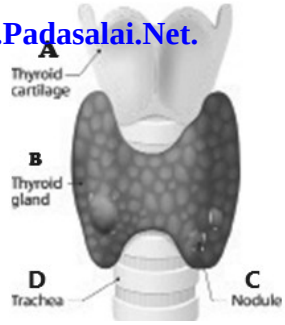
SSLC – GOVERNMENT PUBLIC EXAMINATION MARCH - 2024

SCIENCE - QUESTION AND ANSWER KEY

Q. NO.	ANSWER	MARKS
	PART – I ANSWER ALL THE QUESTIONS (12 X 1 = 12)	
1.	The endarch condition is the characteristic feature of a) root **b) stem** c) leaves d) flower	1
2.	TFM in soaps represents _____ content in soap. a) mineral b) vitamin **c) fatty acid** d) carbohydrate	1
3.	The value of universal gas constant a) 3.81 mol^{-1} K^{-1} b) 8.03 mol^{-1} K^{-1} c) 1.38 mol^{-1} K^{-1} **d) 8.31 mol^{-1} K^{-1}**	1
4.	Kilowatt hour is the unit of a) resistivity b) conductivity **c) electrical energy** d) electrical power	1
5.	An enzyme which cuts DNA is a) Protease **b) Restriction endonucleases** c) DNA Ligase d) RNAase	1
6.	1 mole of any substance contains ____ molecules. **a) 6.023×10^{23}** b) 6.023×10^{-23} c) 3.0115×10^{23} d) 12.046×10^{23} a) 6.023×10^{23}	1
7.	Which one is referred as "Master Gland"? a) Pineal galnd **b) Pituitary gland** c) Thyroid gland d) Adrenal gland	1
8.	Which among the following is not the characteristic of anemophilous flower a) The flowers produce enormous amount of pollen grains b) The stigmas are large and protruding **c) The flowers are brightly coloured, have smell and nectar** d) Pollen grains are small and dry	1
9.	Inertia of a body depends on a) weight of the object b) acceleration due to gravity of the planet **c) mass of the object** d) Both a & b	1
10.	Which is the sequence of correct blood flow a) Ventricle – atrium – vein – arteries b) Atrium – ventricle – veins – arteries **c) Atrium – ventricle – arteries – veins** d) Ventricles – vein – atrium - arteries	1
11.	**Which of the following is not an "element + element → compound" type reaction?** a) $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ b) $2K_{(s)} + Br_{2(l)} \rightarrow 2KBr_{(s)}$ **c) $2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$** d) $4Fe_{(s)} + 3O_{2(g)} \rightarrow 2Fe_2O_{3(s)}$	1
12.	Cancer of the epithelial cells is called a) Leukemia b) Sarcoma **c) Carcinoma** d) Lipoma	1
	PART – II	
	ANSWER ANY 7 QUESTIONS. Q. NO. 22 IS COMPULSORY. 7 X 2 = 14	
13.	**What is co-efficient of apparent expansion?** Coefficient of apparent expansion is defined as the ratio of the apparent rise in the volume of the liquid per degree rise in temperature to its unit volume. The SI unit of coefficient of apparent expansion is K^{-1}.	2
14.	**Why is tungsten metal used in bulbs, but not in fuse wires?** It is because tungsten has a very high melting point. Fuse wires should have low melting point. If tungsten is used as a fuse wire, then it will not melt even when large amount of current is passed through it , and the appliance will be damaged.	2
15.	**What is rust? Give the equation for formation of rust.** 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 and the phenomenon of formation of rust is known as rusting. $4Fe + 3O_2 + xH_2O \longrightarrow 2Fe_2O_3.xH_2O$ (Rust)	1 1
16.	**What is Stage?** 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.	2
17.	**Why is the Sinoatrial node called the pacemaker of heart?** Sino-atrial (SA) node acts as the 'pacemaker' of the heart because it is capable of initiating impulse which can stimulate the heart muscles to contract.	2
18.	**Name the parts of the hind brain.** Hindbrain is formed of three parts a) Cerebellum b) Pons and c) Medulla oblongata.	2

19. THYROID GLAND — 4 PARTS, 4 X ½ = 2



20. **What is colostrum? How is milk production hormonally regulated ?** — 1

1. The first fluid which is released from the mammary gland after child birth is called as colostrum.
2. Milk production from alveoli of mammary glands is stimulated by **prolactin** secreted from the anterior pituitary. The ejection of milk is stimulated by posterior pituitary hormone **oxytocin**. — 1

21. **What is metastasis?** — 2

The cancerous cells migrate to distant parts of the body and affect new tissues. This process is called **metastasis**.

22. **If the pH of a solution is 4.5, what is its pOH?** — 2

Solution :

pH + pOH = 14

pOH = 14 – 4.5 = 9.5

pOH = 9.5.

PART – III

ANSWER ANY 7 QUESTIONS. Q. NO. 32 IS COMPULSORY. 7 X 4 = 28

23. **Explain the various types of inertia with example.** — 4

There are 3 types of Inertia. They are;

1. Inertia at rest : The resistance of a body to change its state of rest is called inertia of rest.

Example : When you vigorously shake the branches of a tree, some of the leaves and fruits are detached and they fall down (Inertia of rest).

2. Inertia of motion : The resistance of a body to change its state of motion is called inertia of motion.

Example : An athlete runs some distance before jumping because this will help him jump longer and higher.

3. Inertia of direction : The resistance of a body to change its direction of motion is called inertia of direction.

Example : When a bus turn towards right, the passangers are thrown towards left.

24. — 3 + 1

a) **Write any three features of natural and artificial radioactivity.**

S.No.	Natural radioactivity	Artificial radioactivity
1	Emission of radiation due to self–disintegration of a nucleus.	Emission of radiation due to disintegration of anucleus through induced process
2	Alpha, beta and gamma radiations are emitted.	Mostly elementary particles such as neutron, positron, etc., are emitted.
3	it is a spontaneous process.	It is an induced process.
4	Exhibited by elements with atomic number more than 83.	Exhibited by elements with atomic number less than 83.
5	This cannot be controlled.	This can be controlled.

b) Name any two devices, which are working on the heating effect of the electric current.

1. Electric Heater
2. Electric Iron.

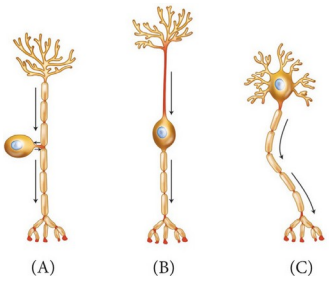
25. — 2

a) **What happens when $MgSO_4.7H_2O$ is heated? Write the appropriate equation.**

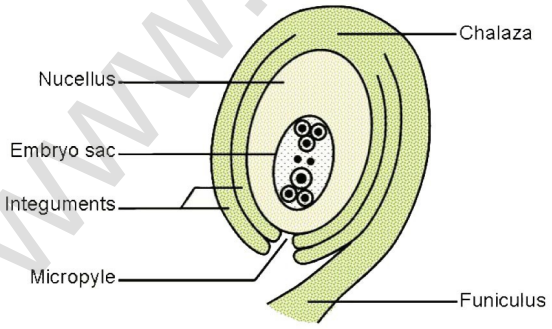
Its water of crystallisation is 7. When magnesium sulphate hepta hydrate crystals are genetly heated, it loses seven water molecules and becomes an hydrous magnesium sulphate.

$$MgSO_4.7H_2O \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} MgSO_4 + 7H_2O$$

(Magnesium sulphate heptahydrate) (Anhydrous Magnesium sulphate)

	b) Define solubility. Solubility is defined as the number of grams of solute that can be dissolved in 100 g of a solvent to form its saturated solution at a given temperature and pressure. For example 36 g of sodium chloride need to be dissolved in 100 g of water to form its saturated solution at 25° C. Thus the solubility of NaCl in water is 36 g at 25° C. The solubility is mathematically expressed as, $\text{Solubility} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$	2
26.	**a) What is respiratory quotient?** Respiratory quotient is the ratio of volume of carbon dioxide liberated and the volume of oxygen consumed during respiration. It is expressed as $\text{Respiratory Quotient (RQ)} = \frac{\text{Volume of } CO_2 \text{ liberated}}{\text{Volume of } O_2 \text{ consumed}}$ **b) Why should the light dependent reaction occur before the light independent reaction?** The light dependent reaction (Light reaction) should occur before light independent reaction (Dark reaction). Because light dependent reaction only have to supply organic energy molecules such as ATP and $NADPH_2$ necessary to reduce CO_2 into carbohydrate in the light independent reaction.	2 2
27.	**Write the dental formula of rabbit.** Dental formula of rabbit is, $I\frac{2}{1}$, $C\frac{0}{0}$, $PM\frac{3}{2}$, $M\frac{3}{3}$, which can be written as $\frac{2033}{1023}$.	4
28.	**a) Why is euploidy considered to be advantageous to both plants and animals?** Organisms with multiples of the basic chromosome set are called euploid. 1. Plants with euploidy condition have increased fruit and flower size. 2. Plants and animals with euploidy condition are typically sterile. b) **Classify neurons based on its structure.** Based on structure the neurons classified as follows: A) **Unipolar neurons:** Only **one nerve process** arises from the cyton which acts as both axon and dendron. They found in **early embryos** but not in adult. B) **Bipolar neurons:** The cyton gives rise to **two nerve processes** of which one acts as an axon while another as a dendron. They found in **retina of eye** and **olfactory epithelium** of nasal chambers. C) **Multipolar neurons:** The cyton gives rise to **many dendrons** and an **axon**. They found in **cerebral cortex** of brain.  (A) (B) (C)	2 2
29.	**How are arteries and veins structurally different from one another?** **No. / Arteries** 1. Wall of artery is **strong, thick and elastic.** 2. Internal valves are **absent.** **No. / Veins** 1. Wall of vein is **weak, thin and non – elastic.** 2. Internal valves are **present.**	2 2
30.	**Define Ethnobotany and write its importance.** Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of 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.	2 2
31.	**a) What are the consequences of deforestation?** **<u>Consequences of Deforestation</u>** Deforestation gives rise to ecological problems like floods, drought, soil erosion, loss of wild life, extinction of species, imbalance of biogeochemical cycles, alteration of climatic conditions and desertification. **Kindly send me your key answers to our email id - padasalai.net@gamil.com**	2

	b) State the applications of DNA fingerprinting technique. Applications of DNA Fingerprinting ▪ DNA fingerprinting technique is widely used in forensic applications like crime investigation such as identifying the culprit. It is also used for paternity testing in case of disputes. ▪ It also helps in the study of genetic diversity of population, evolution and speciation.	2
32.	**a) Name the acid that renders aluminium passive. Why?** Conc. Nitric Acid (Conc.HNO_3). Concentrated and dil. Nitric acid does not attack aluminium, but it renders aluminum passive due to the formation of an oxide film on its surface. **b) Calculate the number of moles in 1.51 x 10^{23} molecules of NH_4Cl.** No. of moles = $\frac{\text{No. of molecules of } NH_4Cl}{\text{Avogadro's number}}$ = $\frac{1.51\times10^{23}}{6.023\times10^{23}}$ = $\frac{1}{4}$ = 0.25 mole.	2 2
	PART – IV	
	ANSWER ALL THE QUESTIONS 3 X 7 = 21	
33. (a)	**i. What are the uses of convex lens?** 1. They are used as camera lenses. 2. They are used as magnifying lenses. 3. They are used in making microscope, telescope and slide projectors. 4. They are used to correct the defect of vision called hypermetropia. **ii. What is refractive index?** Refractive index as the ratio of sine of the angle incidence to the sine of angle of refraction. It can be also be defined as ratio of speed of light in air to the speed of light in medium. It has no unit. **iii. Why are traffic signals red in colour?** Red colour has longest wavelength and scattered by a least amount and travels longer distance in atmosphere. So it used in traffic signals. **iv. What is the least count of travelling microscope ?** The least count of travelling microscope is 0.01 mm.	2 2 2 1
33. (b)	**i) What is an echo?** An echo is the sound reproduced due to the reflection of the original sound from various rigid surfaces such as walls, ceilings, surfaces of mountains, etc. If you shout or clap near a mountain or near a reflecting surface, like a building you can hear the same sound again. The sound, which you hear is called an echo. It is due to the reflection of sound. **ii) State two conditions necessary for hearing an echo.** The persistence of hearing for human ears is 0.1 second. This means that you can hear two sound waves clearly, if the time interval between the two sounds is atleast 0.1 s. Thus, the minimum time gap between the original sound and an echo must be 0.1 s. The above criterion can be satisfied only when the distance between the source of sound and the reflecting surface would satisfy the following equation: Velocity = Distance travelled by sound / Time taken V = 2d / t d = vt /2 Since, t = 0.1 second, then d = V × 0.1/2 = V/20 Thus the minimum distance required to hear an echo is 1/20th part of the magnitude of the velocity of sound in air. If you consider the velocity of sound as 344 m s–1, the minimum distance required to hear an echo is 17.2 m. **iii) What are the medical applications of echo?** The principle of echo is used in obstetric ultrasonography, which is used to create real-time visual images of the developing embryo or foetus in the mother's uterus. This is a safe testing tool, as it does not use any harmful radiations. **iv) How can you calculate the speed of sound using echo?** The sound pulse emitted by the source travels a total distance of 2d while travelling from the source to the wall and then back to the receiver. The time taken for this has been observed to be 't'. **Kindly send me your key answers to our email id - padasalai.net@gamil.com** Hence, the speed of sound wave is given by:	2 3 1 1

	Speed of Sound = Distance travelled / Time taken= 2d/t.	
34. (a)	**i) Under same conditions of temperature and pressure if you collect 3 litre of O_2, 5 litre of Cl_2 and 6 litre of H_2,** **A. Which has the highest number of molecules?** 6 litre of H_2 **B. Which has the lowest number of molecules?** 3 litre of O_2 **ii) Give the salient features of "Modern atomic theory".** Modern Atomic Theory: 1. **An atom is no longer indivisible** (after the discovery of the electron, proton and neutron). 2. Atoms of the same element may have different atomic mass (discovery of **Isotopes** $_{17}Cl^{35}$, $_{17}Cl^{37}$). 3. Atoms of different elements may have same atomic masses (discovery of **Isobars** $_{20}Ar^{40}$, $_{20}Ca^{40}$). 4. Atoms of one element can be transmuted into atoms of other elements. In otherwords, atom is no longer indestructible (discovery of **artificial transmutation**). 5. Atoms may not always combine in a simple whole number ratio (Eg. Glucose $C_6H_{12}O_6$ C:H:O = 6:12:6 or 1:2:1 and Sucrose $C_{12}H_{22}O_{11}$ C:H:O = 12:22:11). 6. Atom is the **smallest particle that take part in a chemical reaction**. 7. The mass of an atom can be converted into energy (**$E=MC^2$**).	1 1 5
34. (b)	**i) How do detergents cause water pollution?** Detergents also add another problem for aquatic life by lowering the surface tension of the water. Phosphates in detergents can lead to fresh water algal blooms that releases toxins and deplete xygen in waterways. When the algae decompose, they use up the oxygen available for aquatic life. **ii) An organic compound 'A' is widely used as a preservative and has the molecular formula C2H4O2. Thiscompound reacts with ethanol to form a sweet smelling compound 'B', then** **A) Identify the compound 'A'.** Ethanoic acid. **B) Write the chemical equation for its reaction with ethanol to form compound 'B'.** Ethyl Ethanoate. $CH_3CH_2OH + CH_3COOH \xrightarrow{H^+} CH_3CH_2COOCH_3 + H_2O$ Ethanol Acetic acid Ethyl ethanoate **C) Name the process.** Esterification.	3 4
35. (a)	**i)What are synthetic auxins? Give examples.** 1. Artificially synthesized auxins that have properties like auxins are called as synthetic auxins. 2. Example: 2, 4 D (2,4 Dichlorophenoxy Acetic Acid). **ii) With a neat labelled diagram describe the parts of a typical angiospermic ovule.**  The main part of the ovule is the nucellus which is enclosed by two integuments leaving an opening called as micropyle. The ovule is attached to the ovary wall by a stalk known as funiculus. Chalaza is the basal part. The embryo sac contains seven cells and the eighth nuclei located within the nucellus. Three cells at the micropylar end form the egg apparatus and the three cells at the chalaza end are the antipodal cells. The remaining two nuclei are called polar nuclei found in the centre. In the egg apparatus one is the egg cell (female gamete) and the remaining two cells are the synergids.	2 2 3
35.	**i) Who is called the " Father of Indian Green Revolution"?**	1

(b)

Dr.M.S.Swaminathan is called the " Father of Indian Green Revolution."

ii. **Differentiate between outbreeding and inbreeding.**

S.No.	Outbreeding	Inbreeding
1	It is the breeding of unrelated animals.	It refers to the mating of closely related animals with the same breed.
2	The hybrids are stronger and vigorous than their parents.	It helps in the accumulation of superior genes and elimination of genes which are undesirable.
3	Cross between two different species with desirable features of economic value are mated. Male donkey + Female Horse = Mule.	Superior males and superior females of the same breed and identified and mated in pairs. Bikaneri (Magra) ewes + Australian Marino rams sheep = Hissardale Sheep.

3

iii. Differentiate between Type – I and Type – II Diabetes mellitus.

Factors	Type-1 Insulin dependent diabetes mellitus (IDDM)	Type-2 Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10-20%	80-90%
Age of onset	Juvenile onset (< 20 years)	Maturity onset (>30 years)
Body weight	Normal or Underweight	Obese
Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine

3

PREPARED BY
M.G.RAYMOND, M.Sc., B.Ed.,
ST.PAUL'S MATRICULATION HIGHER SECONDARY SCHOOL,
BLOCK – 4, NEYVELI - 607 801
CUDDALORE DISTRICT
9629705161 / 9442980841