

SSLC Science Half Yearly Common Exam

Padasalai's - Answer Key December 2019

Prepared by

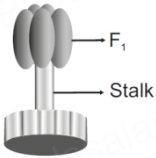
Barani Dharan C, MSc, MEd, PGDM

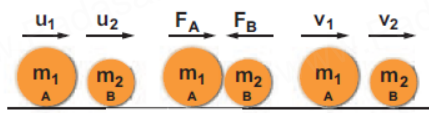
Senior School Coordinator, Isha Vidhya Matric Hr Sec Schools.

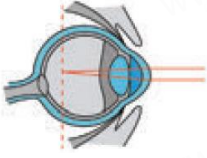
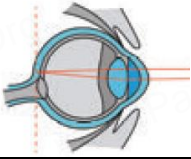
BT Assistant, Vivekananda Balamandir Matriculation School, Attayampatty, Salem.

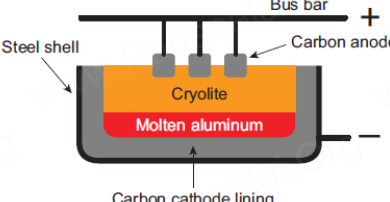
Q.no.	Page no.	Answers	Marks
Part I			
1	38	(d) $8.31 \text{ J mol}^{-1} \text{ K}^{-1}$	1
2	51	(c) electrical energy	1
3	60	(a) vibrate along the direction of the wave motion	1
4	82	(c) Iron 59	1
5	109	(a) 17 th	1
6	247	(c) 1 –(ii), 2- (iv), 3-(i), 4-(iii)	1
7	146	(a) large surface area	1
8	183	(b) mitochondrial matrix	1
9	221	(c) Duramater	1
10	220	(a) retina of eye	1
11	247	(d) large feathery stigma	1
12	266	(b) metacentric	1
Part II			
13	84	1942 Chicago, USA	1 1
14	117	No action in the absence of air. Copper dissolves in dil HCl and H ₂ SO ₄ acids in the presence of air. $2\text{Cu} + 4\text{HCl} + \text{O}_2 (\text{air}) \rightarrow 2 \text{CuCl}_2 + 2 \text{H}_2\text{O}$	$\frac{1}{2}$ $\frac{1}{2}$ 1
15	100	Atomic masses of Ca = 40, P = 30, O = 16. Gram molar mass of Ca ₃ (PO ₄) ₂ = $(40 \times 3) + [30 + (16 \times 4)] \times 2$ = $120 + (94 \times 2) = 120 + 188$ Gram molar mass of Ca ₃ (PO ₄) ₂ = 308 g	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
16	149	(one mark per one correct point) (any two) 1. Our body works within the pH range of 7.0 to 7.8 2. pH of blood is ranging from 7.35 to 7.45. Any increase or decrease in this value leads to diseases. 3. pH of the stomach fluid is approximately 2.0. It helps in the digestion of food without harming the stomach 4. pH of the saliva normally ranges between 6.5 to 7.5. When the pH of the mouth saliva falls below 5.5, the enamel gets weathered	2
17	195	ANS - autonomic nervous system ANS comprises of sympathetic and parasympathetic nerves.	1 1
18	120	(any two methods) (one mark per one correct method) 1. Alloying: The metals can be alloyed to prevent the process of corrosion. E.g: Stainless Steel 2. Surface Coating – Galvanization: process of coating zinc on iron sheets by using electric current. 3. Surface Coating - Electroplating: coating one metal over another metal by passing electric current.	2

		<p>4. Surface Coating - Anodizing: an electrochemical process that converts the metal surface into a decorative, durable and corrosion resistant. Aluminium is widely used for anodizing process.</p> <p>5. Surface Coating - Cathodic Protection: metal surfaced is coated with another metal which is an easily corrodible sacrificial metal which acts as anode.</p>							
19	279	(any two points) (one mark per one correct point) i. Fossils throw light on phylogeny and evolution of plants. ii Fossil plants give a historical approach to plant kingdom. iii Fossils are useful in classification of plants. iv. Fossil plants can be used in the field of descriptive and comparative anatomy.	2						
20	292	Manipulation and transfer of genes from one organism to another to create recombinant DNA (rDNA) .	1 1						
21	331	1. Script area, 2. Block menu, 3. Block palette	2						
22	46	$R = V/I = 30/2$ $R = 15 \text{ ohm}$	1 $\frac{1}{2} + \frac{1}{2}$						
		Part III							
23 (i)	36	<i>When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure. $P \propto 1/V$</i>	2						
(ii)	37	<table border="1"> <thead> <tr> <th>Ideal gas</th> <th>Real gas</th> </tr> </thead> <tbody> <tr> <td>1. Atoms or molecules of ideal gas do not interact with each other.</td> <td>Molecules or atoms of real gases interact with each other</td> </tr> <tr> <td>2. At high temperature the interatomic or intermolecular forces of attraction are weak.</td> <td>At very high temperature there is no interatomic or intermolecular force of attraction.</td> </tr> </tbody> </table>	Ideal gas	Real gas	1. Atoms or molecules of ideal gas do not interact with each other.	Molecules or atoms of real gases interact with each other	2. At high temperature the interatomic or intermolecular forces of attraction are weak.	At very high temperature there is no interatomic or intermolecular force of attraction.	1 1
Ideal gas	Real gas								
1. Atoms or molecules of ideal gas do not interact with each other.	Molecules or atoms of real gases interact with each other								
2. At high temperature the interatomic or intermolecular forces of attraction are weak.	At very high temperature there is no interatomic or intermolecular force of attraction.								
24 (i)	53	<p><u>Role of Earth wire:</u> Earth wire provides a low resistance path to the electric current. Earth wire sends the current from the body of the appliance to the Earth, whenever a live wire accidentally touches the body of the metallic electric appliance. Earth wire serves as a protective conductor, which saves us from electric shocks.</p>	$\frac{1}{2}$ $\frac{1}{2}$ 1						
(ii)	53	<p><u>Merits of LED bulb (any four points):</u> 1. As there is no filament, there is no loss of energy in the form of heat. It is cooler than the incandescent bulb. 2. In comparison with the fluorescent light, the LED bulbs have significantly low power requirement. 3. It is not harmful to the environment. 4. A wide range of colours is possible here. 5. It is cost-efficient and energy efficient. 6. Mercury and other toxic materials are not required.</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$						
25(a) (i)	163	<p>IUPAC name – Ethanol</p> <p>Structural formula:</p> $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	$\frac{1}{2}$ $\frac{1}{2}$						

(ii)		IUPAC name – Ethanoic acid Structural formula: $\begin{array}{c} \text{H} \quad \text{O} \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{OH} \\ \\ \text{H} \end{array}$	$\frac{1}{2}$ $\frac{1}{2}$
(b)	133	Volume percentage = $\frac{\text{Volume of solute}}{\text{Volume of solution}} \times 100$ $20 = \frac{\text{Volume of ethanol}}{200} \times 100$ Volume of ethanol = $(20 \times 200) / 100 = 40 \text{ ml}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} \text{ (value)} + \frac{1}{2} \text{ (unit)}$
26 (i)	183	Oxysomes: The inner mitochondrial membrane bear minute regularly spaced tennis racket shaped particles. 	1 Diagram – $\frac{1}{2}$ Parts – $\frac{1}{2}$
(ii)	181	Process by which autotrophic organisms like green plants, algae and chlorophyll containing bacteria utilize the energy from sunlight to synthesize their own food. $6\text{CO}_2 + 12 \text{H}_2\text{O} \xrightarrow[\text{chlorophyll}]{\text{Light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2 \uparrow$	1 1
27 (i)	189	<u>Locomotion in leech:</u> (i) Looping or Crawling movement: By the <u>contraction and relaxation of muscles</u> . The two <u>suckers serve for attachment</u> during movement on a substratum. (ii) Swimming movement Leeches swim and perform <u>undulating movements</u> in water.	1 1
(ii)	192	Leeches are effective: 1. in increasing blood circulation and breaking up blood clots. 2. to treat cardiovascular diseases. 3. Biochemical substances derived from <u>leech saliva</u> are used for preparation of pharmaceutical drugs that can treat <u>hypertension</u> .	2
28	224	A reflex action is any response that occurs automatically without consciousness. Types: (i) Simple or basic reflexes (ii) Acquired or conditioned reflexes (i) Simple or basic reflexes are <u>inbuilt and unlearned</u> responses performed without thinking.. E.g., winking of eyes when any dust particles enters, sneezing, coughing, yawning, etc. (ii) Acquired or conditioned reflexes are the result of <u>practice and learning</u> . Eg. Playing harmonium by striking a particular key on seeing a music note.	1 1 1 1

29	262	<p>F1 generation: Plants raised were <u>tall and monohybrids</u>.</p> <p>F2 generation: Plants were <u>tall and dwarf</u> plants in the phenotypic ratio of 3:1. 3 different types of plants were obtained:</p> <ol style="list-style-type: none"> 1. Tall Homozygous – TT (Pure) – 1 2. Tall Heterozygous – Tt – 2 3. Dwarf Homozygous – tt – 1 <p>So the genotypic ratio 1:2:1</p> <p>Explanation: Tallness and Dwarfness are determined by a pair of contrasting factors (T and t). The <u>factors are always pure</u> and when gametes are formed, the <u>unit factors segregate</u> so that each gamete gets one of the two alternative factors.</p> <p>So, the factors for tallness (T) and dwarfness (t) are separate entities. When F1 hybrids are self crossed the two entities separate and then unite independently, forming tall and dwarf plants in F2 generation.</p>	1 ½ ½ 1 1
30	281	<p>Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.</p> <p>Importance of Ethnobotany</p> <ol style="list-style-type: none"> 1. provides traditional uses of plant. 2. gives information about unknown and known useful plants. 3. Ethnomedicinal data - source of information for chemists, pharmacologists and practitioners of herbal medicine. 4. Tribal communities utilize 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. 	1 3
31	294	<p>Stem cells have ability to divide and give rise to more stem cells by self-renewal and give rise to specialised cells with specific functions by the process of differentiation.</p> <p>Stem cells in regenerative process: Cells, tissues and organs - permanently damaged or lost - genetic condition or disease or injury - stem cells are used for treatment of diseases which is called stem-cell therapy. In treating neurodegenerative disorders like Parkinson's disease and Alzheimer's disease neuronal stem cells used to replace the damaged or lost neurons.</p>	1 2 1
32(a)	164	A – Ethanoic acid CH_3COOH	½
(b)		B – Ethyl ethanoate $\text{CH}_3\text{COOC}_2\text{H}_5$	½
(c)		$\text{C}_2\text{H}_5\text{OH} + \text{CH}_3\text{COOH} \xrightarrow{\text{conc. H}_2\text{SO}_4} \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$ <p style="text-align: center;">Ethanol Ethanoic acid Ethyl ethanoate</p> <p>Esterification</p>	2 1
Part IV			
33(a)	8	<p>Law of conservation of linear momentum: There is no change in the linear momentum of a system of bodies as long as no net external force acts on them.</p> 	1
(i)			½

(ii)	12	<p>Two bodies A and B - masses m_1 and m_2 - initial velocity u_1 and u_2 - straight line.</p> <p>Velocity of the first body (u_1) > velocity of the second body (u_2)</p> <p>They collide for time t second. After the impact, both of them move along the same straight line with a velocity v_1 and v_2.</p> <p>Force on body B due to A, $F_B = m_2 (v_2 - u_2)/t$</p> <p>Force on body A due to B, $F_A = m_1 (v_1 - u_1)/t$</p> <p>By Newton's III law of motion, Action force = Reaction force</p> <p>$F_A = -F_B$</p> <p>$m_1 (v_1 - u_1)/t = -m_2 (v_2 - u_2)/t$</p> <p>$m_1 v_1 + m_2 v_2 = m_1 u_1 + m_2 u_2$</p> <p>Linear momentum = mass \times velocity</p> <p>Velocity = linear momentum / mass</p> <p>$V = 2.5 / 5 = 0.5 \text{ ms}^{-1}$</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>				
33(b) (i)	25	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Myopia</th> <th style="width: 50%; text-align: center;">Hypermetropia</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <p><u>Causes:</u> focal length of eye lens is reduced or the distance between eye lens and retina increases.</p> <p><u>Reason:</u> The image of distant objects are formed before the retina.</p> <p><u>Correction:</u> concave lens focal length of the required concave lens is $f = -x$, x is distance upto which myopic person can see.</p> </td> <td style="vertical-align: top;"> <p><u>Causes:</u> The focal length of eye lens is increased or the distance between eye lens and retina decreases.</p> <p><u>Reason:</u> The image of nearby objects are formed behind the retina.</p> <p><u>Correction:</u> Convex lens focal length of the required convex lens is $f = dD/(d-D)$ d - distance upto which the person can see D - distance upto which he wants to see</p> </td> </tr> </tbody> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div>	Myopia	Hypermetropia	<p><u>Causes:</u> focal length of eye lens is reduced or the distance between eye lens and retina increases.</p> <p><u>Reason:</u> The image of distant objects are formed before the retina.</p> <p><u>Correction:</u> concave lens focal length of the required concave lens is $f = -x$, x is distance upto which myopic person can see.</p>	<p><u>Causes:</u> The focal length of eye lens is increased or the distance between eye lens and retina decreases.</p> <p><u>Reason:</u> The image of nearby objects are formed behind the retina.</p> <p><u>Correction:</u> Convex lens focal length of the required convex lens is $f = dD/(d-D)$ d - distance upto which the person can see D - distance upto which he wants to see</p>	<p>1</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p>
Myopia	Hypermetropia						
<p><u>Causes:</u> focal length of eye lens is reduced or the distance between eye lens and retina increases.</p> <p><u>Reason:</u> The image of distant objects are formed before the retina.</p> <p><u>Correction:</u> concave lens focal length of the required concave lens is $f = -x$, x is distance upto which myopic person can see.</p>	<p><u>Causes:</u> The focal length of eye lens is increased or the distance between eye lens and retina decreases.</p> <p><u>Reason:</u> The image of nearby objects are formed behind the retina.</p> <p><u>Correction:</u> Convex lens focal length of the required convex lens is $f = dD/(d-D)$ d - distance upto which the person can see D - distance upto which he wants to see</p>						
(ii)	23	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Convex lens</th> <th style="width: 50%; text-align: center;">Concave lens</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <p>1. A convex lens is thicker in the middle than at edges.</p> <p>2. It is a converging lens.</p> <p>3. It produces mostly real images</p> <p>4. It is used to treat hypermeteropia</p> </td> <td style="vertical-align: top;"> <p>A concave lens is thinner in the middle than at edges.</p> <p>It is a diverging lens.</p> <p>It produces virtual images.</p> <p>It is used to treat myopia</p> </td> </tr> </tbody> </table>	Convex lens	Concave lens	<p>1. A convex lens is thicker in the middle than at edges.</p> <p>2. It is a converging lens.</p> <p>3. It produces mostly real images</p> <p>4. It is used to treat hypermeteropia</p>	<p>A concave lens is thinner in the middle than at edges.</p> <p>It is a diverging lens.</p> <p>It produces virtual images.</p> <p>It is used to treat myopia</p>	<p>1</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p>
Convex lens	Concave lens						
<p>1. A convex lens is thicker in the middle than at edges.</p> <p>2. It is a converging lens.</p> <p>3. It produces mostly real images</p> <p>4. It is used to treat hypermeteropia</p>	<p>A concave lens is thinner in the middle than at edges.</p> <p>It is a diverging lens.</p> <p>It produces virtual images.</p> <p>It is used to treat myopia</p>						
34(a) (i)	115	<p>Ores of Aluminium</p> <ol style="list-style-type: none"> 1. Bauxite $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ 2. Cryolite Na_3AlF_6 3. Corundum Al_2O_3 	2				

(ii)	115	<p>Baeyer's Process Bauxite ore - finely ground - heated under pressure - concentrated caustic soda solution at 150°C - sodium meta aluminate. On diluting it with water - precipitate of aluminium hydroxide - filtered, washed, dried and ignited at 1000°C to get alumina.</p> $2\text{Al}(\text{OH})_3 \xrightarrow{1000^\circ\text{C}} \text{Al}_2\text{O}_3 + 3\text{H}_2\text{O}$ <p>Hall's Process Electrolytic reduction of fused alumina (Al_2O_3) in electrolytic cell. Cathode: Iron tank linked with graphite Anode: A bunch of graphite rods suspended in molten electrolyte. Electrolyte: Pure alumina+ molten cryolite + fluorspar (fluorspar lowers the fusion temperature of electrolyte) Temperature: 900 - 950°C Voltage used: 5-6 V Overall reaction: $2 \text{Al}_2\text{O}_3 \rightarrow 4 \text{Al} + 3\text{O}_2 \uparrow$</p>  <p>Aluminium is deposited at the cathode and oxygen gas is liberated at the anode. Oxygen combines with graphite to form CO_2</p>	<p>1</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>				
34(b)	(i)	<table border="1" style="width: 100%;"> <thead> <tr> <th data-bbox="387 1137 837 1176">Hygroscopic substances</th> <th data-bbox="837 1137 1283 1176">Deliquescent substances</th> </tr> </thead> <tbody> <tr> <td data-bbox="387 1176 837 1525"> 1. When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve. 2. Hygroscopic substances do not change its physical state on exposure to air. 3. Hygroscopic substances may be amorphous solids or liquids. </td> <td data-bbox="837 1176 1283 1525"> When exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve. Deliquescent substances change its physical state on exposure to air. Deliquescent substances are crystalline solids. </td> </tr> </tbody> </table>	Hygroscopic substances	Deliquescent substances	1. When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve. 2. Hygroscopic substances do not change its physical state on exposure to air. 3. Hygroscopic substances may be amorphous solids or liquids.	When exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve. Deliquescent substances change its physical state on exposure to air. Deliquescent substances are crystalline solids.	<p>1</p> <p>1</p> <p>1</p>
Hygroscopic substances	Deliquescent substances						
1. When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve. 2. Hygroscopic substances do not change its physical state on exposure to air. 3. Hygroscopic substances may be amorphous solids or liquids.	When exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve. Deliquescent substances change its physical state on exposure to air. Deliquescent substances are crystalline solids.						
(ii)	131	<table border="1" style="width: 100%;"> <thead> <tr> <th data-bbox="387 2134 837 2172">Hygroscopic substances</th> <th data-bbox="837 2134 1283 2172">Deliquescent substances</th> </tr> </thead> <tbody> <tr> <td data-bbox="387 2172 837 2228"> 1. Conc.Sulphuric acid 2. Copper (II) sulphate pentahydrate 3. Silica gel 4. Gypsum salt </td> <td data-bbox="837 2172 1283 2228"> 1. Calcium chloride </td> </tr> </tbody> </table> <p><i>* Copper sulphate pentahydrate and gypsum salts have 5 and 2 number of water molecules respectively. Despite this moisture content they are crystalline in nature. Hence they are hygroscopic in nature.</i></p>	Hygroscopic substances	Deliquescent substances	1. Conc.Sulphuric acid 2. Copper (II) sulphate pentahydrate 3. Silica gel 4. Gypsum salt	1. Calcium chloride	2
Hygroscopic substances	Deliquescent substances						
1. Conc.Sulphuric acid 2. Copper (II) sulphate pentahydrate 3. Silica gel 4. Gypsum salt	1. Calcium chloride						
(iii)	132	<p>Mass percentage = $\frac{\text{Mass of the solute}}{\text{Mass of the solute} + \text{mass of the solvent}} \times 100$</p> $= \frac{45}{(45+180)} \times 100$ $= 20\%$	<p>1</p> <p>($\frac{1}{2} + \frac{1}{2}$)</p>				

35(a)			
(i)	237	Cortisol. It helps to maintain the body in living condition and recover it from the severe effects of stress reactions.	1 1
(ii)	231	<u>Physiological effects of Gibberelins:</u> 1. Application of gibberellins on plants stimulate extraordinary elongation of internode. e.g. Corn 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) e.g. Tomato	2½
(iii)	206	Functions of blood 1. Transport of respiratory gases (Oxygen & CO ₂). 2. Transport of digested food materials to the different body cells. 3. Transport of hormones. 4. Transport of nitrogenous excretory products (ammonia, urea, uric acid). 5. In the protection of the body and defense against diseases. 6. As buffer and regulation of pH and body temperature. 7. It maintains proper water balance in the body.	2½
35(b)			
(i)	322	Rainwater harvesting - collecting and storing rainwater - a traditional method of storing rain water in underground tanks, ponds, lakes, check dams. Purpose of rainwater harvesting - make the rainwater percolate under the ground to recharge ' groundwater level '. (i) Roof top rainwater harvesting: Roof-tops - rain catchers - falls on the roof of the houses, apartments, commercial buildings - collected and stored in the surface tank and can be used for domestic purpose (ii) Recharge pit – water from roof tops or open spaces - directed into the percolation pits for filtration then enters the recharge pits or ground wells . (iii) Digging of tanks or lakes (Eris) - traditional water harvesting system in Tamil Nadu- if the water in one eri overflows - diverted to interconnected eri of the next village (iv) Ooranis - small ponds - collect rainwater - used for various domestic purposes (drinking, washing and bathing).	1 ½ ½ ½ ½
(ii)	301	POCSO - Protection of Children from Sexual Offences People who traffic children for sexual purposes are also punishable under the provisions relating to the Act. Objectives of the POCSO Act, 2012 1. To protect children from the offences of Sexual assault, Sexual	1 1 1 1

	harassment, Pornography. 2. To establish Special Courts for speedy trial of such offences.	
--	---	--

Prepared by

Barani Dharan, Senior School Coordinator, Isha Vidhya Matric Hr Sec Schools.