Half-Yearly Examination – 2023 (ERODE)

SCIENCE   Marks: 75

PART-1

Note: i)Answer all the questions. ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer

1 Impulse is equal to the rate of force and time **b) Change of momentum**
2 _____ is responsible for the white appearance of the cloud. **b) Mie scattering**
3. SI unit of resistance is **C)ohm**
4. The gram molecular mass of oxygen molecule is **d)32 g**
5. Which of the following is not the Ore of Aluminium? **a)Haematite**
6.TFM in soaps represents _____ contents in soap. **c) fatty acid**
7. Which is formed during anaerobic respiration? **b)Ethyl alcohol**
8.Who is known as the Father of Endocrinology? **d) Thomas Addison**
9. Heart of heart is called **a)SA node**
10.The plant which propagates with the help of its leaves **C)Bryophyllum**
11. Palaeontology deals with the study of **b)fossils**
12 . Green house effects refers to **c)Warming of earth**

PART II

Answer any seven questions. Question No. 22 is compulsory.

13. State Boyle's law.

When the temperature of a gas is kept constant, the volume of a fixed mass of gas is

inversely proportional to its pressure. $P \propto \frac{1}{V}.$

14. Mention two cases in which there is no Doppler effect in second.
1. When source (S) and listener (L) both are at rest.
2. When S and L move in such a way that distance between them remains constant.
3. When source S and L are moving in mutually perpendicular directions.
4. If the source is situated at the centre of the circle along which the listener is moving.

15: Match the following:

A	B
i)Fuel	c) Uranium
ii) Moderator	a) heavy water
iii) Fusion reaction	d) Hydrogen bamb
iv) Shield	b) lead

16. What is meant by binary solution?
The solution which is made from one solute and one solvent only is called as binary solution.

**17. Define combination reactions. Give example.**
A chemical reaction in which 2 or more reactants combine to form a single product, the reaction is known as combination reaction. Most of the combination reaction are exothermic because they involve formation of new bonds. For example,

$$H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$$

$$SiO_{2(s)} + CaO_{(s)} \rightarrow CaSiO_{3(s)}.$$
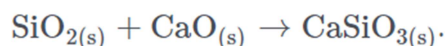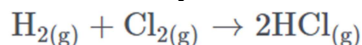
18: What is Cohesion?
The force of attraction between the water molecules is called cohesion.

19. Label the parts.
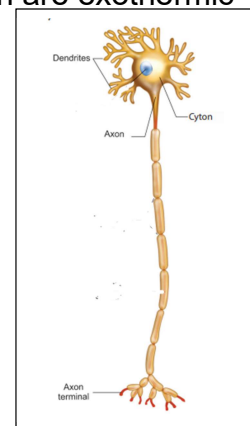
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20. State whether the following statements are true or false.

Correct the false statement.

1) Seeds are the product of asexual reproduction.

False. Seeds are the product of sexual reproduction

i) LH is secreted by the posterior pituitary.

False.Correct Statement: LH is secreted by the anterior pituitary.

21. What is Script Editor? What are its main parts?

With the script editor we can edit programes and sprite pictures. The script editor has three main parts: • Script area• Block menu • Block palette

22. A charge of 15 coulomb flows through a bulb in 3 seconds. What is the current through the bulb?

Charge Q = 12 C, Time t = 5s. Therefore, Current $I = \frac{Q}{t}$

I=15/3=5 A

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PART-III 7x4-28

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Answer any seven questions. Question No. 32 is compulsory

23. Differentiate the eye defects myopia and Hyper metropia. Myopia:

➔ It is also called as near-sightedness in which nearby objects are seen clearly but objects which are at a larger distance cannot be seen clearly.

➔ Myopia causes due to the lengthening of the eyeballs.

➔ In this defect, focal length of the eye lens will be decreased and hence far point comes closer.

➔ And hence, image of the objects which are at a more distance is formed before the retina.

➔ Concave lens is used in the treatment of myopia.

Hypermetropia:

➔ It is also called as far-sightedness in which objects which are at a more distance are seen clearly and distinctly but the nearby objects cannot be seen clearly.

➔ Hypermetropia causes due to the shortening of the eyeballs.

➔ In this defect, focal length of the eye lens will be increased and hence near point is moved farther.

➔ And hence, image of the nearby object is formed behind the retina.Convex lens is used in the treatment of hypermetropia

24 i) Why does sound travel faster on a rainy day than on a dry day?

When humidity increases, the speed of sound increases. That is why you can hear sound from long distances clearly during rainy seasons.

ii) a) Name two animals, which can hear ultrasonic vibrations.

Mosquitos, bats and dogs are the three animals that can hear ultrasonic vibra

b) What is the audible range of frequency?

Audible range of frequency is from 20 Hz to 20000 Hz.

25. Give the salient features of "Modern atomic theory.

The salient features of "Modem atomic theory" are,

1. An atom is no longer indivisible.
2. Atoms of the same element may have different atomic mass.
3. Atoms of different elements may have the same atomic masses.
4. Atoms of one element can be transmuted into atoms of other elements. In other words, an atom is no longer indestructible.
5. Atoms may not always combine in a simple whole-number ratio.
6. Atom is the smallest particle that takes part in a chemical reaction.
7. The mass of an atom can be converted into energy [E = mc^2].

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26. 1) State two conditions necessary for rusting of iron.
Conditions for rusting of iron:
- The presence of water and oxygen is essential for the rusting of iron.
- Impurities in the iron, the presence of water vapour, acids, salts and carbon dioxide hasten to rust.
- Pure iron does not rust in dry and CO_2 free air. It also does not rust in pure water, free from dissolved salts.

ii) Give an example for each.**i) gas in liquid:** CO_2 in water   ii) solid in liquid: NaCl in water
iii) solid in solid: Alloys iv) gas in gas: He – O_2 gas

27 i) What is respiratory quotient?
The ratio of volume of carbon dioxide liberated and the volume of oxygen consumed, during respiration is called Respiratory Quotient (R.Q)
R.Q.= Volume of CO_2 liberated / Volume of O_2consumed

ii) Identify the parts A, B, C and D in the given figure,
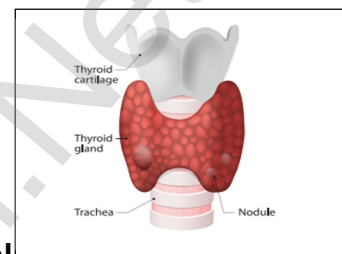
28 i) a) ---------- involves evaporative loss of water from aerial parts.
Transpiration
b) Normal blood pressure is 120 mm / 80 mm Hg.
ii) Assertion (A) Diabetes mellitus increases the blood sugar level.
Reason (R): Insulin decreases the blood sugar level.
a) Both A and R are true and R is correct explanation of A
b) Both A and R are true but 'R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true

29. (i) What are allosomes ?
Out of 23 pairs of chromosomes, 22 pairs are autosomes and the 23rd pair is the allosome or sex chromosome.

ii) What are okazaki fragments?
For the synthesis of new DNA, two things are required one is RNA primer and the enzyme primase. The DNA polymerase moves along the newly formed RNA primer nucleotides, which leads to the elongation of DNA. In the other strand, DNA is synthesis in small fragments called okazaki fragments. These fragments are linked by the enzyme called ligase.

30. Define Ethno botany 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 the 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, flowers, flower bud, fruits, seeds, oils, resins, dyes and gum for the treatment of diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites and leprosy, etc.

31.(i) Define genetic engineering
Genetic engineering is the manipulation and transfer of genes from one, organism to another organism to create a new DNA called as recombinant DNA(rDNA).

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ii)Write short note on Green revolution.
(1)Green Revolution is the process of increasing food production through high yielding crop varieties and modern agricultural techniques in underdeveloped and developing nations.
(2)Dr. Norman E. Borlaug, an American agronomist the "Father of the Green Revolution", received the Nobel Peace Prize in 1970.
(3)In India Dr. M. S. Swaminathan joined with Dr.Borlaug in bringing Green Revolution by introducing Mexican wheat varieties. This eventually increased wheat and rice production between 1960 and 2000. 20.2.1 Breeding for high yield and better qualit

32. Calculate the P^{OH} of 1 x10 $^{-4}$ molar solution of HNO_3.

$$[H^+] = 1.0 \times 10^{-4}$$

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

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

$$pH = -\left(\log_{10} 1 - 4\log_{10}\log_{10}^{10}\right)$$

$$= 0 + 4 \times \log_{10}^{10}$$

$$= 0 + 4 \times 1 = 4$$

$$pH = 4$$

$$pH + pOH = 14$$
$$P^{OH} = 14-4=10$$

PART-IV

Answer all the questions. Draw diagrams wherever necessary.   3x7=21

a) **i) State and prove the law conservation of linear momentum.**
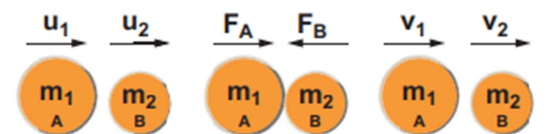
Let two bodies A and B having masses m_1 and m_2 move with initial velocity u_1 and u_2 in a straight line.
Let the velocity of the first body be higher than that of the second body, i.e,, $u_1 > u_2$. During an interval of time t second, they tend to have a collision. After the impact, both of them move along the same straight line with a velocity v_1 and v_2 respectively.
Force on body B due to A,
$F_B = m_2(v_2 - u_2)/t$
Force on body A due to B,
$F_A = m_1(v_1 - u_1)/t$
By Newton's III law of motion,
Action force = Reaction force
$F_A = -F_B$
$m_1(v_1 - u_1)/t = -m_2 (v_2 - u_2)/t$
$m_1 v_1 + m_2 v_2 = m_1 u_1 + m_2 u_2$
The above equation confirms in the absence of an external force, the algebraic sum of the momentum after collision is numerically equal to the algebraic sum of the momentum before collision.
Hence the law of conservation of linear momentum is proved.
ii) State the principle of moments.

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Principle of moments states that if a rigid body is in equilibrium on the action of a number of like (or) unlike parallel forces then the algebraic sum of the moments in the clockwise direction is equal to the algebraic sum of the moments in the anticlockwise direction. (OR)

b) i) Compare the properties of alpha, beta and gamma radiations, radioactivity
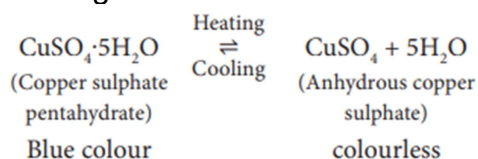
Properties	α rays	β rays	γ rays
What are they?	Helium nucleus ($_2He^4$) consisting of two protons and two neutrons.	They are electrons ($_{-1}e^0$), basic elementary particle in all atoms.	They are electromagnetic waves consisting of photons.
Charge	Positively charged particles. Charge of each alpha 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 (even stopped by a thick paper)	Penetrating power is greater than that of α rays. They can penetrate through a thin metal foil.	They have a very high penetrating power greater than that of β rays. They can penetrate through thick metal blocks.
Effect of electric and magnetic field	Deflected by both the fields. (in accordance with Fleming's left hand rule)	Deflected by both the fields; but the direction of deflection is opposite to that for alpha rays. (in accordance with Fleming's left hand rule)	They are not deflected by both the fields.

ii)Write any two differences 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 a nucleus 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.

34. a) 'A' is a blue coloured crystalline salt on heating it losses blue colour and to give B. When water is added, B gives back to 'A'. Identify A and B. Write the equation. Since 'A' is a blue coloured crystalline salt, it is $CuSO_4. 5H_2O$ (Blue vitriol). On

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heating it loses all five water molecules and becomes colourless anhydrous $CuSO_4$.

$$CuSO_4 \cdot 5H_2O \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} CuSO_4 + 5H_2O$$

(Copper sulphate pentahydrate)   (Anhydrous copper sulphate)

Blue colour   colourless

i) Differentiate reversible and irreversible reaction
(OR)

REVERSIBLE REACTION	IRREVERSIBLE REACTION
It can be reversed under suitable conditions.	It cannot be reversed.
Both forward and backward reactions take place simultaneously.	It is unidirectional. It proceeds only in forward direction.
It attains equilibrium.	Equilibrium is not attained.
The reactants cannot be converted completely into products.	The reactants can be completely converted into products.
It is relatively slow.	It is fast.

b) (i) What is called homologous series? Write its characteristics.
➔ Homologous series is a group or a class of organic compounds having same general formula and similar chemical properties in which the successive members differ by a - CH_2 group.
➔ Each member of the series differs from the preceding or succeeding member by one methylene group (–CH2) and hence by a molecular mass of 14 amu.
➔ All members of a homologous series contain the same elements and functional group.
➔ They are represented by a general molecular formula. e.g. Alkanes, CnH2n + 2.
➔ The members in each homologous series show a regular gradation in their physical properties with respect to their increase in molecular mass.
➔ Chemical properties of the members of a homologous series are similar.
➔ All the members can be prepared by a common method.

(ii)What is esterification?
The reaction of an alcohol with a carboxylic acid gives a compound having fruity odour.
This compound is called an ester and the reaction is called esterification.

35. a) i) List out the parasitic adaptations in leech.

1. The suckers are the primary organ of the blood sucking.
2. The blood is sucked by muscular pharynx.
3. Leeches attaches itself to the body of host by Anterior and Posterior ends of the body.
4. The three jaws inside the mouth, causes a painless triradiate or Y shaped incision in the skin of the host.

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5. A protein called hirudin is produced in the salivary gland of leech to prevent blood coagulation. Thus, a continuous supply of the blood is maintained.
6. Parapodia and setae are completely absent.
7. Leeches also inject an anaesthetic substances that prevents the host from feeling their bite.
8. In the crop, blood is stored which gives nourishment to the leech for several months. Due to this reason there is no elaborate secretion of the digestive juices and enzymes.

ii) Write the physiological effects of gibberellins.

1. Application of gibberellins on plants stimulate extraordinary elongation of intemode. Eg: Com and Pea.
2. Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
3. Gibberellins promote the production of male flowers in monoecious plants (Cucurbits).
4. Gibberellins break dormancy of potato tubers.
5. Gibberellins are efficient than. auxins in inducing the formation of seedless fruit – Parthenocarpic fruits (Development of fruits without fertilization) Eg: Tomato.

(OR)

b) i) Suggest measures to overcome the problems of an alcoholic.

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

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

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 dping and get rid of the habit.

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 to the individual so that they could get rid of the problem completely and can lead a normal and healthy life.

ii) What is the importance of rain water harvestings?

The importance of rainwater harvesting is as follows:
- overcome the rapid depletion of groundwater levels.
- To meet the increased demand for water.
- Reduces flood and soil erosion.
- Water stored in-ground is not contaminated by human and animal wastes and hence can be used for drinking purpose.

HARD WORK NEVER FAILS

PREPARED BY SANGEETHA D
GHSS KURUMANDUR   ERODE(DT)