - vein - atrium - arteries
Ans: c) atrium - ventricle - arteries - vein
- Bipolar neurons are found in:
a) retina of eye b) cerebral cortex c) embryo d) Respiratory epithelium
Ans: a) retina of eye.
- The loss of one or more chromosome in a ploidy is called _____.
a) Tetraploidy b) Aneuploidy c) Euploidy d) polyploidy
Ans: b) Aneuploidy.
- We can cut the DNA with the help of
a) scissors b) restriction endonucleases c) knife d) RNA ase
Ans: b. restriction endonucleases
- Green house effect refers to
a) cooling of earth b) trapping of UV ray
c) cultivation of plant d) warming of earth
Ans: d) warming of earth
- Match the following:
(1) Sarcoma (i) Excessive hunger
(2) Carcinoma (ii) Excessive thirst
(3) Polydipsia (iii) Connective tissue cancer
(4) Polyphagia (iv) Stomach cancer
(a) (1) - iii, (2) - iv, (3) - ii, (4) - i
(b) (1) - iv, (2) - iii, (3) - i, (4) - ii
(c) (1) - i, (2) - iii, (3) - iv, (4) - ii
(d) (1) - iv, (2) - i, (3) - iv, (4) - iii
Ans: (a) (1) - iii, (2) - iv, (3) - ii, (4) - i.

PART-II

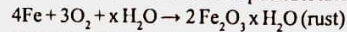
(7×4=28)

Answer any Seven Questions. Question No.22 is Compulsory

- Define Inertia. Give its classification.
Ans: Anybody would like to continue to be in its state of rest or the state of motion.
Types : inertia of rest, inertia of motion, inertia of direction.
- Why does the sky appear blue in colour?
Ans: When sunlight passes through the atmosphere the blue colour is scattered to a greater extent than the red colour.

- What is rust? Give the equation for formation of rust.

Ans: When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust.



- What is respiratory quotient?

Ans: Respiratory quotient is the ratio of volume of carbon dioxide liberated and the volume of oxygen consumed during respiration.

$$\text{Respiratory quotient} = \frac{\text{Volume of CO}_2 \text{ liberated}}{\text{Volume of O}_2 \text{ consumed}}$$

- What is bolting? How can it be induced artificially?

Ans: Treatment Of Rosette Plants With Gibberellin Induces Sudden Shoot Elongation Followed By Flowering. This Is Called Bolting.

- What are allosomes?

Ans:

- Allosomes are chromosomes which are responsible for determining the sex of an individual
- They are also called as sex chromosomes or hetero-chromosomes.
- The 23rd pair of chromosomes in humans are allosomes—Male XY Female XX

- Distinguish between -somatic gene therapy and germ line gene therapy

Ans:

Somatic gene therapy	Germ line gene therapy
1. It is the replacement of defective gene in somatic cells.	It is the replacement of defective gene in germ cell (egg and sperm).
2. It is only beneficial to the patient but not carried to the next generation	The gene can be carried to the next generation.

- Identify the parts A, B, C and D in the given figure.

Ans:

- A - Exine, B - Intine,
C - Generative Cell,
D - Vegetative nucleus



- What is Stage?

Ans:

- Stage is the background appearing when we open the scratch window.
- The background will most often be white.
- You can change the background colour as you like.

- An electric heater of resistance 5Ω is connected to an electric source. If a current of 6A flows through the heater, then find the amount of heat produced in 5 minutes.

Ans:

$$\text{Resistance } R = 5\Omega,$$

$$\text{Current } I = 6\text{ A},$$

$$\text{Time } t = 5 \text{ minutes} = 5 \times 60\text{s} = 300\text{s}$$

$$\text{Amount of heat produced, } H = I^2 R t,$$

$$H = 6^2 \times 5 \times 300.$$

$$\text{Hence, } H = 54000 \text{ J}$$

PART-III

(7×2=14)

Answer any Seven Questions. Question No.32 is Compulsory

- List any five properties of light?

Ans:

- Light is a form of energy.
- Light always travels along a straight line.
- Light does not need any medium for its propagation. It can even travel through vacuum.
- The speed of light in vacuum or air is, $c = 3 \times 10^8 \text{ ms}^{-1}$.
- Light is in the form of waves, it is characterized by a wavelength (λ) and a frequency (ν)
- Different coloured light has different wavelength and frequency.
- Among the visible light, violet light has the lowest wavelength and red light has the highest wavelength.

24. a) What is meant by electric current? (2Mark)

b) Name and define its unit? (2Mark)

Ans:

a) The rate of flow of charges in a conductor. If a net charge 'Q' passes through any cross section of a conductor in time 't', then the current flowing through the conductor is, $I = Q/t$

b)

- The SI unit of electric current is ampere (A).
- The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross-section of a conductor, in one second.

$$\text{Hence, 1 ampere} = \frac{1 \text{ Coulomb}}{1 \text{ Second}}$$

25. a) What is amalgam? Give an example.

b) Mention any two uses of copper.

Ans:

- (a). An amalgam is an alloy of mercury with another metal.
(b). It is used in electroplating. It is alloyed with gold and silver for making coins and jewels.

26. What are the methods of preventing corrosion?

Ans:

1. Alloying:

The metals can be alloyed to prevent the process of corrosion. E.g: Stainless Steel

2. Surface Coating:

It involves application of a protective coating over the metal. It is of the following types:

a) **Galvanization:** It is the process of coating zinc on iron sheets by using electric current.

b) **Electroplating:** It is a method of coating one metal over another metal by passing electric current.

c) **Anodizing:** It is an electrochemical process that converts the metal surface into a decorative, durable and corrosion resistant.

Aluminium is widely used for anodizing process

d) **Cathodic Protection:** It is the method of controlling corrosion of a metal surface protected is coated with the metal which is easily corrodible.

The easily corrodible metal is called Sacrificial metal to act as anode ensuring cathodic protection

27. Differentiate the eye defects: Myopia and Hypermetropia.

Ans:

	Myopia:	Hypermetropia:
1.	Short sightedness	Long sightedness
2.	Lengthening of eyeball	Shortening of eyeball.
3.	Distant object cannot be seen clearly	Nearby object cannot be seen clearly.
4.	Focal length of eye lens is reduced	The distance between eye lens and retina decreases.

28. Enumerate the functions of blood.

Ans:

- Transport of respiratory gases (Oxygen and CO_2).
- Transport of digested food materials to the different body cells.
- Transport of hormones.
- Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and also helps in regulation of pH and body temperature.
- It maintains proper water balance in the body.

29. With a neat labelled diagram explain the structure of a neuron.

A neuron typically consists of three basic parts: Cyton, Dendrites and Axon.

(i) **Cyton:**

(a) Cyton is also called cell body or perikaryon. It has a central nucleus with abundant cytoplasm called neuroplasm.

(b) The cytoplasm has large granular body called Nissl's granules and the other cell organelles like mitochondria, ribosomes, lysosomes, and endoplasmic reticulum.

(c) Neurons do not have the ability to divide.

(ii) **Dendrites:**

(a) These are the numerous branched cytoplasmic processes that project from the surface of the cell body. They conduct nerve impulses towards the cyton.

(b) The branched projections increase the surface area for receiving the signals from other nerve cells.

(iii) **Axon:**

(a) The axon is a single, elongated, slender projection. The end of axon terminates as fine branches which terminate into knob like swellings called synaptic knob.

(b) The plasma membrane of axon is called axolemma, while the cytoplasm is called axoplasm. It carries impulses away from the cyton.

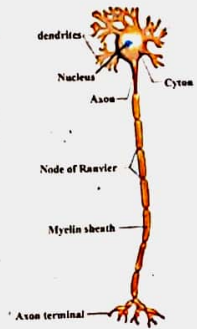
(c) The axons may be covered by a protective sheath called myelin sheath which is further covered by a layer of Schwann cells called neurilemma.

(d) Myelin sheath breaks at intervals by depressions called Nodes of Ranvier. The region between the nodes is called as internode. Myelin sheath acts as insulator and ensures rapid transmission of nerve impulses.

(iv) **Synapse:**

(a) A junction between synaptic knob of axon of one neuron and dendron of next neuron is called synaptic junction.

(b) Information from one neuron can pass to another neuron through these junctions with the release of chemicals known as neurotransmitters from the synaptic knob.



30. Define Ethnobotany and write its importance.

Ans: • Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

- The term Ethnobotany was coined by J.W. Harshberger in 1895 to include the study of plants used by the primitive and aboriginal people.

Importance of Ethnobotany:

- It provides traditional uses of plant.
- It gives information about certain unknown and known useful plants.
- The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologists and practitioners of herbal medicine.
- Tribal communities utilize ethnomedicinal plant parts like bark, stem, roots, leaves, flower bud, flowers, fruits, seeds, oils, resins, dyes, gum for the treatment of diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites, leprosy, etc.

31. a) How are e-wastes generated? (2Mark)

b) What is the importance of rainwater harvesting? (2Mark)

Ans: a) • E-wastes are generally called as electronic wastes, which includes the spoiled, outdated, non-repairable electrical and electronic devices.

- They are generated at house, Industries etc.,

b) (i) Overcome the rapid depletion of ground water levels.

(ii) To Meet the increase demand of water.

(iii) Reduces flood and soil erosion

(iv) Water stored in ground is not contaminated by human and animal wastes and hence can be used for drinking purpose.

32. a) Calculate the volume of ethanol in 200 ml solution of 20% v/v aqueous solution of ethanol. (2Mark)

b) Calculate the pH of 1.0×10^{-4} molar solution of HNO_3 . (2Mark)

Ans:

a) Volume of aqueous solution = 200 ml

Volume percentage = 20%

$$\text{Volume percentage} = \frac{\text{Volume of solute}}{\text{Volume of Solution}} \times 100$$

$$\text{Volume of ethanol} = \frac{20 \times 200}{100} \Rightarrow 40 \text{ ml}$$

b)

$$[\text{H}^+] = 1 \times 10^{-4}$$

$$\text{pH} = -\log_{10} [\text{H}^+]$$

$$= -\log_{10} [1 \times 10^{-4}]$$

$$\text{pH} = -(\log_{10} 1 - 4 \log_{10} 10)$$

$$\text{pH} = 0 + 4 \times \log_{10} 10 = 0 + 4 \times 1 = \text{pH} = 4.$$

PART-IV

(3×7=21)

Answer all Questions. Draw diagram wherever necessary.

33. a) 1. State Newton's laws of motion? (5Mark)

2. State the principle of moments? (2Mark)

Ans: a) 1.

a) **Newton's First Law:**

- This law states that every body continues to be in its state of rest or the state of uniform motion along a straight line unless it is acted upon by some external force.
- It gives the definition of force as well as inertia.

8 12.2.2024

தினகரன் கல்வி

b) Newton's Second Law Of Motion

- According to this law, "the force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force"
- This law helps us to measure the amount of force. So, it is also called as 'law of force'.
- $F = m \times a$

c) Newton's Third Law Of Motion

- Newton's third law states that 'for every action, there is an equal and opposite reaction. They always act on two different bodies'
- $F_B = -F_A$

Ans: a) 2.

When a number of like or unlike parallel forces act on a rigid body and the body is in equilibrium, then the algebraic sum of the moments in the clockwise direction is equal to the algebraic sum of the moments in the anticlockwise direction.

Moment in clockwise direction = Moment in anticlockwise direction

$$F_1 \times d_1 = F_2 \times d_2$$

(OR)

b) 1. Compare the properties of alpha, beta and gamma radiations? (5 Mark)

2. Define critical mass? (2 Mark)

Ans: b) 1.

Properties	α rays	β rays	γ rays
What are they?	Helium nucleus (${}^4_2\text{He}^{2+}$) consisting of two protons and two neutrons.	They are electrons ($-1e^0$), basic elementary particle in all atoms.	They are electromagnetic waves consisting of photons.
Charge	Positively charged particles. Charge of each alpha particle = $+2e$.	Negatively charged particles. Charge of each beta particle = $-e$.	Neutral particles. Charge of each gamma particle = zero.
Ionising power	100 time greater than β rays and 10,000 times greater than γ rays.	Comparatively low.	Very less ionization power.
Penetrating power	Low penetrating power.	Penetrating power is greater than that of α rays.	They have a very high penetrating power greater than that of β rays.
Effect of electric and magnetic field	Deflected by both the fields.	Deflected by both the fields; but the direction of deflection is opposite to that for alpha rays.	They are not deflected by both the fields.
Speed	Their speed ranges from $1/10$ to $1/20$ times the speed of light.	Their speed can go up to $9/10$ times the speed of light.	They travel with the speed of light.

Ans: b) 2.

The minimum mass of a fissile material necessary to sustain the chain reaction is called 'critical mass'.

34. a) 1. Give the salient features of "Modern atomic theory". (5Mark)

2. Calculation molar mass of CO_2 (2Mark)

Ans: a) 1.

- An atom is no longer indivisible
- Isotopes - Atoms of the same element may have different atomic mass.
- Isobars - Atoms of different elements may have same atomic masses
- Artificial transmutation- Atoms of one element can be transmuted into atoms of other elements. In other words, atom is no longer indestructible
- Atoms may not always combine in a simple whole number ratio
- Atom is the smallest particle that takes part in a chemical reaction.
- The mass of an atom can be converted into energy ($E = mc^2$).

Ans: b) 2.

$$\begin{aligned} \text{Atomic masses of C} &= 12, \\ \text{Atomic masses of O} &= 16 \\ \text{Gram molar mass of } \text{CO}_2 &= (12 \times 1) + (16 \times 2) = 12 + 32 \\ \text{Gram molar mass of } \text{CO}_2 &= 44 \text{ g} \end{aligned}$$

(OR)

b) 1. What is mean by binary solution? (2Mark)

2. How does pH play an important role in everyday life? (5Mark)

Ans: b) 1. : A solution must at least be consisting of two components (a solute and a solvent). Such solutions which are made of one solute and one solvent (two components) are called binary solutions.

Ans: b) 2.

- Our body works within the pH range of 7.0 to 7.8.
- pH of blood is ranging from 7.35 to 7.45. Any increase or decrease in this value leads to diseases.

pH in our digestive system:

- our stomach produces hydrochloric acid. It helps in the digestion of food without harming the stomach.
- During indigestion the stomach produces too much acid and this causes pain and irritation.
- pH of the stomach fluid is approximately 2.0.

pH changes as the cause of tooth decay:

- pH of the saliva normally ranges between 6.5 to 7.5.
- White enamel coating of our teeth is calcium phosphate, the hardest substance in our body.
- When the pH of the mouth saliva falls below 5.5, the enamel gets weathered.
- Toothpastes, which are generally basic are used for cleaning the teeth that can neutralise the excess acid and prevent tooth decay.

pH of soil:

- In agriculture, the pH of the soil is very important.
- Citrus fruits require slightly alkaline soil, while rice requires acidic soil and sugarcane requires neutral soil.

pH of rain water:

- The pH of rain water is approximately 7, which means that it is neutral
- If the pH of rain water is less than 7, then it is called acid rain.

35. a)

1. Differentiate-Aerobic and Anaerobic respiration. (4Mark)

2. Why are the rings of cartilages found in trachea of rabbit? (2Mark)

3. Prolactin is a hormone produced by _____. (1Mark)

Ans: a) 1.

	Aerobic respiration	Anaerobic respiration
1.	Takes place in presence of oxygen.	Takes place in absence of oxygen.
2.	Carbohydrate is completely oxidized into carbon dioxide, water and energy	Glucose is converted into ethanol (in plants) or lactate (in some bacteria)
3.	Lot of energy is produced	Very small Quantity of energy is produced
4.	Its is Complex process and occurs in three Major steps	It is a simpler process
5.	$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$	$\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{CO}_2 + 2\text{C}_2\text{H}_5\text{OH} + (\text{ATP})$

a) 2. Tracheal walls are supported by rings of cartilage which help in the free passage of air.

a) 3. Anterior pituitary

(OR)

b) 1. Suggest measures to overcome the problems of an alcoholic. (5Mark)

2. What is adult onset diabetes? (2Mark)

Ans: b) 1.

A) Education and counselling:

- Education and proper counselling will help the alcoholics to overcome their problems and stress, to accept failures in their life.

B) Physical activity:

- Individuals undergoing rehabilitation should be channelized into healthy activities like reading, music, sports, yoga and meditation.

C) Seeking help from parents and peer groups:

- When a problematic situation occurs, the affected individuals should seek help and guidance from parents and peers.
- This would help them to share their feeling of anxiety, wrong doing and get rid of the habit.

D) Medical assistance:

- Individual should seek help from psychologists and psychiatrists to get relieved from this condition and to lead a relaxed and peaceful life.
- Alcohol de-addiction and rehabilitation programmes are helpful.

Ans: b) 2.

Obesity is due to genetic factors, physical inactivity, eating habits (overeating) and endocrine factors.

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