



SCIENCE

X - Standard

Based on the new Blue Print Pattern for 2017-18

Salient Features :

- Updated as per the latest Samacheer Textbook Edition 2017 - 18
- Sura's six Model Question Papers are given, based on the Latest Govt. Exam Paper Pattern.
- Exhaustive Additional Questions in all Sections in this guide.
- Answers of 26 Question Papers (Dept. Model, PTA - 4 Model Papers, April 2012 to Oct 2017; QY-2016, 2017 and HY-2016 Question Papers) are incorporated in the appropriate Sections of the Chapters.
- Dept. Model and PTA - 4 Model Question Papers are updated as per Govt's latest revised Model Papers.
- Detailed Analysis of 5 marks Questions of 19 Question Papers (Dept. Model and April 2012 to Oct. 2017).
- Free Unit Test Booklet (64 Pages).
- Quarterly - 2017 Question paper with Answers are given at the end of this guide.



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NOTE FROM PUBLISHER

It gives me great pride and pleasure in bringing to you Sura's Science Guide for X Standard (Based on New Uniform Syllabus System of Education). As this common syllabus frame work had already been introduced, the students have to carefully understand the topics, terminologies, formulas, scientific names and equations. A deep understanding of the text and exercises is rudimentary to have an insight into Biology, Chemistry and Physics concepts.

Sura's Science X Standard Guide encompasses all the requirements of the students to comprehend the text and the evaluation of the textbook.

- It will be a teaching companion to teachers and a learning companion to students.
- As the guide has been framed based on the revised '**Blue Print**' and '**Question Paper Pattern**', it provides a precise and clear understanding of text and exercises from the examination perspective.
- Exhaustive additional
 - ◆ Choose the correct answer
 - ◆ Spot the error
 - ◆ Raise questions
 - ◆ Label the parts in the given diagram
 - ◆ Fill up the blanks
 - ◆ Find the odd one out
 - ◆ Long answers
 - ◆ Match the following
 - ◆ Assertion and Reason
 - ◆ Problem solving
 - ◆ Copy a diagram and to identify it
 - ◆ Interpret what happens in the given situations

have been given to help students practice and learn effectively all the sections of the textbook.

- In order to learn effectively I advise students to learn the subject and practice the exercises given.
- Answers of 26 Question Papers (Dept. Model, PTA - 4 Model Papers, April 2012 to Oct. 2017, QY-2016, 2017 and HY-2016 Question Papers) are incorporated in the appropriate Sections of the Chapters in this guide.
- Sura's six Model Question Papers are given, based on the revised Govt. Exam Paper Pattern.

(iii)

- A free Unit Test booklet (64 pages) with this guide will help the students sharpen their chapter-wise learning skills and practise efficiently.
- Quarterly 2017 Question paper with Answers are given at the end of this guide.

Though these salient features are available in our Sura's Science Guide X-Standard, I cannot negate the indispensable role of the teachers in assisting the student to understand Biology, Physics and Chemistry concepts.

I sincerely believe this guide satisfies the needs of the students and bolsters the teaching methodologies of the teachers.

I pray the almighty to bless the students for consummate success in their examinations.

- Publisher

All the Best

Also available for Std. - X

Guides
and Question Banks

- ✦ சுராவின் தமிழ் உரைநூல்
- ✦ Sura's English Guide
- ✦ Sura's Will to Win Easy English Guide
- ✦ Sura's Will to Win Easy English Workbook
- ✦ Sura's Mathematics Guide (EM)
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- ✦ Sura's Sigaram Thoduvom (EM/TM) for all subjects
- ✦ Sura's Will to Win - 1 mark Q & A - English Paper I & II
- ✦ Sura's Map Work Book (EM & TM)
- ✦ சுராவின் செந்தமிழ் பயிற்சி புத்தகம் (தமிழ்)

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Design of Question Paper – X Std Science (Theory)**Time: 2½ Hours****Max. Marks: 75**

The weightage of marks allotted for the design of question paper shall be as under:

A. Weightage to Learning Outcome

SI.No	Categories	Mark	PERCENTAGE
1	Knowledge	17	15
2	Understanding	56	45
3	Application	35	30
4	Skill	11	10
	Total	119	100

Note: (1) Total Marks is 119 inclusive of choice. (2) While preparing the question paper, there may be variations in weightage to the extent from 2 % to 5 %.

B. Weightage given to various types of question

S.No	Types of Questions	Marks for Each Question	Total No. of Questions	No. of Questions to be answered	Total Marks
1	Section A Objective Type (OT)	1	15	15	15 x 1 = 15
2	Section B Short Answer (SA)	2	32*	20	20 x 2 = 40
3	Section C Long Answer (LA)*	5	8	4	4 x 5 = 20
	Total		55	39	75

* Each Question may be split into 2 or 3 sub-divisions carrying 1, 2 or 3 marks. But the questions shall be from each area (Botany, Zoology, Chemistry, Physics). Choices will be internal (Either - or)

***Short Answer split up**

SI.No.	Very Short Answer Type of Questions	To be asked
1	To Match	3
2	To spot the error / mistake in the given statements	3
3	Reason and assertion	3
4	To Raise questions	5
5	To label the parts in the given diagram	3
6	To copy a diagram & to identify /mark the parts	3
7	To calculate the required value(Problem solving)	3
8	To fill in the blanks (from the given pair of answers)	3
9	To interpret what happens in the given situations	3
10	To find the odd one out	3
	Total Number of Questions given	32
	Total Number of Questions to be answered	20

(vi)

C. Weightage given to the higher order of questions

SI.No	Estimated higher order of questions	% Percentage
1	Easy	20
2	Average	60
3	Difficult	20

D. Weightage to Content Unit

Units		No. of Questions			Total Marks	
		OT	SA	LA		
1. Heredity and Evolution	Botany and Zoology	1(1)	3(2)	-	7	
2. Immune System		1(1)	1(2)	1(5)	8	
3. Structure & Function of the Human Body Organ System		1(1)	1(2)	1(5)	8	
4. Reproduction in Plants		1(1)	1(2)	1(5)	8	
5. A representative Study of Mammals		1(1)	3(2)	-	7	
6. Life Processes		1(1)	3(2)	-	7	
7. Conservation of Environment		-	1(2)	1(5)	7	
8. Waste Water Management		1(1)	3(2)	-	7	
9. Solutions	Chemistry	1(1)	2(2)	-	5	
10. Atoms and Molecules		-	1(2)	1(5)	7	
11. Chemical Reaction		1(1)	2(2)	-	5	
12. Periodic Classification of Elements		1(1)	2(2)	-	5	
13. Carbon and its Compounds		1(1)	1(2)	1(5)	8	
14. Measurements		1(1)	-	-	1	
15. Laws of Motion and Gravitation	Physics	1(1)	2(2)	1(5)	10	
16. Electricity and Energy		1(1)	3(2)	-	7	
17. Magnetic Effect of Electric Current and Light		1(1)	3(2)	1(5)	12	
Total Number of Questions given		15(15)	32(64)	8(40)	55	119
Total Number of Questions to be answered		15(15)	20(40)	4(20)	39	75

() Indicates the marks

Based on the Blue Print Pattern for 2017 - 18.

(vii)

BLUE PRINT

Unit No.	Content Unit	Related Subject	Knowledge			Understanding			Application			Skill			Total No. of Questions	Total Marks
			OT	SA	LA	OT	SA	LA	OT	SA	LA	OT	SA	LA		
1	Heredity and Evolution	Zoo	1(1)			3(2)								4	7	
2	Immune System	Zoo	1(1)			1(5)			1(2)					3	8	
3	Structure & Function of the Human Body Human Body – Organ System	Zoo	1(1)						1(2)	1(5)				3	8	
4	Reproduction in Plants	Bot	1(1)			1(5)							1(2)	3	8	
5	A Representative Study of Mammals	Zoo		1(2)		1(1)	1(2)		1(2)					4	7	
6	Life Processes	Bot & Zoo		1(2)		1(1)	1(2)		1(2)					4	7	
7	Conservation of Environment	Bot											1(2)	2	7	
8	Waste Water Management	Bot	1(1)				2(2)		1(2)					4	7	
9	Solutions	Che				1(1)	1(2)		1(2)					3	5	
10	Atoms and Molecules	Che			1(5)				1(2)					2	7	
11	Chemical Reaction	Che		1(2)		1(1)	1(2)							3	5	
12	Periodic Classification of Elements	Che				1(1)	1(2)		1(2)					3	5	
13	Carbon and its Compounds	Che				1(1)		1(5)	1(2)					3	8	
14	Measurements	Phy				1(1)								1	1	
15	Laws of Motion and Gravitation	Phy		1(2)		1(2)	1(2)	1(5)	1(1)					4	10	
16	Electricity and Energy	Phy		1(2)		1(1)	1(2)						1(2)	4	7	
17	Magnetic Effect of Electric Current and Light	Phy				1(1)	1(2)						1(2)	5	12	
	Total		5(5)	5(10)	1(5)	9(9)	13(26)	4(20)	1(1)	10(20)	3(15)	4(8)	-	55	119	

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DETAILED ANALYSIS

(For 5 marks questions)

It covers 16 sets of Question Papers. i.e. Dept. Model and April 2012 to Oct. 2017.

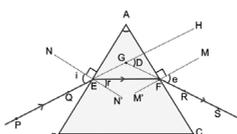
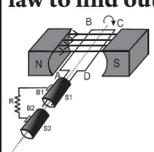
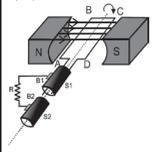
Units	Questions	Answers in Pg No.	Examination Month & Year
Biology (5 Marks)			
1	Human evolution has a record of changes for the past 15 million years. Name the different species of mankind in chronological order from primitive to modern man. When were the primitive caves developed? Narrate the life led by early man like hominids	9	April 2013
	Explain Mendel's Monohybrid Cross Experiment.	9	June 2013
	a) What is Genetic engineering? b) What are the uses of genetic engineering?	18	April 2012, 2014 & 2017; Oct. 2012 & 2013;
	a) What is bio sensor? b) State any four applications of bio sensor.	19	June 2012; June & Oct 2015
	Explain about the uses of Biotechnology.	19	June 2014; April 2015
	List the recent advances made in bio-technical field through a chart.	19	Dept. Paper;
	Stem cell culture has brought a lot of benefits to mankind a) List the types of stem cells. b) What are the characteristic features of stem cells? c) How are the somatic stem cells obtained?	20	Sep. 2014
2	Kala has delivered a baby. a) Suggest the immunization schedule for the baby in the six months. b) What are all the diseases that can be prevented as per the schedule?	31	April 2012, 2013, 2016; June 2012, 2013, 2014, 2016; Sep 2013; Oct. 2015 & 2016
	There is wide-spread outbreak of malaria in your area. a) Suggest some controlling measures to the local authorities concerned. b) Pick out the right symptom for malaria. (chill and shiver and a rise in temperature, diarrhoea)	31	Dept. Paper; April 2013, 2015 & 2017; June 2015 & 2017
	15 th October is observed as "Hand Washing Day" a) Tell your friend the effects of hand washing b) In a day, what are the occasions in which you wash your hand	31	Sep. 2014
	What is immunity? Write a note on the various types of immunity.	32	Oct. 2017
	What are the tests to identify and confirm HIV virus? Give their preventions.	40	Oct. 2015
3	Describe the structure of a neuron with the help of a neat, labelled diagram.	56	April 2016; Oct. 2016

3	Use words from the given list to complete the following paragraph. (Skull, Vertebral column, Pia mater, Arachnoid membrane, Brain, Spinal cord, Meninges, Dura mater) The central nervous system is covered by three protective coverings collectively called _____. The outermost covering below the _____ and _____ is double thick and is called _____. The middle covering is thin and vascularised and is called _____. The innermost covering is a very thin delicate membrane and is closely stretched over the outer surface of brain and spinal cord is called _____.	60	June 2016; Mar. 2017
	Name any 5 types of nerve cells.	69	Mar. 2017
	List out the various parts of the human brain and write a note on their functions. (Diagram not necessary)	57	June 2017
	Name the endocrine glands and their location in the human body. Describe any two of them in detail.	57	Oct. 2017
4	Name the process by which the fruit is developed Give the development process in brief Draw a neat diagram of that process and label its parts.	80	June & Sep. 2013; Oct. 2015
	Write the two events involved in the sexual reproduction of flowering plants. a. Discuss the first event and write the types. b. Give the advantages and disadvantages of that event.	80	Dept. Paper; April 2013 & 2015; June 2015
	Fruit is the product of fertilization. Is there any fruit formed without the act of fertilization? Represent the classification of fruits in a diagrammatic sketch.	81	April 2012 & 2016; Oct. 2015
	Compare the aggregate fruit with multiple fruit with suitable examples.	82	June 2014
	Describe the structure of dicot seed.	82	June 2012; Oct. 2012, 2014 & 2016; April 2014 & 2017
	Describe the structure of a monocot seed.	83	Oct. 2015
	What are the types of pollination? Which among them is more advantageous? why?	87	June 2016
	What is self-pollination? Mention its merits and demerits.	88	Oct. 2017
7	What is fruit ? (a) Explain briefly about fruit formation. (b) What are parthenocarpic fruits ? Give examples.	96	June 2017
	Classify the following substances (wood, paper, plastic and grasses) Give detailed account on your classification	144	Sep. 2013; Oct. 2015
	In your locality people are affected due to water scarcity. What measures will you take to deal with the problem of the water scarcity?	144	Dept. Paper; April 2013 & 2015; June 2014 & 2017; Oct. 2017

7	Smoke, smoke, everywhere smoke. Do you agree this situation is good for health? List out the harmful effects of coal burning.	146	April 2012 & 2016; June 2013 & 2016; April & Sep. 2014; Oct. 2016
	a) What is global village? b) What is the use of global village? c) What are the technologies used in global village?	154	June 2012
	a) What is Green Chemistry? b) Write any two principles of green chemistry. c) Mention the products produced by the process of green chemistry.	155	Oct. 2012; June 2015 (a & c only); Mar. 2017
Chemistry (5 Marks)			
10	List out the differences between atoms and molecules.	195	Dept. Paper; June 2012 & 2013; Oct. 2015
	Calculate the gram molecular mass of water from the values of gram atomic mass of hydrogen and oxygen. Gram atomic mass of hydrogen = 1 gm Gram atomic mass of oxygen = 16 gm	195	April 2012, 2013 & 2015 Oct. 2015
	Modern atomic theory takes up the wave concept, principle of uncertainty and other latest discoveries to give a clear-cut picture about an atom. State any three findings of modern atomic theory.	196	June 2013 & 2015; April 2012; 2014 & 2017; Oct. 2012 & 2015
	You are given the values of mass of one volume of oxygen gas and the mass of one volume of hydrogen. By applying Avagadro's law how will you establish the relation between vapour density and molecular mass of a gas?	197	Sep. 2013 & 2014
	Calculate the number of moles in : 3.0115×10^{23} atoms of copper, 27.95 g of iron, 1.51×10^{23} molecules of CO_2 .	197	June & April 2013
	Find the number of moles in copper containing 12.046×10^{22} molecules.	197	Dept. Paper
	Write down any two applications of Avagadro's law.	216	Oct. 2012; April 2014 & 2016
	Calculate the number of moles in 90g of water. Atoms and molecules are the building blocks of matter. List out any two differences between them.	217	June 2012; April 2015; Oct. 2015
	What are Isotopes? Write any three applications of Avagadro's law?	216	April 2016

10	Find how many moles of atoms are there in: (i) 2g of nitrogen (ii) 23g of sodium (iii) 40 g of calcium (iv) 1.4 g of lithium (v) 32 g of sulphur	203	June & Oct. 2016 & 2017																
	(i) State any four findings of modern atomic theory. (ii) Difference between an atom and molecules.	218	June 2017																
13	An organic compound (A) is widely used as a preservatives in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound (B). i) Identify the compound (A) and (B) ii) Name the process and write the corresponding chemical equation	265	Oct. 2012, 2015 & 2017; June 2015; Mar.2017																
	Fill in the blanks using suitable formula in the given table.	268	June 2014 & 2016																
	<table border="1"> <thead> <tr> <th>No</th> <th>Alkane</th> <th>Alkene</th> <th>Alkyne</th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>C_2H_6 Ethane</td> <td>..... Ethene</td> <td>C_2H_2 Ethyne</td> </tr> <tr> <td>(b)</td> <td>..... Propane</td> <td>C_3H_6 Propene</td> <td>..... Propyne</td> </tr> <tr> <td>(c)</td> <td>C_4H_{10} Butane</td> <td>..... Butene</td> <td>..... Butyne</td> </tr> </tbody> </table>			No	Alkane	Alkene	Alkyne	(a)	C_2H_6 Ethane Ethene	C_2H_2 Ethyne	(b) Propane	C_3H_6 Propene Propyne	(c)	C_4H_{10} Butane Butene Butyne
	No			Alkane	Alkene	Alkyne													
	(a)			C_2H_6 Ethane Ethene	C_2H_2 Ethyne													
	(b) Propane	C_3H_6 Propene Propyne															
	(c)	C_4H_{10} Butane Butene Butyne															
	Write the common name and IUPAC name of the following (a) CH_3CH_2CHO , (b) CH_3COCH_3 , (c) $CH_3-CH-CH_3$, (d) CH_3COOH , (e) $HCHO$ OH	269	April & Sep. 2013 April & June 2015																
	Write the common name and IUPAC name for the following i) $CH_3CH_2COCH_3$ (ii) $HCOOH$	282	Oct. 2012 & 2015																
	Define esterification. Give its chemical reaction.	282	Dept. Paper; April 2014; June 2017																
Ethanoic acid reacts with ethanol in the presence of concentrated sulphuric acid. Name the organic product formed. Give the name of the reaction. What is the role of H_2SO_4 in the above reaction? Give two uses of ethanol.	285	April 2012; June 2013;																	
The molecular formula of an organic compound is CH_3COOH . i) Write the IUPAC name of this compound ii) Give one use of this compound.	285	April 2012																	
Ethanoic acid reacts with carbonates and bicarbonates. a) Write the balanced equation. b) Give three uses of ethanoic acid.	286	June 2012																	
What are the evil effects of consuming alcohol?	286	June & Sep 2014 April 2016																	
Organic compound 'A' of molecular formula $C_2H_4O_2$ gives brisk effervescence with sodium-bicarbonate solution. Sodium salt of A on treatment with soda lime gives a hydrocarbon 'B' of molecular mass 16. It belongs to the first member of the alkane family. What are 'A' and 'B' and how will you prepare 'A' from ethanol?	275	Oct. 2016																	

13	Explain the manufacturing of Ethanol from Molasses.	287	Mar.2017																	
	(a) How is Ethanoic Acid (CH_3COOH) prepared ? Give the chemical equation. (b) Write the common name and IUPAC name of the following : (i) $\text{CH}_3\text{CH}_2\text{OH}$ (ii) CH_3CHO (iii) $\text{CH}_3\text{CH}_2\text{COOH}$	288	June 2017																	
	Complete the following table: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Molecular Formula</th> <th style="width: 33%;">Common Name</th> <th style="width: 33%;">IUPAC Name</th> </tr> </thead> <tbody> <tr> <td>$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Dimethyl ketone</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Propanal</td> </tr> <tr> <td>HCOOH</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>Butanone</td> </tr> </tbody> </table>	Molecular Formula	Common Name	IUPAC Name	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$				Dimethyl ketone				Propanal	HCOOH					Butanone	271
Molecular Formula	Common Name	IUPAC Name																		
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$																				
	Dimethyl ketone																			
		Propanal																		
HCOOH																				
		Butanone																		
Physics (5 Marks)																				
15	Space stations are used to study the effects of long-space flight on the human body. Justify.	308	April & Sep. 2014 June 2016																	
	$F = Gm_1m_2/d^2$ is the mathematical form of Newton's law of gravitation. Give the statement of Newton's law of gravitation.	308	June 2012 & 2016; June & Sep. 2013; April & Sep. 2014; April 2015																	
	Newton's first law of motion gives a qualitative definition of force. Justify.	308	Dept. Paper; April 2012, 2013, 2015 & 2017; Oct. 2017																	
	The figure represents two bodies of masses 10 kg and 15 kg, moving with an initial velocity of 10 ms^{-1} and 5 ms^{-1} respectively. They collide with each other. After collision, they move with velocities 4 ms^{-1} and 9 ms^{-1} respectively. The time of collision is 2 s. Now calculate F_1 and F_2 .	309	Mar.2017; Oct. 17																	
	Which would require a greater force for accelerating a 2 kg of mass at 4 ms^{-2} or a 3 kg of mass at 2 ms^{-2} .	318	April 2012																	
	Write any five achievements of Chandrayan - I	334	June 2014; April 2016																	
	Write two differences between mass and weight.	328	Oct. 2012 & 2015; June 2013 & 2015																	
	What are the uses of cryogenic techniques.	328	Oct. 2012 & 2015; June 2017																	

15	Newton's third law of motion : For every action there is an equal and opposite reaction. Explain this law using one illustration.	328	June 2012; Sep. 2013
	State Newton's law of gravitation.	311	June 2017
17	Label the following, in the following diagram : Incident ray, Refracted ray, Emergent ray, Angle of refraction, Angle of deviation, Angle of emergence.	379	April 2013 & 2015; June 2012, 2014 ; Oct. 2015
			
	The refractive index of diamond is 2.42. What is the meaning of this statement in relation to speed of light ?	379	June 2012 & 2015
	Redraw the above diagram, This diagram represents, Label the parts of the diagram, Name the principle by which it works, Name the law to find out the direction of the current.	382	Dept. Paper; June 2013 & 2016; April 2012, 2014 & 2016
			
	What are the defects of eye? How are these rectified?	402	April 2012
State and explain the defects of vision. How can these defects be corrected?	404	Sep. 2014; Oct. 2015; Mar. 2017	
Draw and explain the refraction of light through a prism	405	Sep. 2013; June 2015	
The optical prescription of a pair of spectacle is : Right eye : - 3.5 D Left eye : - 4.00 D			
(a) Name the defect of the eye.	383	Oct. 2016	
(b) Are these lenses thinner at the middle or at the edges ?			
(c) Which lens has a greater focal length?	407	Oct. 2017	
(ii) Define power of lens and give its unit.			
Observe the Diagram and answer the following : (a) What is known as induced current ? (b) How this induced current be generated by AC Generator ?	406	June 2017	
			

BIOLOGY**1****HEREDITY AND EVOLUTION**

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	3	-	4	7

Important Terms and Definitions :

- **Heredity** : The inheritance of characteristics from one generation to another generation is called heredity.
- **Genetic Material** : DNA (De-Oxyribo Nucleic Acid).
- **Progeny** : Offspring.
- **Trait** : A genetically determined characteristic.
- **Monohybrid Cross** : The experiment considering the inheritance of a single trait (character).
- **Dwarf** : Short plant.
- **Phenotype** : Expression of morphological characters as tall or dwarf plant, violet or white flower is called Phenotype.
- **Genotype** : The expression of gene (or genetic make up) of an individual for a particular trait is called Genotype.
- **Alleles** : The alternate forms of the same gene are called alleles.
- **Allelomorph** : The expression of contrasting pair of alleles (Tt) makes up an allelomorph. e.g., Height of plant (Tt), shape of seed (Rr).
- **Variation** : It may be defined as differences in the characteristics among the individuals of the same species, or among the different genera, or different species.
- **Evolution** : It may be defined as a gradual development of more complex species from pre-existing simpler forms.
- **Genetic Engineering** : It is the modification of the genetic information of living organisms by manipulation of DNA by adding, removing or repairing part of genetic material (DNA) and changing the phenotype of the organism.
- **Vitamins** : These are chemical compounds present in variable minute quantities in natural food stuffs. They do not furnish energy but are very essential for energy transformation and regulation of metabolism.
- **Vaccines** : These are substances that confer immunity against specific disease.
- **Steroids** : They are derivatives of lipids. Eg: Cholesterol containing steroid drugs like prednisolone, produced from the fungus Rhizopus.
- **Cloning** : It is an experimental technique wherein a group of morphologically and genetically identical organisms are produced.

- **Clone** : A clone may be defined as an exact carbon copy or copies of a single genetical parent. The word clone refers only to living species.
- **Stem cells** : These are the most unspecialized mass of cells.
- **Antibiotics** : They are chemical substances derived from microbes like fungi, bacteria etc., employed to kill infectious germs and cure a disease.
- **Gene Therapy** : It is the means to treat or even cure genetic and acquired diseases like cancer and AIDS by using normal gene to supplement or replace the defective gene.

MODEL EVALUATION

PART - A

Textbook Page No : 11

1. Mendel observed 7 pairs of contrasting characters in *Pisum sativum*. Which one of the following is not a part of that? (June 2014 & 2015; Oct. 2017)

i) Tall and dwarf	ii) Yellow and green seed colour
iii) Terminal and axial flower	iv) Smooth and rough stem

[Ans: iv) Smooth and rough stem]
2. Primitive man evolved in _____ (Apr. 2013 & 2015)

i) Africa	ii) America	iii) Australia	iv) India
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[Ans: i) Africa]
3. Which of the following is inheritable? (June 2013, April 2016)

i) an altered gene in sperm	ii) an altered gene in liver cells
iii) an altered gene in skin cells	iv) an altered gene in udder cells

[Ans: i) an altered gene in sperm]
4. The theory of Natural Selection was proposed by ____ (Deptl. Paper; Apr. 2012; Sep. 2013; Apr. & Sep. 2014; Oct. 2015 & 2016; June 2016; PTA - 4)

i) Charles Darwin	ii) Hugo de Vries
iii) Gregor Johann Mendel	iv) Jean Baptiste Lamarck

[Ans: i) Charles Darwin]
5. Somatic gene therapy causes _____ (PTA - 2; QY 2017)

i) changes in sperm	ii) changes in progeny
iii) changes in body cell	iv) changes in ovum

[Ans: iii) changes in body cell]
6. In a pea plant, the yellow colour of the seed dominates over the green colour. The genetic make up of the green colour of the seed can be shown as _____ :

i) GG	ii) Gg	iii) Yy	iv) yy
-------	--------	---------	--------

[Ans: iv) yy]
7. Some people can roll their tongue and this is a genetically controlled auto-somal dominant character. [Roller = RR / Rr;; Non-roller = rr]
 A child who can roll the tongue has one brother who is a non-roller and two sisters who are rollers. If both the parents are rollers, the genotypes of their parents would be _____.

i) RR × RR	ii) Rr × Rr	iii) RR × rr	iv) rr × rr
------------	-------------	--------------	-------------

[Ans: ii) Rr × Rr]

Hint:

Parents : Rr Rr
gamete : R r, R r

♀ \ ♂	R	r
R	RR	Rr
r	Rr	rr

1RR 2Rr 1rr
Child 2 Sisters 1 Brother
(Roller) Rollers non roller

8. Hydra, a multi-cellular invertebrate of phylum cnidaria (coelenterata) can give rise to new offspring by various methods. Choose the method by which the offspring are produced with significant variations.

- i) budding ii) regeneration
iii) sexual reproduction iv) asexual reproduction

[Ans: iii) sexual reproduction]

9. The following are the events in the formation of the first cloned animal – the sheep Dolly.

- (a) Removal of haploid nucleus from the ovum.
(b) Implantation of ovum with diploid nucleus into the surrogate mother.
(c) Collection of udder cell from the sheep.
(d) Injection of diploid nucleus of udder cell into the enucleated ovum.
(e) Development of a young clone.

The correct sequential order of these events is _____ .

- i) abcde ii) cabed iii) cadbe iv) edcba

[Ans: iii) cadbe]

10. The following are statements about stem cells:

- a) There are unspecialised / undifferentiated cells.
b) They can be transformed into any type of body cell.
c) They can multiply rapidly to form a large number of similar types of cells.
d) They cannot transform into cardiac cells or nerve cells.
e) They are obtained from reproductive progeny only.

The correct statements are _____:

- i) a, b, c only ii) c, d, e only iii) a, c, e only iv) b, c, e only

[Ans: i) a, b, c only]

11. In persons suffering from insulin-dependent diabetes, _____ the cells of pancreas are degenerated.

(Mar. 2017; June 2017)

- i) Alpha ii) Beta iii) Gamma iv) Delta [Ans: ii) Beta]

12. Identical twins are born as a result of fertilization between _____.

- i) two eggs and two sperms ii) two eggs and one sperm
iii) one egg and one sperm iv) one egg and two sperms

[Ans: iii) one egg and one sperm]

2

IMMUNE SYSTEM

Blue Print	1 Mark question	2 Marks question	5 Marks question	Total questions	Total Marks
	1	1	1	3	8

Important Terms and Definitions :

- **Health** : It is a state of physical, mental and social well-being of an individual.
- **Disease** : The condition of malfunctioning of the organ system is called disease.
- **Normal blood sugar level** : 80-120mg/dl of blood under fasting conditions.
- **Diabetes mellitus** : It is a state of expulsion of excess unused glucose in the urine due to less production of insulin.
- **Albinism** : It is an inherited disorder of melanin metabolism, characterised by the absence of melanin in the skin.
- **Marasmus** : It is a protein deficiency disease. The child loses weight and suffers from severe diarrhoea. The child will appear as though bones are covered by skin.
- **Kwashiorkar** : It is also a protein deficiency disease. The child develops an enlarged belly, with face and feet swelling.
- **Toxins** : Poisonous substances produced by microbes inside the body.
- **Viruses** : These are living substances inside the host cell and behave as dead particles outside the host cell.
- **Prokaryotes** : Organism which do not have well developed nucleus. e.g. Bacteria.
- **Saprophytic** : Organisms living on dead and decaying organic matter is called saprophytic.
- **Parasitic** : Organism which derives energy from living organisms.
- **Protozoan** : They are unicellular animalcules.
- **Fomites** : The objects like hand kerchief, bedding, clothes, utensils, toilet articles etc., used by sick people are likely to carry infection and are called fomites.
- **Transmission** : The transfer of a disease causing germ from an infected person to a healthy person through certain agents or direct contact is called transmission.
- **Antigens** : The foreign proteins that enter the body.
- **Antibodies** : The immune system produces suitable proteinaceous substances called antibodies to detoxify the antigens.
- **Active Acquired Immunity** : Immunity developed by our body, during the first infection of any pathogen.

- **Passive Acquired Immunity** : Immunity acquired by using readymade antibodies introduced from outside instead of stimulating the body to produce antibodies.
- **MMR** - Mumps, Measles, Rubella.
- **DPT** - Diphtheria, Pertussis, Tetanus.
- **DT** - Diphtheria, Tetanus.
- **TT** - Tetanus Toxoid.
- **HIV** - Human Immuno Deficiency Virus
- **AIDS** - Acquired Immune Deficiency Syndrome.
- **ELISA** - Enzyme Linked Immuno Sorbent Assay.
- **Natural or Innate immunity** : Naturally got immunity from the mother by birth.
- **Photophobia** - High sensitivity to light.
- **Germ Theory of disease** - Established by Robert Koch and Louis Pasteur

MODEL EVALUATION

PART - A

(Textbook Page No. 31)

1. **Pick out a case of healthy state of an individual.**

- i) Mr. X is recovering from an infectious disease
- ii) Mr. Y takes insulin injection everyday
- iii) Mrs. Z is very depressed
- iv) Mr. K does his duty and spends time joyfully

[Ans: iv) Mr. K does his duty and spends time joyfully]

2. **Which one of the following is not socially balanced?**

- i) He enjoys a birthday party
- ii) He behaves rudely over trivial matters
- iii) He adjusts well to the surrounding situation
- iv) He attends to his ailing mother at the hospital

[Ans: ii) He behaves rudely over trivial matters]

3. _____ is a bacterial disease.

(Apr. 2013 & 2016)

- | | | | |
|---------------|------------|--------------|---------------|
| i) Meningitis | ii) Rabies | iii) Tetanus | iv) Small pox |
|---------------|------------|--------------|---------------|

[Ans: iii) Tetanus]

4. **One of the following is transmitted through air. Find it out.**

(Apr. 2014)

- | | | | |
|-----------------|----------------|--------------|-------------|
| i) Tuberculosis | ii) Meningitis | iii) Typhoid | iv) Cholera |
|-----------------|----------------|--------------|-------------|

[Ans: i) Tuberculosis]

5. **The most serious form of malaria is caused by Plasmodium _____**

(Apr. 2012; Sep. 2013; Oct. 2015 ; June 2016; PTA - 4)

- | | | | |
|----------|--------------|-----------------|-----------|
| i) ovale | ii) malariae | iii) falciparum | iv) vivax |
|----------|--------------|-----------------|-----------|

[Ans: iii) falciparum]

6. An example of protozoan infecting our intestine is _____
(June 2012 & 2013; Oct. 2017; QY 2017)
- i) Plasmodium vivax
ii) Entamoeba histolytica
iii) Trypanosoma gambiense
iv) Taenia solium
[Ans: ii) Entamoeba histolytica]
7. One of the means of indirect transmission of a disease is _____ (Apr. 2015)
- i) sneezing
ii) coughing
iii) through placenta
iv) using utensils of patients
[Ans: iv) using utensils of patients]
8. When antibodies, extracted from other animals are injected into your body, what kind of immunity do you gain?
- i) Artificially active acquired immunity
ii) Artificially passive acquired immunity
iii) Naturally active acquired immunity
iv) Naturally passive acquired immunity [Ans: ii) Artificially passive acquired immunity]
9. The first vaccine injected into a just born baby is _____
(Deptl. Paper; Sep. 2014; June 2015; Oct. 2016; HY 2016; Mar. 2017)
- i) Oral polio
ii) DPT
iii) DPT and Oral polio
iv) BCG [Ans: iv) BCG]
10. In order to lead a healthy life, a person should enjoy physical, mental and social well-being. If a person lacks any one of them, then that person is suffering from _____
Ans: Disease (June 2014)
11. A child eats food rich in carbohydrates and avoids protein in its diet. Which type of nutritional deficiency will affect that child? (June 2017)
- i) Kwashiorkar
ii) Nyctalopia
iii) Diabetes
iv) Down syndrome
[Ans: i) Kwashiorkar]
12. Assertion (A): Expulsion of excess unused glucose in the blood through urine is observed in a diabetic mellitus person.
Reason (R) : insulin is not produced in sufficient quantity by pancreas
- i) Both 'A' and 'R' are true and 'R' explains 'A'.
ii) Both 'A' and 'R' are true but 'R' doesn't explain 'A'.
iii) Only 'A' is true but 'R' is false.
iv) A is false but 'R' is true. [Ans: i) Both 'A' and 'R' are true and 'R' explains 'A']
- Reason** : Insulin converts unused glucose in the blood to glycogen and stores it in the liver. In the absence of insulin excess unused glucose is expelled in the urine in a diabetes mellitus person.

3

STRUCTURE AND FUNCTIONS OF HUMAN BODY - ORGAN SYSTEMS

Blue Print	1 Mark question	2 Marks question	5 Marks question	Total questions	Total Marks
	1	1	1	3	8

Important Terms and Definitions :

- **Nerve cell or Neuron** : It is the structural and functional unit of the nervous system.
- **Brain** : It is made up of about 86 billions neurons and many more neuroglial cells (more than 86 billion).
- **Cyton** : It is the cell structure irregular in shape or polyhedral structure.
- **Nissle's granules** : Cell body contains cytoplasm with typical cell organelles and certain granular bodies called Nissle's granules.
- **Dendrites** : Shorter fibres, which branch repeatedly and project out of cell body. They transmit electrical impulses.
- **Unipolar neurons** : It has a nerve cell body with a single process or fibre, which will act both as axon and dendron.
- **Meninges** : The central nervous system is covered by three protective coverings or envelopes collectively called meninges.
- **Duramater** : Doubly thick outermost covering lying below the skull and vertebral column.
- **CNS** : The Central Nervous System.
- **PNS** : The Peripheral Nervous System.
- **ANS** : The Autonomic Nervous System.
- **Arachnoid membrane** : Vascularised and thin middle covering of the central nervous system.
- **Piamater** : Very thin, innermost delicate membrane of the central nervous system and is closely applied on the outer surface of brain and spinal cord.
- **Corpus callosum** : Right and left cerebral hemispheres are united at the base by a sheet of nervous tissue called corpus callosum.
- **Cerebral aqueduct** : A canal passing through the mid brain.
- **Corpora quadrigemina** : Four hemispherical bodies which constitute the mid brain
- **Cervical plexus** : Enlargements of spinal cord in the neck region of the body.
- **Lumbar plexus** : Enlargement in the lumbar region of the spinal cord.

- **Filum terminale** : The lower end of the spinal cord which is filamentous.
- **Dorsal fissure** : Narrow depression found on the mid-dorsal side of the spinal cord.
- **Ventral fissure** : A deep depression found on the mid-ventral side of the spinal cord.
- **Hormones** : Chemical substances secreted by the endocrine glands.
- **Adenohypophysis** : Anterior lobe of the pituitary gland.
- **Neurohypophysis** : Posterior lobe of the pituitary gland.
- **TSH** : Thyrotropic or Thyroid stimulating hormone.
- **ACTH** : Adrenocorticotropic or Adrenal cortex stimulating hormone.
- **FSH** : Follicular stimulating hormone.
- **LH** : Lutenizing hormone.
- **ICSH** : Interstitial Cell Stimulating Hormone.
- **ADH** : Vasopressin or Antidiuretic hormone.
- **Thyroxine** : Hormone secreted by Thyroid gland.
- **Personality hormone** : Thyroxine.
- **Goitre** : Thyroid gland bulges as a swelling in the neck and it is called as goitre.
- **Emergency hormones** : Adrenaline or Noradrenaline.
- **Hormones of flight and fight** : Adrenaline or noradrenaline.
- **Androgen** : The male sex hormones are called Androgens.
- **Testosterone (androgen)** : Male sex hormones called Testosterone.
- **Parathyroid gland** : These are found within the thyroid gland and produce parathormone.
- **Thymus gland** : It is a lymphoid mass, present above the heart. It secretes thymosin.
- **Pineal gland** : It lies under the corpus callosum in the brain. It produces melatonin.
- **Mitosis** : It is a type of cell division which occurs in the body cells of plants and animals without change in the chromosomal number of the daughter cells.
- **Meiosis** : It is a type of cell division where a diploid cell produces four haploid daughter cells.
- **Synapsis** : Pairing of homologous chromosome is called synapsis and occurs during zygotene of Meiotic Prophase I.
- **Bivalent** : Paired chromosomes are called Bivalents and are seen during zygotene of Meiotic Prophase I.
- **Crossing over** : Exchange of segments of chromatids between homologous chromosomes is called crossing over. It occurs during Meiosis.
- **Cytokinesis** : Cytoplasmic division of the cell which follows division of nuclear material during cell division.
- **Tetrad** : During pachytene of Meiotic prophase I the paired chromosomes appear to have four chromatids and is called Tetrad or quadrivalent
- **Chiasmata** : These are points of contact between homologous pair of chromosomes during Meiosis.
- **Crossing over** : The exchange of segments of chromatids between homologous chromosomes.
- **Terminalization** : The separation of homologous chromosomes after crossing over is called Terminalization and is seen during diplotene of Meiosis prophase I.

MODEL EVALUATION

PART - A

(Textbook Page No. 49)

- Unipolar neurons are found in the _____.
 (i) Brain (ii) Spinal Cord
 (iii) Embryonic nervous tissue (iv) Adult nervous tissue
 [Ans: (iii) Embryonic nervous tissue]
- The sensory organs contain _____. (PTA - 3)
 (i) Unipolar neuron (ii) Bipolar neuron
 (iii) Multipolar neuron (iv) Medullated neuron
 [Ans: (ii) Bipolar neuron]
- The part of brain which controls emotional reactions in our body is _____.
 (Apr. 2016; Oct. 2017)
 (i) Cerebellum (ii) Cerebrum (iii) Thalamus (iv) Hypothalamus
 [Ans: (iv) Hypothalamus]
- One of the following is a part of the brain stem. Pick it out.
 (i) Forebrain and midbrain (ii) Midbrain and hindbrain
 (iii) Forebrain and hindbrain (iv) Forebrain and spinalcord
 [Ans: (ii) Midbrain and hindbrain]
- Spinal nerves are _____.
 (i) Sensory nerves (ii) Motor nerves
 (iii) Mixed nerves (iv) Innervating the brain
 [Ans: (iii) Mixed nerves]
- An endocrine gland found in the neck is _____. (June 2016)
 (i) adrenal gland (ii) pituitary gland (iii) thyroid gland (iv) pancreas
 [Ans: (iii) thyroid gland]
- An endocrine gland which is both exocrine and endocrine is the _____.
 (i) Pancreas (ii) pituitary (iii) thyroid (iv) adrenal
 [Ans: (i) Pancreas]
- Normal blood glucose level in 1dl of blood is _____. (Oct. 2016)
 (i) 80-100 mg/dl (ii) 80-120 mg/dl (iii) 80-150 mg/dl (iv) 70-120 mg/dl
 [Ans: (ii) 80-120 mg/dl]
- The "T" lymphocytes are differentiated to resist infection in the _____.
 (i) parathyroid gland (ii) lymph gland
 (iii) thymus gland (iv) adrenal gland [Ans: (iii) thymus gland]

4

REPRODUCTION IN PLANTS

Blue Print	1 Mark question	2 Marks question	5 Marks question	Total questions	Total Marks
	1	1	1	3	8

Important Terms and Definitions :

- **Reproduction** : It is a special biological process, by which new individuals of the same species are produced.
- **Binary Fission** : Splitting of an organism into two equal halves. It is a mode of asexual reproduction. e.g. Amoeba.
- **Fragmentation** : Breaking into bits.
- **Vegetative propagation** : It is the ability of plants to reproduce by bringing forth new plants from existing vegetative structures without sexual reproduction. eg. Bryophyllum.
- **Aplanospores** : In algae, the protoplast of the vegetative cells contract and produce ovoid bodies surrounded by a thin wall. These thin walled non-motile spores are called Aplanospores.
- **Zoospore** : It is a motile asexual spore that uses a flagellum for locomotion. It is created by some algae, bacteria and fungi.
- **Akinetes** : In algae, the vegetative cells secrete thick additional wall layers. During adverse conditions, food materials are filled up in cells. These structures are called Akinetes.
- **Conidia** : Conidia are uninucleate, non motile, asexual spores produced, by the fungus like penicillium.
- **Sexual reproduction** : It is the process in which two **gametes** (male and female) are fused to produce offsprings of their own kind.
- **Androecium** : It is the male reproductive part of a flower.
- **Gynoecium** : It is the female reproductive part of a flower.
- **Pollination** : Transfer of pollen grains from the anther to the stigma is called pollination.
- **Autogamy** : It is also known as self pollination. i.e., transfer of pollen grains from the anther of a flower to the stigma of the same flower or another flower of the same plant.
- **Cross pollination** : The transfer of pollen grains of a flower to the stigma of another flower of a different plant of the same species is called Cross pollination or Allogamy.
- **Zoophily** : Pollination by animals.
- **Ornithophily** : Pollination by birds.
- **Entamophily** : Pollination by insects.

- **Anemophily** : Pollination by wind.
- **Hydrophily** : Pollination by water.
- **Fertilization** : The fusion of a male gamete with female gamete is known as fertilization.
- **Double fertilization** : In higher plants during fertilization, one male gamete fuses with the egg and the other male gamete fuses with the secondary nucleus, which is diploid and forms the triploid endosperm nucleus.
- **Triple fusion** : The fusion of secondary nucleus with the second male gamete is known as triple fusion which occurs during fertilization in higher plants.
- **Endosperm** : It is a nutritive tissue meant for development of the embryo inside the seed.
- **Seed** : Seed can be defined as a fertilized ovule.
- **Parthenocarpic fruit** : Some fruits develop without the act of fertilization. They are called parthenocarpic fruits and are seedless. eg. seedless grapes.
- **Pericarp** : Fruit wall is called pericarp.
- **Dehiscent fruit** : These fruits split open at maturity to liberate the seeds. eg. Bean.
- **Mericarps** : At maturity, schizocarpic fruits break into many one seeded parts called mericarps.
- **Aggregate fruit** : It is developed from a single flower with multicarpellary, apocarpous, superior ovary. e.g. polyalthia.
- **Berry** : It is one or many seeded simple fleshy fruit.
- **Dicotyledons** : Seeds with two cotyledons. e.g. Pea, bean.
- **Monocotyledons** : Embryo with one cotyledon e.g. maize, rice.
- **Raphe** : A dicot is bulky, oval and slightly indented on one side. On this side there is a short longitudinal, whitish ridge called the raphe.
- **Micropyle** : Minute opening on the raphe is known as germ pore or micropyle.
- **Chaff** : The fruit is covered by generally yellowish bract and bracteoles which are commonly known as chaff.
- **Coleorhiza** : The radicle is covered by a sheath called coleorhiza (root sheath) in a monocot seed.
- **Coleoptile** : The plumule is covered by a sheath called coleoptile in a monocot seed.
- **Autochory** : It is an active mechanism of self dispersal of fruits and seeds.
- **Anemochory** : Wind dispersal of fruits and seeds.
- **Hydrochory** : Dispersal of fruits and seeds by water.
- **Zoochory** : Dispersal of fruits and seeds by animals.
- **Pappus** : Calyx modified into a ring of fine feathery hairs to help in dispersal by wind. eg. Tridax fruit.
- **Multiple fruit** : Fruit formed by all the flowers of whole inflorescence to give a single fruit. eg. Jack fruit.

MODEL EVALUATION

PART - A

(Textbook Page No. 73)

- The method of reproduction in unicellular organisms like amoeba and bacteria in which they split into two equal halves and produce new ones is called _____. (Sep. 2014)
 (i) fragmentation (ii) binary fission (iii) budding (iv) spore formation
 [Ans: (ii) binary fission]
- In sexual reproduction of flowering plants, the first event involved in this is _____. (Dept. Paper; Apr. 2012; June 2013, 2014 & 2016; Oct. 2016)
 (i) fertilization (ii) germination (iii) regeneration (iv) pollination
 [Ans: (iv) pollination]
- Which of the following statement is true?
 (i) Thin-walled non-mobile spores are called zoospores
 (ii) A motile asexual spore produced by some algae bacteria and fungi are Akinetes
 (iii) Uninucleate, non-motile, asexual spores produced by fungus are called conidia
 (iv) Thick-walled vegetative cells produced by algae during adverse conditions are called aplanospores
 [Ans: (iii) Uninucleate non-motile asexual spores are produced by fungus are called conidia]
- The fertilized ovary is a fruit. The fruit that develops from a single flower with multi carpellary, apocarpous superior ovary is _____. (June 2012 & 2017)
 (i) Aggregate fruit (ii) Composite fruit (iii) Simple fruit (iv) Multiple fruit
 [Ans: (i) Aggregate fruit]
- If a water soaked seed is pressed, a small drop of water comes out through the _____. (Apr. 2013 & 2015; PTA - 4; Mar. 2017)
 (i) stomata (ii) lenticel (iii) micropyle (iv) radicle
 [Ans: (iii) micropyle]
- The mango fruit is called as stone fruit, because it has _____. (Sep. 2013)
 (i) skinny epicarp (ii) stony mesocarp (iii) fleshy endocarp (iv) hard endocarp
 [Ans: (iv) hard endocarp]
- Pick out the wrong statement.
 (i) In a dicot seed there is a short longitudinal whitish ridge called the raphae.
 (ii) The minute opening in a dicot seed is known as micropyle.
 (iii) The rudimentary stem portion is known as radicle.
 (iv) The rudimentary root portion is called radicle.
 [Ans: (iii) The rudimentary stem portion is known as radicle]



A REPRESENTATIVE STUDY OF MAMMALS

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	3	-	4	7

Important Terms and Definitions :

- **Mammals** : Mammals are higher chordates characterised by a presence of milk producing glands and epidermal hairs.
- **Quills** : long, sharp, stiff hairs found in animals to protect themselves from predators.
- **Habitat** : The living place of an organism.
- **Dentition** : Arrangement of teeth in an organism
- **Ruminant** : Cud chewing animal.
- **Heterodont dentition** : Presence of different types of teeth that are highly specialized to match particular eating habits.
- **Nocturnal** : Active during night.
- **Warm blooded** : Animals which maintain a constant body temperature are said to be warm blooded.
- **Homeotherms** : Warm blooded animals are called homeotherms.
- **Normal Body temperature** : 98.4° F to 98.6° F for man.
- **William Harvey** : Discovered circulation of blood in man.
- **Pericardium** : Heart is protected by a double walled sac called pericardium.
- **Deoxygenated blood** : Blood without oxygen.
- **Oxygenated blood** : Blood with oxygen.
- **Auricles** : These are thin walled upper chambers of the heart.
- **Auricular septum** : Partition separating right auricle and left auricle.
- **Ventricles** : Thick walled lower chambers of the heart.
- **Ventricular septum** : Partition separating right ventricle and left ventricle.
- **Tricuspid valve** : Valve with three flaps found in the right auriculo ventricular aperture of heart.
- **Bicuspid valve** : Valve with two flaps found in the left auriculo ventricular aperture of heart.
- **Systole** : The contraction phase of the heart.
- **Diastole** : The relaxation phase of the heart.
- **Heartbeat** : The closure of the valves of the heart produce two different cardiac sound as "lubb" and "dubb" which constitutes the heart beat.

- **Frequency of Heart beat** : 72 times in a minute at rest.
- **Pulmonary artery** : The artery carrying deoxygenated blood from right ventricle of the heart to the lungs
- **Aorta** : Largest artery that carries oxygenated blood from the left ventricle to all parts of the body.
- **Capillaries** : Tiny blood vessels.
- **Blood** : It is a connective tissue consisting of the fluid part, the plasma and the solid components, the blood cells.
- **Blood cells** : White blood cells, Red blood cells and Blood Platelets.
- **RBC** : Red Blood Cells / Erythrocytes. It is circular, biconcave and disc shaped.
- **WBC** : White Blood Cells / Leucocytes. It is amoeboid in shape with prominent nuclei.
- **Phagocytosis** : Destruction of germs by WBC by engulfing them is called Phagocytosis.
- **Blood Platelets / Thrombocytes** : It is irregular broken up pieces of certain giant cells found in blood. They help in blood clotting.
- **Excretion** : It is the process of removal of metabolic waste material from the body.
- **Capsule** : A thin transparent membrane covering the kidney is called capsule.
- **Renal hilus** : The depression in the concave side of kidney called renal hilus.
- **Urinary bladder** : It is a muscular sac, which is the store house of urine.
- **Urethra** : The opening in the urinary bladder through which urine is expelled out from the body.
- **Renal cortex** : Outer dark portion of kidney is called Renal cortex.
- **Renal medulla** : Inner pale region of the kidney is called Renal medulla.
- **Pyramids** : Conical masses on the renal medulla of the kidney are called Pyramids.
- **Nephrons** : It is the structural and functional unit of the kidney.
- **Behaviour** : It can be defined as an organism's adaptive response to stimuli in its environment.
- **Imprinting** : Social attachments between animals is called imprinting.
- **Filial imprinting** : The binding or attachment between the parents and the offspring is called filial imprinting.
- **Cross fostering** : The individual of a species is raised by a parent of another species. This behavioural pattern is called Cross fostering.
- **Courtship signalling** : A character exhibited by one sex to attract the other sex is called Courtship signalling.

MODEL EVALUATION

PART - A

(Textbook Page No. 92)

- Select important characteristic features of mammals** (June 2017)

(i) four-chambered heart (ii) fore-limbs and hind limbs
(iii) milk-producing glands (iv) post anal tail

[Ans: (iii) milk-producing glands]
- Carnivorous animals use these teeth to tear flesh.**

(i) incisors (ii) canines (iii) premolars (iv) molars

[Ans: (ii) canines]
- The Henle's loop of nephron is mainly responsible for reabsorption of water in the kidney. Which of the following has a long loop of Henle in its nephrons to conserve water?**

(i) polar bear (ii) camel (iii) frog (iv) whale

[Ans: (ii) camel]
- Which blood cells of mammals are concerned with immunity?** (June 2016)

(i) Young Erythrocytes (ii) Leucocytes
(iii) Thrombocytes (iv) Matured Erythrocytes

[Ans: (ii) leucocytes]
- You were given two unlabelled slides with blood smears of an amphibian and a mammal. You would differentiate the blood samples by observing the _____.** (PTA - 1)

(i) colour (ii) nature of RBC's (iii) nature of WBC's (iv) contents of plasma

[Ans: (ii) nature of RBC's]
- For the digestion of cellulose, an enzyme called cellulase is required. Some mammals lodge cellulase producing bacteria in their digestive system by offering them food and shelter. These mammals are mostly _____.**

(i) Herbivores (ii) Carnivores (iii) Omnivores (iv) Sanguivores

[Ans: (i) Herbivores]
- Forelimbs of mammals have a common basic structure or pattern, but are different in their usage/ function in different animals. They can be called _____.**

(i) Homologous organs (ii) Analogous organs
(iii) Vestigial organs (iv) Rudimentary organs

[Ans: (i) Homologous organs]
- Sensitive whiskers are found in _____.** (Apr. 2012; Sep. 2013; Oct. 2015)

(i) Bat (ii) Elephant (iii) Deer (iv) Cat [Ans: (iv) cat]
- The tusks of elephants are modified _____.** ⊗ (Apr.2012; Sep. 2013; Oct. 2015)

[Ans: Incisors]

6

LIFE PROCESSES

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	3	-	4	7

Important Terms and Definitions :

- **Life process** : Activities performed by the different organs to maintain the body.
- **Nutrition** : Process of obtaining energy through consumption of food.
- **Respiration** : The process of acquiring oxygen through breathing in order to break down organic substances to obtain energy.
- **Breathing** : It is the process of taking in oxygen and giving out carbon-dioxide.
- **Transportation** : It is the process by which the food and oxygen is carried from one organ to the other organs.
- **Excretion** : It is the process of removing metabolic waste by-products from the body.
- **Autotrophic nutrition** : The process by which organisms synthesis their own food material by photosynthesis.
- **Heterotrophic nutrition** : The process by which an organism obtains nutrition from other living or non living sources. eg. Fungi
- **Parasites** : Organisms that live on other organisms for their nourishment. e.g. cuscuta and viscum.
- **Saprophytes** : Organisms that derive nutrients from nonliving organic matter. e.g. fungi and bacteria.
- **Mycorrhizal roots** : Roots which posses mycorrhizic fungus are called mycorrhizal roots. The fungus helps to absorb nourishment from the soil.
- **WBC** : White blood cells (leucocytes).
- **Phagocytosis** : It is a process of engulfing the invading germs by producing pseudopodia around the germs and digesting them. eg. WBC. Invades disease germs.
- **Digestion** : It is a process of breaking complex food materials into simpler forms.
- **Intracellular digestion** : Food is directly taken into the cells and is digested within the cell. eg. Paramecium.
- **Extracellular digestion** : Digestion takes place in the space or lumen of alimentary canal i.e. outside the cell and is called extracellular digestion.
- **Alimentary canal** : It is a long muscular tube of about 9 mts in length in digestive system.
- **ATP** : Adenosine triphosphate.

- **Respiratory substrate** : Substance that is used in respiration is known as respiratory substrate.
- **Aerobic respiration** : Respiration that uses oxygen is known as aerobic respiration.
- **Glycolysis** : It is a process of splitting glucose into two molecules of pyruvic acid and is the first stage of respiration.
- **Anaerobic respiration** : In some organisms, oxygen is not utilized for respiration. It is also known as fermentation.
- **Alveoli** : In lungs, the air passage branches repeatedly divided into smaller tubules which finally terminate in balloon like structure called alveoli.
- **Xylem** : Tissue which transports water with dissolved minerals absorbed from the soil to all parts of the plant.
- **Phloem** : Tissue which transports products of photosynthesis from the leaves to the other parts of the plant.
- **Transpiration** : The loss of water in the form of vapour from the aerial parts of the plant is known as transpiration.
- **Translocation** : The transport of soluble products of photosynthesis through the phloem to all the parts of the plant is called translocation.
- **Phototropism** : Response of the plants towards the direction of light.
- **Geotropism** : Response of the plants towards the direction of gravitational force.
- **Hydrotropism** : Response of the plants towards the direction of water.
- **Chemotropism** : Response of the plants towards the direction of chemicals.
- **Hormones** : Hormones are bio-chemical substances which act as bio catalysts speeding up the chemical reactions in the body.
- **Haustoria** : Special roots found in parasitic plants which penetrate the host Plants and absorb food from the phloem and water from the xylem. eg. Cuscuta.
- **Lymph** : It is also called tissue fluid and is colourless. Helps to transport digested fat and drains into lymphatic capillaries.
- **Artificial kidney** - It is a device to remove nitrogenous waste products from the blood through dialysis. It is used when kidney failure occurs.
- **Ammonotelic animals** - When the excreta of animals contains large amount of ammonia, the animals are said to be ammoniatelic animals. eg. Fishes.
- **Uricotelic animals** - Birds are said to be uricotelic animals since their excretory substance is composed of mostly uric acids.
- **Ureotelic animals** - In mammals urea is the main excretory product so they are called Ureotelic animals.

MODEL EVALUATION

PART - A

(Textbook Page No. 111)

- In monotropa the special type of root which absorbs nourishment is the _____.
(Sep. 2013; PTA - 3; Mar. 2017)
i) Haustoria ii) Mycorrhizal root iii) Clinging root iv) Adventitious root
[Ans: ii) Mycorrhizal root]
- The product obtained in the anaerobic respiration of yeast is _____.
(Apr. 2014; June 2015, 2016; Oct. 2016; HY 2016)
i) Lactic acid ii) Pyruvic acid iii) Ethanol iv) Acetic acid
[Ans: iii) Ethanol]
- The roots of a coconut tree are seen growing far from the plant. Such a kind of movement of root for want of water is _____.
(Oct. 2015; PTA - 4)
i) Phototropism ii) Geotropism iii) Chemotropism iv) Hydrotropism
[Ans: iv) Hydrotropism]
- The xylem in the plants is responsible for _____.
(Deptl. Paper, June 2012; Apr. 2013; June 2014; Apr. 2015; June 2017)
i) transport of water ii) transport of food
iii) transport of amino acids iv) transport of oxygen
[Ans: i) transport of water]
- The autotrophic nutrition requires _____.
(Oct. 2012; June 2013; Sep. 2014; PTA - 2)
i) CO₂ and water ii) chlorophyll iii) sunlight iv) all the above
[Ans: iv) all the above]
- Leaf pores / stomata help in _____.
i) intake of CO₂ during photosynthesis ii) releasing of O₂ during photosynthesis
iii) releasing of water vapour during transpiration
iv) All of these
[Ans: iv) all the these]
- _____ of green plants are called factories of food production.
(Apr. 2016)
i) Mitochondria ii) Chloroplasts
iii) Endoplasmic reticulum iv) Nucleus
[Ans: ii) Chloroplasts]
- The special root-like structure of plant parasites in cuscuta and viscum are called _____.
(Textbook Page No. 112)
i) Rhizoids ii) Haustoria iii) Hyphae iv) stolons
[Ans: ii) Haustoria]
- Pick out the odd one : The parts of the alimentary canal are _____.
(Apr. 2015)
i) Pharynx ii) mouth iii) buccal cavity iv) pancreas
[Ans: iv) pancreas]



CONSERVATION OF ENVIRONMENT

Blue Print	1 Mark question	2 Marks question	5 Marks question	Total questions	Total Marks
	-	1	1	2	7

Important Terms and Definitions :

- **Environment** : The place surrounding us (both living organisms and non-living things).
- **Biotic factors** : Living organisms (plants, animals, human beings).
- **Abiotic factors** : Non-living things (air, water, soil, light).
- **Pollution** : Any undesirable change in the physical, chemical or biological characteristics of air, land, water, etc.
- **Pollutant** : Substances that cause pollution are called pollutants.
- **Biodegradable** : Substances that can be broken down by biological processes.
- **Non-biodegradable** : Substances that cannot be broken down by biological processes.
- **Land fill** : It is a permanent storage facility for disposal of harmful waste materials such as radioactive storage by storing it deep underground.
- **Deep well injection** : It is a method for disposal of harmful waste materials by drilling a well into dry porous material below ground water eg. hazardous waste liquids.
- **Incineration** : The burning of materials is called incineration, and is a method to dispose harmful waste material such as biomedical waste.
- **Recycling** : The separating out of materials such as rubber, glass, paper and scrap metal from refuse and reprocessing them for reuse is named as recycling.
- **Main sources of water** : Rain and snow.
- **Aquifers** : They are underground reserves of fresh water.
- **Seeding clouds** : A method to initiate rain by seeding clouds with Dry ice or Potassium iodide particles if water laden clouds and conditions that favour precipitation are present.
- **Desalination** : It is a process of removing salt content from the ocean water by methods of evaporation and recondensation.
- **Water shed management** : The management of rainfall and resultant run off is called water shed management.

- **Rain water harvesting** : It means collecting rain water from the roof of building or courtyards and storing it in under ground for later use.
- **Wetland conservation** : It preserves natural water storage and acts a aquifer recharge zones.
- **Ground water** : Water that percolates into the ground through porous rocks is ground water.
- **Water table** : The upper layer of water level is the water table.
- **Ecosystem** : A community of organisms that interact with one another and with the environment is called an ecosystem.
- **Wildlife** : All non-domesticated and non-cultivated biota found in natural habitat are termed 'wildlife'.
- **Flora** - Plants.
- **Fauna** - Animals.
- **Primary consumers** : Organisms in an ecosystem which feed on plants.
- **Carnivores** : Flesh eating animals are called carnivores.
- **Decomposers** : Bacteria and fungi decompose the dead organic matter and return the nutrients to the soil.
- **Food chain** : Producers → Herbivores → Carnivores → Decomposers.
- **Food web** : An interlinked food chain is called food web.
- **Black gold** - Petroleum is also known as 'Black gold'.
- **Tar Balls** : A tar ball is a blob of oil which has been weathered after floating on the ocean.
- **Green chemistry** : It is the design of chemical products and processes to reduce or eliminate the use and generation of hazardous substances.
- **Global village** : Is the term used to mean that world had shrunk into a village by means of different types of media.
- **Bio-plastics** : Plastics made from plants including corn, potatoes or other agricultural products.

MODEL EVALUATION

(Textbook Page No. 129)

1. Which of the following groups contain only bio degradable items?

- | | |
|------------------------------------|-----------------------------|
| i) Grass, flowers and leaves | ii) Grass, wood and plastic |
| iii) Fruit peels, cake and plastic | iv) Cake, wood and glass |

[Ans: i) Grass, flowers and leaves]

2. Which of the following constitutes a food chain?

- | | |
|-----------------------------|---------------------------|
| i) Grass, wheat and mango | ii) Grass, goat and human |
| iii) Goat, cow and elephant | iv) Grass, fish and goat |

[Ans: ii) Grass, goat and human]

3. Which of the following are environmental friendly practices?
 i) Carrying cloth bags for shopping
 ii) Switching off light and fans when not in use
 iii) Using public transport
 iv) All the above
 [Ans: iv) All the above]
4. What is called as 'black gold'? \otimes (Apr., June & Oct. 2012; Apr. 2013 & 2015)
 i) hydrocarbons ii) coal iii) petroleum iv) ether
 [Ans: iii) Petroleum]
5. Based on the food chain, pick the odd one out. \otimes (Oct. 2012 & 2015; June 2015; PTA - 1)
 plants \rightarrow grasshopper \rightarrow frog \rightarrow tiger \rightarrow snake
 [Ans: Tiger]
6. Example for product of green chemistry is _____. \otimes (Sep. 2013 & 2014; Oct. 2016)
 i) plastic ii) paper
 iii) bio plastics iv) halogen flame retardants
 [Ans: iii) Bio-plastics]
7. _____ is a green house gas which causes climate change and global warming.
 i) hydrogen ii) oxygen iii) nitrogen iv) carbondioxide
 \otimes (Deptl. Paper, June 2013 & Sep. 2014; PTA - 3; QY 2017)
 [Ans: iv) Carbondioxide]
8. The _____ form decomposers in the pond ecosystem. (June : 2015)
 i) plants ii) bacteria
 iii) frogs iv) phytoplanktons
 [Ans: ii) bacteria]
9. _____ is used in seeding clouds. \otimes [Sep. 2014; PTA - 2; Apr. 2016]
 i) potassium iodide ii) calcium carbonate
 iii) sulphurdioxide iv) ammonium phosphate
 [Ans: i) Potassium iodide]
10. An example for fossil fuel is _____. (April & June 2014, 2016)
 i) copper ii) iron
 iii) magnesium iv) coal
 [Ans: iv) Coal]
11. Air pollution is caused by transport exhaust fumes and emission of gases like SO_2 , CO_2 , NO_2 from industries. Similarly, water pollution is caused by _____.
 i) sewage ii) crop cultivation
 iii) rain iv) soil erosion
 [Ans: i) sewage]
12. If wild animals are killed, what difficulty would we face?
 i) imbalance in nature ii) decrease in fog rain
 iii) decrease in population iv) increase in rain
 [Ans: i) imbalance in nature]

8

WASTE WATER MANAGEMENT

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	3	-	4	7

Important Terms and Definitions :

- **Primary source of water :** Rainfall.
- **Ocean water :** It is the largest among all the water resources.
- **Freshwater :** 2.4%.
- **Aquifers :** Geologic layers containing water is known as Aquifers from which water can be extracted.
- **Sewage :** It includes household waste liquid from toilets, baths, showers, kitchens, sinks, etc., and is disposed through sewer lines.
- **Lagoon :** Wetland.
- **Nitrosomonas europaea :** A bacteria used to treat sewage.
- **Grey water :** Waste water is often referred to as grey water.
- **Pathogenic bacteria :** Harmful or disease causing bacteria.
- **Vectors :** Agents involved in transmission of disease.
- **Aquaculture :** Fish farming.
- **Energy management :** It is a process of monitoring, controlling and conserving energy in a living home or in any organization.
- **Solar energy :** It is the energy derived directly from the sun.
- **Renewable resource :** A natural resource is a renewable resource if it is replaced by natural processes at a rate comparable or faster than its rate of consumption by humans.
- **Wind power :** It is derived from uneven heating of the Earth's surface from the sun and the warm core.
- **Non-renewable sources :** A non-renewable resource is a natural resource which cannot be produced, grown, generated or used on a scale which can sustain its consumption rate.
- **Biodiesel :** Biodiesel is made from vegetable oils and animal fats and is a Biofuel.
- **Biogas :** It is produced by the process of anaerobic digestion of organic material by anaerobes.
- **Energy Audit :** It is an inspection, survey and analysis on energy flows for energy conservation in a building, process or system.
- **CFL :** Compact Fluorescent Light bulbs

MODEL EVALUATION

PART - A

(Textbook Page No. 142)

- An example of water-borne disease is _____ (⊗) (Sep. 2014, June 2016; Oct. 2017)
 (i) scabies (ii) dracunculiasis (iii) trachoma (iv) typhoid
 [Ans: (iv) typhoid]
- The sedimented and floating materials are removed by this treatment process.
 (i) primary treatment (ii) secondary treatment (Mar. 2017)
 (iii) tertiary treatment (iv) peripheral treatment
 [Ans: (i) primary treatment]
- Which is a non-renewable resource? (Sep. 2014; Oct. 2016)
 (i) coal (ii) petroleum (iii) natural gas (iv) all the above
 [Ans: (iv) all the above]
- _____ is the chief component of natural gas. (⊗) (Oct. 2012; Apr. 2016; HY 2016)
 (i) ethane (ii) methane (iii) propane (iv) butane
 [Ans: (ii) methane]

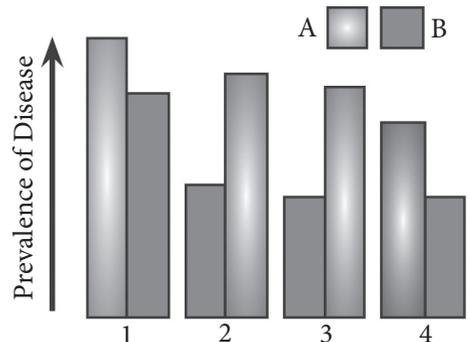
PART - B

(Textbook Page No. 143)

- The bar graph indicates the prevalence / widespread attack of infectious diseases in two cities A and B. Observe it and answer the questions given below.
 - Dengue fever
 - Rat fever
 - Cholera
 - Chikungunya
 - What may be the reason for the disease in city A?
 - Which city needs more effective system of waste-disposal and cleaning?
 - How can the disease be controlled in city A?

Ans: a. The reason for the disease in city "A":

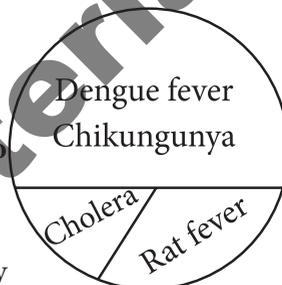
- Poor hygiene, inadequate quantity and quality of drinking water.
 - The ingestion of water, contaminated by human or animal feces or urine, containing pathogenic bacteria or viruses.
 - Uncontrolled breeding of insect vectors such as mosquito, housefly and rat flea.
- b. City A needs more effective system of waste-disposal and cleaning.



- c. The disease can be controlled in city "A" by the following ways:
- There should be **sufficient toilet facilities**, arranged in separate blocks for men and women.
 - Disposal of waste water** in a proper drainage system.
 - Abolishing the breeding grounds** of the insect vectors.
 - All **public places** need to have **adequate sanitation** and **hygiene facilities**.

2. The pie diagram represents a survey result of infectious diseases in a village during 2008- 2009. Analyse it and answer the following:(June & Sep.2013; Apr.&Sep.2014; Apr. 2015)

- Which diseases affect the majority of the population?
- How are these diseases transmitted?
- Mention any three measures that can control the other two diseases.



- Ans : a. Dengue fever and Chikungunya.
 b. These diseases are transmitted by **insect vectors**, i.e. by **mosquitoes**, which breed in water.
 c. Three measures to control Cholera and Rat fever.
 (i) Proper **sanitation** and **hygiene** facilities.
 (ii) Adequate quantity and **quality of drinking water**.
 (iii) Keeping the **surroundings clean** and **pollution free**.

3. Match the suitable renewable and non-renewable sources.

(June 2012 & 2016; Apr. & June & Sep. 2014; Oct. 2016; Mar. 2017)

Sources	A	B	C
Renewable	Coal	Wind	Petroleum
Non - Renewable	Hydrogen	Natural gas	Solar energy

Ans :

Sources	A	B	C
Renewable	Hydrogen	Wind	Solar energy
Non - Renewable	Coal	Natural gas	Petroleum

4. Find the odd one out. (Apr. 2012 ; Apr., June 2013, 2015, 2016 & 2017; Sep. 2013; Oct. 2015, 2016)

- bio-alcohol, green diesel, bio-ethers, petroleum (⊗) (PTA - 1 & 2; HY 2016)
- cholera, typhoid, scabies, dysentery

- Ans : (i) petroleum - It is a **fossil fuel** and the others are bio fuels.
 (ii) scabies - It is a **water washed disease** and the others are water borne diseases.

CHEMISTRY

9 SOLUTIONS

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	2	-	3	5

Important Terms and Definitions :

- **Solution** : It is a homogeneous mixture of two or more substances.
- **Homogeneous solution** : It is a solution in which two or more substances that are inseparably present.
- **Binary solution** : A solution containing two components only is called Binary solution.
- **Solute** : The component present in lesser amount by weight in a solution is called solute.
- **Solvent** : The component present in larger amount by weight in a solution is called solvent.
- **True solution** : It is a homogeneous mixture that contains small solute particles that are dissolved throughout the solvent.
- **Colloidal solution** : It is a heterogeneous mixture made up of dispersed phase and dispersion medium.
- **Suspension** : It is a heterogeneous mixture of small insoluble particles in a solvent.
- **Tyndall Effect** : The phenomenon by which colloidal particles scatter light is called Tyndall Effect .
- **Brownian movement** : The phenomenon by which the colloidal particles are in continuous random motion is called Brownian movement.
- **Aqueous solution** : The solution in which water acts as a solvent is called aqueous solution.
- **Non-aqueous solution** : The solution in which any liquid other than water acts as a solvent is called non-aqueous solution.
- **Unsaturated solution** : It is a solution in which more of the solute can be dissolved at a given temperature.
- **Saturated solution** : A solution in which no more solute can be dissolved in a definite amount of solvent at a given temperature is called saturated solution.
- **Super saturated solution** : A solution which has more of solute than the saturated solution at a given temperature is called super saturated solution.
- **Solubility** : Solubility of a solute in a given solvent at a particular temperature is defined as the number of grams of solute necessary to saturate 100g of the solvent at that temperature.
- **Dilute Solution** : A solution containing less amount of solute is known as a dilute solution.
- **Factors affecting solubility** : 1. Temperature, 2. Nature of solute and solvent, 3. Pressure.
- **Henry's law** : At a given temperature, the mass of gas dissolved in a fixed volume of liquid is directly proportional to the pressure of the gas on the surface of the liquid.

MODEL EVALUATION

PART - A

(Textbook Page No. 154)

1. A true solution is a homogeneous mixture of solute and solvent. Chalk powder in water is a heterogeneous mixture. Is it a true solution? (June 2016)
[Ans: No, it is not a true solution. It is called Suspension]
2. A solution that contains water as the solvent is called an aqueous solution. If carbon disulphide is a solvent in a given solution, then the solution is called _____. ⊗ (Apr. 2013)
 (aqueous solution, non-aqueous solution) [Ans: non-aqueous solution]
3. The solubility of common salt in 100g of water is 36g. If 20g of salt is dissolved in it, how much more is required to attain saturation? [Ans: 16 g of salt]
4. If two liquids are mutually soluble, they are called _____ liquids. (Sep. 2014)
 (miscible, immiscible) [Ans: miscible]
5. When sunlight passes through the window of a classroom, its path is visible. This is due to _____ of light. (reflection, scattering) ⊗ (Sep. 2013; Apr. 2014; Oct. 2015 & 2016; HY 2016)
[Ans: scattering]
6. The particles in various forms are visible only under an ultramicroscope. A solution containing such particles is called _____. (true solution, colloidal solution)
(Deptl. Paper; June 2014) [Ans: colloidal solution]
7. The number of components in a binary solution are / is _____. (one / two) [Ans: two]
8. The mixture of gases used by deep-sea divers is _____. ⊗ (June 2012 & 2013; Apr. 2015)
 (helium-oxygen, oxygen-nitrogen) [Ans: helium-oxygen] (QY 2016; Mar. 2017)
9. Soil cannot store more nitrogen than it can hold. Hence soil is said to be in a state of _____.
 (saturation, unsaturation) (June 2015)
[Ans: saturation]
10. In an endothermic process, solubility increases with _____ in temperature. (Apr. 2016)
 (increase, decrease) [Ans: increase]
11. Aquatic species are more comfortable in cold water because _____. (June 2017)
 - (i) as the temperature decreases, the solubility of dissolved oxygen increases.
 - (ii) as the temperature increases, the solubility of dissolved oxygen increases.
 - (iii) as the temperature increases, the solubility of dissolved oxygen decreases.[Ans: (i) as the temperature decreases, the solubility of dissolved oxygen increases.]
(Reason : Solubility of gases in liquids increases with decreases in temperature.)

PART - B

(Textbook Page No. 154)

1. From the table given below, furnish your points of inference. ⊗

Substance	Solubility at 25°C
NaCl	36g
NaBr	95g
NaI	184g

Ans : Inference :

- As the size of the anion increases, the solubility of the corresponding metallic ion also increases.
- As the electrons gain enthalpy, of the halide ion decreases and the solubility level increases.
- At 25°C, the order of saturation is as follows: NaCl < NaBr < NaI

2. Distinguish between the saturated and unsaturated solution at a temperature of 25°C using the data given below (Note : Solubility of NaCl is 36g) ⊗

(i) 16g NaCl in 100g water

(ii) 36g NaCl in 100g water

(Deptl. Paper, June 2012, 2013 & 2016; Apr. 2014; Oct. 2015 & 2016)

Ans: i) 16g NaCl in 100g water

Unsaturated solution : A solution in which the solute is in lesser amount in comparison with the solvent is called unsaturated solution. So the solution containing 16g of NaCl in 100g of water is an unsaturated solution.

ii) 36g NaCl in 100g water

Saturated solution : A solution in which no more solute can be dissolved in a definite amount of solvent at a given temperature is called a saturated solution. So the solution containing 36g of NaCl in 100g of water is a saturated solution.

3. Differentiate true solution and colloidal solution. ⊗

(Apr. 2013 & 2015; Oct. 2013;

QY 2016; June 2017)

Ans :

True Solution	Colloidal Solution
Particles size from 1 Å to 10 Å	Particles size from 10 Å to 2000 Å
Transparent	Translucent
Not visible even under ultra microscope	Visible under ultra microscope
Homogeneous	Heterogeneous
Diffuses rapidly	Diffuses slowly
Does not scatter light	Scatters light

10

ATOMS AND MOLECULES

Blue Print	1 Mark question	2 Marks question	5 Marks question	Total questions	Total Marks
	-	1	1	2	7

Important Terms and Definitions :

- **Einstein equation** : $E = mc^2$, where E = energy liberated, m = mass and c = speed of light.
- **Avogadro's Law** : Equal volumes of all gases under the same conditions of temperature and pressure contain an equal number of molecules.
- **Isotopes** : These are the atoms of same element with same atomic number (Z) but different mass number (A). (Eg. $_{17}\text{Cl}^{35}$, $_{17}\text{Cl}^{37}$).
- **Isobars** : These are the atoms of different elements with same mass number but different atomic number. (Eg. $_{18}\text{Ar}^{40}$, $_{20}\text{Ca}^{40}$).
- **Isotones** : These are the atoms of different elements with same number of neutrons. (Eg. $_{6}\text{C}^{13}$, $_{7}\text{N}^{14}$).
- **Atomicity** : The number of atoms present in one molecule of an element is called the atomicity of an element.
- **Vapour density** : It is defined as the ratio of the mass of a certain volume of the gas or vapour to the mass of same volume of hydrogen at the same temperature and pressure.
 $2 \times \text{vapour density} = \text{Relative Molecular mass}$.
- **Gay-Lussac's law of combining volumes of gases** : Whenever gases react, they do so in volumes which bear a simple ratio to one another, and to the volumes of the gaseous products, provided all the volumes are measured under the same conditions of temperature and pressure.
- **Atom** : An atom is the ultimate particle of an element which may or may not have independent existence.
- **Molecule** : A molecule is the simplest structural unit of an element or a compound which contains one (or) more atoms.
- **Homo atomic molecule** : The molecules which are made up of atoms of the same element.
- $$\text{Atomicity} = \frac{\text{Molecular mass}}{\text{Atomic mass}}$$
- **Hetero atomic molecule** : The molecules which are made up of atoms of different elements.
- **Molecular mass** : Molecular mass is the sum of the masses of all the atoms present in one molecule of the compound or an element.

- **Relative Molecular Mass (RMM)** : It is defined as the ratio of the mass of one molecule of the element or a compound to the mass of one atom of hydrogen.
- **Relative Atomic Mass** : (RAM) It is defined as the ratio of mass of one atom of the element to the mass of one atom of hydrogen taken as standard.

(or)
It is the ratio of mass of one atom of an element to the $\frac{1}{12^{\text{th}}}$ part of mass of one atom of carbon - 12.

- **Mole** : It is defined as the amount of the substance that contains as many specified elementary particles as the number of atoms in 12g of carbon-12 isotope.
- **Avogadro's Number** : It is the number of atoms or molecules or ions present in one mole of a substance. Its value is 6.023×10^{23} .

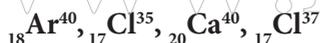
$$\text{No. of Moles} = \frac{\text{Mass}}{\text{Atomic Mass}} \text{ (or)} \frac{\text{Mass}}{\text{Molecular Mass}} \text{ (or)} \frac{\text{No. of Atoms (or) No. of Molecules}}{6.023 \times 10^{23}}$$

MODEL EVALUATION

PART - A

(Textbook Page No. 165)

- From the given examples, form the pair of isotopes and the pair of isobars. \otimes (June 2012 & 2014; Apr. 2015; QY 2017)



Ans: Isotopes are ${}_{17}\text{Cl}^{35}$ and ${}_{17}\text{Cl}^{37}$; Isobars are ${}_{18}\text{Ar}^{40}$ and ${}_{20}\text{Ca}^{40}$

- Molecular mass of Nitrogen is 28. Its atomic mass is 14. Find the atomicity of Nitrogen. \otimes (Sep. 2013; Apr. & Sep. 2014; QY 2016)

Solution :

$$\text{Atomicity} = \frac{\text{Molecular Mass}}{\text{Atomic Mass}} = \frac{28}{14} = 2$$

Ans: Atomicity of Nitrogen = 2

- Gram molecular mass of Oxygen is 32g. Density of Oxygen is 1.429 g / litre. Find the gram molar volume of Oxygen.

Solution :

$$\begin{aligned} \text{Gram Molar Volume} &= \frac{\text{Molecular mass of Oxygen}}{\text{Density of Oxygen}} \\ &= \frac{32}{1.429} = 22.4 \text{ litres.} \end{aligned}$$

Ans: Gram Molar Volume of Oxygen = 22.4 litres.

4. 'Cl' represents Chlorine atom, 'Cl₂' represents Chlorine molecule.

List out any two differences between atoms and molecules.

(Deptl. Paper; June 2012, 2013 & 2015; QY 2017)

Ans:

	Atoms	Molecules
1.	The smallest particle of an element that can take part in a chemical reaction.	The smallest particle of an element or compound that can exist freely.
2.	An atom is a non bonded entity.	A molecule is a bonded entity.
3.	An atom may or may not exist freely.	A molecule can exist freely.

5. Calculate the gram molecular mass of water from the values of gram atomic mass of Hydrogen and of Oxygen. (⊗) (Apr. 2012 & 2013 & 2015; Oct. 2015)

Gram atomic mass of Hydrogen = 1g; Gram atomic mass of Oxygen = 16g

Solution :

Molecular formula of water = H₂O

∴ Gram molecular mass = sum of gram atomic mass of the elements

∴ Gram molecular mass of H₂O = 2(H) + 1(O) = (2×1) + (1×16) = 2 + 16 = 18 g

6. One mole of any substance contains 6.023 × 10²³ particles. (⊗)

If 3.0115 × 10²³ particles are present in CO₂, find the number of moles.

Solution :

$$\text{Number of moles} = \frac{\text{No. of molecules}}{\text{Avogadro number}} = \frac{3.0115 \times 10^{23}}{6.023 \times 10^{23}} = \frac{1}{2} = 0.5 \text{ mole}$$

7. _____ have equal number of neutrons.

(i) Isobars (ii) Isotones (iii) Isotopes (iv) Mass Numbers

[Ans: (ii) Isotones]

8. Classify the following based on atomicity:

(HY 2016)

(i) Chlorine (ii) Neon (iii) Phosphorous (iv) Ozone

Ans: (i) Chlorine - Diatomic
(ii) Neon - Mono atomic
(iii) Phosphorous - Polyatomic
(iv) Ozone - Triatomic

9. Identify and correct the mistake in each of the following:

(i) The molar volume of gas at STP is 22.4 cm³.

[Ans: The molar volume of gas at STP is 22.4 litres]

(ii) 2 × R.M.M. = V.D.

[Ans: 2 × V.D. = R.M.M.]

(iii) An atom cannot exist independently.

(QY 2016)

[Ans: An atom may or may not exist independently]

11

CHEMICAL REACTIONS

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	2	-	3	5

Important Terms and Definitions :

- **Chemical reaction** : It is a process in which one or more substances (Reactants) are changed into new substance or substances (Products).
- **Combination reaction** : It is a reaction in which a single product is formed from two or more reactants.
- **Decomposition reaction** : It is a reaction in which a single compound breaks down to produce two or more substances.
- **Displacement reaction** : The reaction in which a more reactive element displaces a less reactive element from its compound is called displacement.
- **Double decomposition reaction** : It is any reaction in which exchange of ions between two reactants occur, leading to the formation of two different products.
- **Oxidation** : A chemical reaction which involves addition of oxygen (or) removal of hydrogen (or) loss of electrons is called oxidation.
- **Reduction** : A chemical reaction which involves addition of hydrogen (or) removal of oxygen (or) gain of electrons is called reduction.
- **Redox reaction** : A chemical reaction in which oxidation and reduction take place simultaneously is called redox reaction.
- **Exothermic reaction** : The chemical reaction which proceeds with the evolution of heat energy is called exothermic reaction.
- **Endothermic reaction** : The chemical reaction which proceeds with the absorption of heat energy is called endothermic reaction.
- **Rate of a chemical reaction** : It is defined as change in concentration of any one of the reactant or product per unit time.
- **Factors influencing rate of reaction** : (i) Nature of the reactants (ii) Concentration of reactants (iii) Surface area of the reactants (iv) Temperature (v) Catalyst.
- **Catalyst** : A substance which alters the rate of the reaction without undergoing any change in mass and composition is known as catalyst.



PERIODIC CLASSIFICATION OF ELEMENTS

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	2	-	3	5

Important Terms and Definitions :

- **Metallurgy** : The steps involved in the extraction of metals from their ores and refining of crude metal are known as Metallurgy.
- **Carat** : Purity of Gold is expressed in Carat.
- **24 Carat gold** : 100% Pure Gold.
- **22 Carat Gold** : 91.6% Gold and 8.4% copper.
- **Coinage metals** : Copper, Silver, Gold.
- **Strategic metals** : The metals like Titanium, Chromium, Manganese, Zirconium which are used in the manufacture of defence equipments are called Strategic metals.
- **Metal present in Haemoglobin** : Iron.
- **Calcium** : A constituent of bone and teeth.
- **Minerals** : It may be a single compound or complex mixture of compounds of metals which are found in earth.
- **Ores** : The mineral from which a metal can be readily and economically extracted on a large scale.
- **Clay** : $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$
- **Bauxite** : $Al_2O_3 \cdot 2H_2O$.
- **Mining** : The process of taking out ores from the earth crust is called Mining.
- **Gangue or Matrix** : The rocky impurity associated with the ore is called Gangue or Matrix.
- **Flux** : It is a substance added to the ore to reduce the fusion temperature.
- **Slag** : It is the fusible product formed when flux reacts with gangue during the extraction of metals.
- **Uses of aluminium** : Making of house hold utensils, used in Electrical cable industry, Aluminium alloys, thermite welding.

- **Duralumin** : An alloy containing Al, Cu, Mg and Mn. It is used in making aeroplane parts.
- **Thermite powder** : Al powder and Fe_2O_3 . It is a strong reducing agent.
- **Ores of copper** : Copper Pyrites (CuFeS_2), Cuprite (or) Ruby Copper (Cu_2O) and Copper glance (Cu_2S).
- **Matte** : It is a mixture of Cu_2S and FeS .
- **Blister copper** : It contains 98% pure copper and 2% impurities.
- **Anode mud** : The impurities settled at the bottom of the anode in the form of sludge is called anode mud.
- **Uses of copper** : In making electric cables, utensils, containers, calorimeters, coins, electroplating, and jewellery.
- **Ores of Iron** : Haematite (Fe_2O_3), Magnetite (Fe_3O_4) and Iron Pyrite (FeS_2).
- **Gravity separation process** : The ore is washed with water in which lighter impurities are washed away and heavy ore particles settle down.
- **Calcination** : It is a process in which ore is heated in the absence of air.
- **Roasting** : It is a process in which ore is heated in the presence of excess of air.
- **Types of iron** :
 - Pig iron - Iron with 2% - 4.5% carbon.
 - Wrought iron - Iron with < 0.25% carbon.
 - Steel - Iron with 0.25-2% carbon.
- **Rust** : Hydrated ferric oxide, $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$
- **Uses of Pig iron** : In making pipes, stoves, radiators, railings, man hole covers and drain pipes.
- **Uses of steel** : Construction of buildings, machinery, transmission cables and T.V. towers.
- **Uses of wrought iron** : In making springs, anchors and electro magnets.
- **Alloys** : It is a homogeneous mixture of a metal with other metals or with non-metals that are fused together.
- **Amalgam** : It is an alloy of mercury with metals such as Sodium, Gold, Silver, etc.
- **Dental amalgam** : It is an alloy of mercury with silver and tin metals, used in dental filling.
- **Corrosion** : It is defined as the slow and steady destruction of a metal by the environment.
- **Methods of Preventing Corrosion** : By coating with paints, coating with oil and grease, alloying with other metals.
- **Galvanization** : It is a process of coating of zinc.
- **Electroplating** : It is a method of coating one metal with another by passing electric current.
- **Sacrificial protection** : When a metal is coated on the articles made of steel it sacrifices itself to protect the steel.

MODEL EVALUATION

PART - A

(Textbook Page No. 209)

1. In the modern periodic table, periods and groups are given. Periods and Groups indicate _____.
 (i) Rows and Columns (ii) Columns and rows
 [Ans: (i) Rows and Columns]
2. The third period contains elements. Out of these elements, how many elements are non-metals? (8, 5) ⊗ (June 2016)
 [Ans: 5]
3. An element which is an essential constituent of all organic compounds belongs to the _____ group. (14th group / 15th group) (Sep. 2013; June 2014 & 2015; Mar. 2017)
 [Ans: 14th group]
4. Ore is used for the extraction of metals profitably. Bauxite is used to extract aluminium, it can be termed as _____. (ore / mineral) ⊗ (Apr. 2013; Sep. 2014; PTA - 2)
 [Ans: ore]
5. Gold does not occur in the combined form. It does not react with air or water. It is in the _____ state. (native / combined) (Deptl. Paper; Sep. 2013; June & Sep. 2014)
 [Ans: native]

PART - B

(Textbook Page No. 209)

1. **Assertion:** A greenish layer appears on copper vessels, if left uncleaned.
Reason: It is due to the formation of a layer of basic copper carbonate.
Give the correct option. (June 2012; Oct. 2015, 2016 ; PTA - 3; Mar. 2017)
 (i) Assertion and reason are correct and relevant to each other.
 (ii) Assertion is true but reason is not relevant to the assertion.
 [Ans: (i) Assertion and reason are correct and relevant to each other]
2. A process employed for the concentration of sulphide ore is _____.
 (June 2013 & 2016; Apr. 2014)
 [froth floatation / gravity separation] [Ans: froth floatation]
3. Coating the surface of iron with other metal prevents it from rusting. If it is coated with a thin layer of zinc, it is called _____. [galvanization / painting / cathodic protection]
 [Ans: galvanization]
4. Any metal mixed with mercury is called an amalgam. The amalgam used for dental filling is _____. [Ag - Sn amalgam / Cu - Sn amalgam]
 (Deptl. Paper; Apr. 2013 & 2015; June 2013 & 2016; Oct. 2017) [Ans: Ag - Sn amalgam]

13

CARBON AND ITS COMPOUNDS

Blue Print	1 Mark question	2 Marks question	5 Marks question	Total questions	Total Marks
	1	1	1	3	8

Important Terms and Definitions :

- **Living Chemistry** : Carbon compounds hold the key to plant and animal life on earth. Hence carbon chemistry is called living chemistry.
- **Carbon cycle** : Carbon circulates through air, plants, animals and soil by means of complex reactions. This is called carbon cycle.
- **Inorganic compounds** : Compounds obtained from non-living matter.
- **Organic compounds** : Compounds obtained from living matter.
- **Wohler** : He synthesized the first organic compound (urea) from an inorganic compound (ammonium cyanate).
- **Organic Chemistry** : It is defined as the branch of chemistry that deals with organic compounds which are made up of hydrocarbons and their derivatives.
- **Tetra valency of carbon** : This is the characteristic of carbon atom by virtue of which it forms four covalent bonds.
- **Allotropy** : It is defined as the property by which an element can exist in more than one form that are physically different but chemically similar.
- **Allotropic forms of carbon** : Carbon exists in 3 allotropic forms : 1. Crystalline form (diamond and graphite), 2. Amorphous form (coke, charcoal), 3. Fullerene.
- **Diamond** : Each carbon atom is bonded to four other carbon atoms, forming a rigid three dimensional structure.
- **Graphite** : Each carbon atom is bonded to three other carbon atoms in the same plane giving hexagonal layers held together by weak Vander Waals forces. Graphite is a good conductor of electricity.

- **Fullerene** : It contains 60 carbon atoms in the shape of a football and it is named as Buckminster Fullerene.
- **Catenation** : This is the property of carbon that has the ability to form covalent bonds with other atoms of carbon giving rise to a large number of molecules, through self linking property.
- **Isomerism** : The phenomenon by which two or more compounds to have same molecular formula but different structural formula with difference in properties.
- **Homologous series** : It is a group or a class of organic compounds having same general molecular formula and similar chemical properties in which the successive members differ by a $-\text{CH}_2$ group.
- **Hydrocarbons** : The organic compounds containing only carbon and hydrogen are called hydrocarbons.
- **Alkane** : $\text{C}_n\text{H}_{2n+2}$ (Compounds containing carbon-carbon single bond)
- **Alkene** : C_nH_{2n} (Compounds containing carbon, carbon double bonds)
- **Alkyne** : $\text{C}_n\text{H}_{2n-2}$ (Compounds containing carbon, carbon triple bonds)
- **Intra molecular dehydration** : It is a type of dehydration taking place within the same molecule involved in the reaction.
- **Esterification** : The compound formed by the reaction of an alcohol with carboxylic acid is known as ester and the reaction is called esterification.
- **Functional group** : It is defined as an atom or group of atoms or reactive part which is responsible for the characteristic properties of the compounds.
- **Ethanol** : Boiling point of Ethanol is 351.5 K.
- **Methylated spirit** : It is a mixture of 95% ethanol and 5% methanol.
- **Power alcohol** : It is a mixture of petrol and ethanol.
- **Denatured Spirit** : It is a mixture of ethanol with pyridine.
- **Ethanoic acid** : It is most commonly known as Acetic acid and belongs to a group of acids called carboxylic acids.
- **Glacial acetic acid** : Ice like flakes of pure ethanoic acid, on cooling, is named as glacial acetic acid.
- **Decarboxylation** : Removal of carbon dioxide.
- **Uses of ethanoic acid** : As preservative in food and fruit juices, laboratory reagent, coagulating agent for rubber latex, preparing dyes, perfumes and medicine.

PHYSICS**14****MEASURING INSTRUMENTS**

Blue Print	1 Mark question	2 Marks question	5 Marks question	Total question	Total Marks
	1	-	-	1	1

Important Terms and Definitions :

- Screw gauge is an instrument to measure the dimensions of very small objects upto 0.01mm.
- Screw gauge works under the principle of the screw.
- The pitch of the screw is the distance between two successive screw threads. It is also equal to the distance travelled by the tip of the screw for one complete rotation of the head.

$$\text{Pitch} = \frac{\text{Distance travelled on the pitch scale}}{\text{No. of rotations of the head scale}}$$

- The Least Count of a Screw Gauge is the distance moved by the tip of the screw for a rotation of one division on the head scale.

$$\text{L.C} = \frac{\text{Pitch}}{\text{No. of divisions on the head scale}}$$

- If the zero of the head scale coincides with the pitch scale axis, then there is no zero error.
- If the zero of the head scale lies below the pitch scale axis, then the zero error is positive.
- If the zero of the head scale lies above the pitch scale axis, then the zero error is negative.
- To measure long distances Radio echo method, Laser pulse method and Parallax method are used.
- Astronomical unit is the mean distance of the centre of the Sun from the centre of the Earth. 1 AU = 1.496×10^{11} m.
- Light year is the distance travelled by light in one year in vacuum. 1 Light year = 9.467×10^{15} m.

MODEL EVALUATION**PART - A**

(Textbook Page No. 231)

1. Screw Gauge is an instrument used to measure the dimensions of very small objects upto _____. (0.1 cm., 0.01 cm., 0.1 mm., 0.01 mm) [Ans: 0.01 mm] (Mar. 2017)

2. In a Screw Gauge, if the zero of the head scale lies below the pitch scale axis, the zero error is _____. (positive, negative, nil) [Ans: *positive*]
3. The Screw Gauge is used to measure the diameter of a _____. (crowbar, thin wire, cricket ball) [Ans: *thin wire*]
4. One light year is equal to _____. (QY 2017; Oct. 2017)
 (i) $365.25 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m (ii) $1 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m
 (iii) $360 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m [Ans: (i) $365.25 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m]
5. One astronomical unit is the mean distance between the centre of the Earth and centre of the _____. (QY 2016; June 2017)
 (i) Moon (ii) Sun (iii) Mars [Ans: (ii) *Sun*]

PART - B

(Textbook Page No. 232)

1. Correct the mistakes if any, in the following statements:
 (i) Astronomical unit is the mean distance of the surface of the sun from the surface of the earth.
 (ii) Light year is the distance travelled by light in one year in vacuum at a speed of 3×10^8 m per minute.
 Ans : (i) Astronomical unit is the mean distance of the centre of the sun from the centre of the earth.
 (ii) Light year is the distance travelled by light in one year in vacuum at a speed of 3×10^8 m. per second.
2. Match the items in group A with the items in group B:

Sl. No.	Group - A	Group - B
1.	Small dimensions	Kilometre
2.	Large dimensions	Screw gauge
3.	Long distance	Scale
4.	Small distance	Light year
		Altimeter

Ans :

Group - B
Screw gauge
Scale
Light year
Kilometre

3. Fill in the blanks:
 The special methods adopted to determine very large distances are _____ and _____.
 (Laser pulse method, Light year method, Radio echo method, Astronomical method).
 [Ans : *Laser pulse method, Radio echo method*]
4. Least count of a screw gauge is an important concept related to screw gauge. What do you mean by the term least count of a screw gauge?

Ans : The distance moved by the tip of the screw for a rotation of one division on the head scale is called the least count of the Screw Gauge.

$$\text{L.C} = \frac{\text{Pitch}}{\text{No.of divisions on the head scale}}$$



LAWS OF MOTION AND GRAVITATION

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	2	1	4	10

Important Terms and Definitions :

- If the resultant of all the forces acting on a body is zero, the forces are called **balanced forces**.
- If the resultant of all forces acting on a body is not zero, the forces are called **unbalanced forces**.
- **Force** is one which changes or tends to change the state of rest or of uniform motion of a body.
- **The first law of motion** states that a body continues to be in a state of rest or in a state of uniform motion along a straight line, unless an external force is applied on the body to change the state.
- **Inertia** is the inability of the body to change by itself its state of rest or of uniform motion along a straight line. **The mass** of a body is a measure of inertia.
- According to Newton's second law of motion, the rate of change of linear momentum of a body is directly proportional to the external force applied on the body and this change takes place always in the direction of applied force.
- **Force acting on a body** is the product of mass and acceleration of the body.
- **Linear momentum of a body** is defined as the product of mass and velocity of the body.
- **Newton III law states** that for every action, there is always an equal and opposite reaction. These forces act on two different objects and never cancel each other.
- Although the action and reaction forces are always equal in magnitude, yet these forces may not produce acceleration of equal magnitude. This is because each force acts on a different object which may have different mass
- According to law of conservation of momentum, in the absence of external unbalanced force the total momentum of a system of objects remains unchanged or conserved by collision.
- Total momentum before collision is equal to the total momentum after collision.
- The magnitude of the moment of force F , about a point is defined as the product of the magnitude of force and the perpendicular distance of the point from the line of action of the force.
- The moment of the force $T = \text{magnitude of the force}(F) \times \text{perpendicular distance } (d)$, ie. $T = Fd$.
- Two equal and opposite forces whose lines of action do not coincide are said to constitute a couple.
- The force which pulls the objects towards the centre of earth is known as **gravitational force of earth**.

- Every body in the universe attracts every other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.
- **The acceleration** experienced by an object falling freely due to force of gravity is called acceleration due to gravity.
- Mass of an object is the quantity of matter contained in the body. It is measured in kg. It is constant everywhere.
- Weight of an object is the force of attraction between the object and the centre of the earth. It changes from place to place. It is zero at the centre of the earth. Its unit is newton.
- Relation between acceleration due to gravity and the gravitational constant G is $g = \frac{GM}{R^2}$
- The acceleration produced in a body on account of the force of gravity is called **acceleration due to gravity**.
- Chandrayaan-1 is a moon traveller or moon vehicle. It is a lunar probe.
- Its main achievement is finding of the presence of water molecules in lunar soil.
- Cryogenics is the study of the production at very low temperature and the behaviour of materials at those temperatures.
- Cryogenic fuels are used as rocket fuel.
- MRI is used to scan inner organs of human body by penetrating very intense magnetic field. The magnetic field is generated by super conducting coils with the help of liquid helium.
- A space station is an artificial structure designed for humans to live and work in outer space for a period of time.
- The space stations are Almaz and Salyut series, Skylab and Mir.
- The space stations have various issues that limit their long-term habitability such as very low recycling rates relatively high radiation levels and a lack of gravity.

MODEL EVALUATION

PART - A

(Textbook Page No. 246)

1. **The acceleration in a body is due to _____**
 (i) balanced force (ii) unbalanced force (iii) electro static force
[Ans: (ii) unbalanced force]
2. **The physical quantity which is equal to rate of change of momentum is _____**
(Mar.2016)
 (i) displacement (ii) acceleration (iii) force (iv) impulse [Ans: (iii) force]
3. **The momentum of a massive object at rest is _____**
(Apr. 2016; Sep. 2013 & 2014; Oct. 2015; PTA - 3)
 (i) very large (ii) very small (iii) zero (iv) infinity [Ans: (iii) zero]
4. **The mass of a person is 50 kg. The weight of that person on the surface of the earth will be _____.**
(Deptl. Paper; Oct. 2012 & 2016; June 2013 & 2016; Apr. 2014)
 (i) 50 N (ii) 35 N (iii) 380 N (iv) 490 N [Ans: (iv) 490 N]

5. The freezing of biotechnology products like vaccines require _____ freezing system.
(Apr. & Jun. 2012, Apr. 2013 & 2015; PTA - 1)

(i) Helium (ii) Nitrogen (iii) Ammonia (iv) Chlorine [Ans: (ii) Nitrogen]

6. Two objects of same mass, namely A and B hit a man with a speed of 20 km/hr and 50 km/hr respectively and comes to rest instantaneously. Which object will exert more force on that man? Justify your answer.

Ans: Object B will exert more force.

Reason : Force = Rate of change of momentum. The rate of change of momentum of object A is lesser than the rate of change of momentum of object B. Hence object B exerts more force.

7. An object is moving with a velocity of 20 m/s. A force of 10 N is acting in a direction perpendicular to its velocity. What will be the speed of the object after 10 seconds?

Ans: The object will move with the same speed of 20 m/s after 10 seconds.

The force acting perpendicular to the velocity will not change the speed but change only the direction. Therefore, the speed of the body remains unchanged after 10 seconds.

8. Assertion(A) : Liquefied cryogenic gases are sprayed on electric cables in big cities.

Reason(R): Liquefied cryogenic gases prevent wastage of power. (April 2016; Oct. 2016)

(i) A is incorrect and R is correct. (ii) A is correct and R is incorrect
(iii) Both A and R are incorrect. (iv) A is correct and R supports A.

[Ans: (iv) A is correct and R supports A.]

9. The acceleration due to gravity on the surface of the earth will be maximum at _____ and minimum at _____ [Ans: the poles, the equator]

10. If the radius of the earth is reduced to half of its present value, with no change in the mass, how will the acceleration due to gravity, be affected?

Ans: $g = \frac{GM}{R^2}$

When radius of the earth is reduced to half of its present value, with no change in the mass,

$$g^1 = \frac{GM}{R^1{}^2} = \frac{GM}{\left(\frac{R}{2}\right)^2} = 4 \frac{GM}{R^2}$$

∴ R is reduced by half, then the new value of **acceleration** due to gravity would become **four times the original value**.

11. Selvi placed her purse on the passenger's seat of her car when she drove to work. By the time she reached her office, her purse had fallen on the floor in front of the passenger's seat. Why did this happen? Explain.

Ans : This happened due to inertia of motion.

Explanation : When the car moves with a uniform velocity, the purse on the car seat will also have the same velocity. When Selvi applies brake, due to inertia of motion, the purse will continue to move with the same velocity. Hence the purse has fallen down.

12. Why does a fielder in the game of cricket pull his hands back when he catches a ball?

Ans: A cricket player while catching a ball lowers his hands in the direction of the ball.

If the total change in momentum is brought about in a very short interval of time, the average force is very large. Hence, it hurts the player.

By increasing the time interval, the *average force is decreased*. It is for this reason that a cricket player while catching a ball, to increase time of contact, the player should lower his hands in the direction of the ball.

13. From the following statements, choose that which is not applicable to the mass of an object

(Sep. 2013; April 2015; June 2017)

- (i) It is a fundamental quantity. (ii) It is measured using physical balance.
(iii) It is measured using spring balance.

[Ans: (iii) It is measured using spring balance.]

14. List out the names of the organisations which are not associated with Chandrayaan-I mission from the following: i) ISRO ii) BARC iii) NASA iv) ESA v) WHO vi) ONGC

[Ans: (ii) BARC (v) WHO (vi) ONGC] (June 2015 & 2017)

PART - B

(Textbook Page No. 247)

1. Fill in the blanks. (Apr. & Jun. 2013; Apr. 2015; PTA - 2 & 4)

(i) If force = mass \times acceleration, then momentum = _____. (Jun. 2012; Oct. 2015)

(ii) If liquid hydrogen is for rocket, then _____ is for MRI.

[Ans: (i) mass \times velocity (ii) liquid helium]

2. Correct the mistakes, if any, in the following statements.

(June 2012 & 2013; Apr. & Sep. 2014; Oct. 2016; QY 2016)

(i) One newton is the force that produces an acceleration of 1 ms^{-2} in an object of 1 gram mass.

(ii) Action and reaction always act on the same body.

16

ELECTRICITY AND ENERGY

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	3	-	4	7

Important Terms and Definitions :

- A continuous and closed path of an electric current is called an **electric circuit**.
- The rate of flow of charges through the area of cross section of a conductor is called **current**. $I = Q/t$.
- When one coulomb of charge flows in one second across any cross section of a conductor, the current in it is one **ampere**.
- **The electric potential difference** between two points in an electric circuit carrying current as the work done to move a unit charge from one point to the other.
- **One volt** is the potential difference between two points in a current carrying conductor when 1 joule of work is done to move a charge of 1 coulomb from one point to the other.
- **Ohm's law** states that at constant temperature the steady current (I) flowing through a conductor is directly proportional to the potential difference (V) between its ends. $V \propto I$.
- The equivalent resistance of the resistances connected in series is equal to the sum of the individual resistances. $R_s = R_1 + R_2 + R_3$
- The reciprocal of the effective resistance of the parallel combination is equal to the sum of the reciprocals of the individual resistance.
- According to **Joule's law**, the amount of heat produced in a resistor is directly proportional to the square of current, resistance and time.
- **Fuse** is a safety device which protects the circuits and appliances.
- When the current is passed through aqueous solutions of inorganic acids, bases and salts, the conduction of electricity is always accompanied by chemical decomposition of the solutions. Such solutions are called **electrolytes**.
- The phenomenon of the conduction of electricity through electrolytes and chemical decomposition is called **electrolysis**.
- The cells from which the electric energy is derived by irreversible chemical reaction are called **primary cells**.
- The chemical process of obtaining current from a secondary cell is called **discharge**.
- The process of reproducing active materials is called **charging**.
- A **good source of energy** would be the one (i) easily accessible (ii) easy to store and transport and economical.
- **Conventional sources** of energy are fossil fuels thermal power plant and hydropower plants.

- **Non conventional sources** of energy are solar energy, wind energy, nuclear energy, wave energy and tidal energy.
- The process of breaking up of the nucleus of a heavier atom into two fragments with the release of energy is called **nuclear fission**.
- Nuclear fusion is a process in which two or more lighter nuclei combine to form a heavier nucleus.
- The phenomenon of spontaneous emission of highly penetrating radiations such as α , β and γ rays by heavy elements having atomic number greater than 82 is called **radioactivity**.
- The radiation exposure is measured by the unit called **roentgen (R)**.
- One roentgen is defined as the quantity of radiation which produces 1.6×10^{12} pairs of ion in 1gm of air.
- Nuclear reactivity is a measure of the departure of a reactor from criticality.

MODEL EVALUATION

PART - A

(Textbook Page No. 268)

1. **The potential difference required to pass a current 0.2 A in a wire of resistance 20 ohm is _____.** (Deptl. Paper; June 2013 & 2014; Apr. 2012; Apr. 2015 & Oct. 2015; PTA - 4)

(i) 100 V (ii) 4V (iii) 0.01V (iv) 40V

Given : $I = 0.2A$, $R = 20 \Omega$

$$V = IR$$

$$= 0.2 \times 20 = 4 \text{ V}$$

[Ans: (ii) 4 V]

2. **Two electric bulbs have resistances in the ratio 1 : 2. If they are joined in series, the energy consumed in these are in the ratio _____.** (Sep. 2014)

(i) 1 : 2 (ii) 2 : 1 (iii) 4 : 1 (iv) 1 : 1

Given : $R_1 : R_2 = 1 : 2$

$$\Rightarrow \frac{R_1}{R_2} = \frac{1}{2}$$

$$\frac{H_1}{H_2} = \frac{I^2 R_1 t}{I^2 R_2 t} = \left(\frac{R_1}{R_2} \right) = 1 : 2$$

[Ans: (i) 1 : 2]

3. **Kilowatt-hour is the unit of _____.** (June 2012; Apr. & Sep. 2013; Apr. 2015 & 2017; PTA - 2)

(i) potential difference (ii) electric power (QY 2016 & 2017)
(iii) electric energy (iv) charge [Ans: (iii) electric energy]

4. **_____ surface absorbs more heat than any other surface under identical conditions.**

(Apr. 2016; June 2013 & 2016; June & Sep. 2014; Oct. 2015; QY 2017)

(i) White (ii) Rough (iii) Black (iv) Yellow

[Ans: (iii) Black]

5. **The atomic number of natural radioactive element is _____.** (April 2013)

(i) greater than 82 (ii) less than 82 (iii) not defined (iv) at least 92

[Ans: (i) greater than 82] (QY 2016; Oct. 2016 & 2017)

6. Which one of the following statements does not represent Ohm's law? (Sep. 2013)
- current / potential difference = constant
 - potential difference / current = constant
 - current = resistance \times potential difference
- [Ans: (i) current / potential difference = constant & (iii) current = resistance \times potential difference]
7. What is the fuel used in thermal power plants?
Ans: Coal.
8. Which is the ultimate source of energy?
Ans: The Sun.
9. What must be the minimum speed of wind to harness wind energy by turbines?
Ans: The wind speed should be higher than 15 km per hour.
10. What is the main raw material used in the production of biogas?
Ans: Cow dung.

PART - B

(Textbook Page No. 269)

1. Fill in the blanks. (April 2013; June 2014 & 2015; Oct. 2015; Mar. 2017; HY 2016)
- Potential difference : voltmeter, then current: _____
 - Hydro power plant : Conventional source of energy, then solar energy: _____
- Ans : (i) Ammeter (ii) Non-conventional source of energy
2. In the list of sources of energy given below, find out the odd one. (Apr. 2016; June 2016; Sep. 2013 & 2014)
- (wind energy, solar energy, hydro electric power)
- Ans : Hydro electric power.
- Reason: Hydro electric power is Conventional Source of Energy, whereas the other two are Non-conventional Sources of Energy.
3. Correct the mistakes, if any, in the following statements. (June 2012; Apr. 2013 & 2015; Oct 2017)
- A good source of energy would be one which would do a small amount of work per unit volume of mass.
 - Any source of energy we use to do work is consumed and can be used again.
- Ans : (i) A good source of energy would be one which would do a large amount of work per unit volume of mass.
- (ii) Any source of energy we use to do work is consumed and cannot be used again.



MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

Blue Print	1 Mark question	2 Marks questions	5 Marks question	Total questions	Total Marks
	1	3	1	5	12

Important Terms and Definitions :

- The region surrounding the magnet, in which the force of the magnet can be detected is called magnetic field.
- Magnetic lines of force are closed curves. They never intersect. It starts from north pole and ends in south pole.
- A current carrying conductor produces a magnetic field.
- A current carrying conductor placed in a magnetic field experiences a force.
- The direction of force is given by Fleming's left hand rule or motor rule. According to that, the thumb, forefinger and middle finger of left hand is stretched perpendicular to each other. Forefinger represents direction of magnetic field and middle finger points in the direction of current, then thumb will point in the direction of motion.
- Electric motor converts electrical energy into mechanical energy.
- An electromotive force is produced in a circuit whenever the magnetic flux linked with the coil changes. This is called electromagnetic induction.
- Electric generator converts mechanical energy into electrical energy. It is based on electromagnetic induction.
- A spherical mirror whose reflecting surface is curved inwards is called a concave mirror.
- A spherical mirror whose reflecting surface is curved outwards is called a convex mirror.
- The centre of curvature is the centre of the hollow sphere, of which spherical mirror forms a part.
- The centre of the mirror is pole.
- The radius of the sphere, of which the mirror forms a part is called radius of curvature.
- The line which passes through the centre of curvature and pole of a mirror is called principal axis.
- The point at which the incident rays get converged or diverged on a principal axis is known as principal focus.
- The distance between pole and principal focus is known as focal length.
- $R = 2f$
- According to law of reflection (i) The angle of incidence is equal to the angle of reflection. (ii) The incident ray, the normal and the reflected ray all lie in the same plane.
- Magnification is defined as the ratio of height of the image to the height of the object
- Laws of refraction states that the ratio of sine of angle of incidence to the sine of the angle of refraction is constant. This is known as Snell's law.
- Refractive index is defined as the ratio of sine of the angle of incidence to the sine of angle of refraction.

- It can also be defined as ratio of speed of light in air to the speed of light in medium. It has no unit.
- The power of lens is defined as the reciprocal of its focal length. Its unit is dioptre.
- The splitting of white light into its component colours is called dispersion.
- Myopia is known as near sightedness. It arises due to (i) excessive curvature of the eye lens (ii) elongation of the eyeball. It is corrected by using concave lens.
- Hypermetropia is also known as far sightedness. It arises (i) if the focal length of the eye lens is too long (ii) eye ball becomes too small. It is corrected by convex lens.
- The power of accommodation of eye decreases with ageing. It is difficult to see nearby objects. This is called presbyopia.

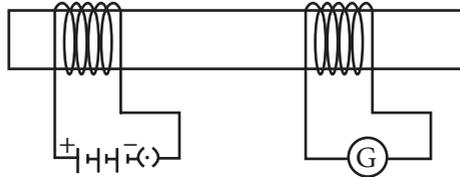
MODEL EVALUATION

PART - A

(Textbook Page No. 301)

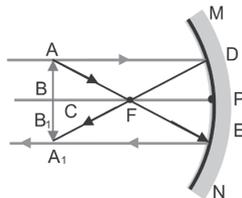
1. The magnification produced by a mirror is $+\frac{1}{3}$. Then the mirror is a _____
(concave mirror, convex mirror, plane mirror) (Sep. 2013; Apr. 2014; Oct. 2016; PTA - 1)
[Ans: convex mirror]
2. The phenomenon of producing an emf in a circuit whenever the magnetic flux linked with a coil changes is _____. (Apr. 2016; June 2017)
(electromagnetic induction, inducing current, inducing voltage, change in current)
[Ans: electromagnetic induction]
3. An electric current through a metallic conductor produces _____ around it.
(Deptl. Paper, June, Oct. 2012, June 2013; Apr. & Sep. 2014; Apr. 2015 & 2017; PTA - 3)
(magnetic field, mechanical force, induced current) [Ans: magnetic field]
4. The field of view is maximum for _____. (Oct. 2012 & 2015; June 2013 & 2014)
(plane mirror, concave mirror, convex mirror) [Ans: convex mirror]
5. An object is placed 25 cm from a convex lens whose focal length is 10 cm. The image distance is _____. (April 2012; Oct. 2015)
(50 cm, 16.66 cm, 6.66 cm, 10 cm) [Ans: 16.66 cm]
6. From the following statement write down that which is applicable to a commutator.
(a) A galvanometer uses a commutator for deadbeat
(b) A transformer uses a commutator to step up voltage
(c) A motor uses a commutator to reverse the current
[Ans: (c) A motor uses a commutator to reverse the current]
7. An overhead wire carries current from east to west. Find the direction of the magnetic field 5 cm below the wire.
[Ans: Towards South. (North → South. Using Maxwell's right hand cork screw rule)]

8. In the arrangement shown in the figure, there are two coils wound on a non-conducting cylindrical rod. Initially the key is not inserted. Then the key is inserted and later removed. Then, which of the following statement is correct?
- The deflection in the galvanometer remains zero throughout.
 - There is a momentary deflection in the galvanometer but it dies out shortly.



Ans: (b) There is a momentary deflection in the galvanometer but it dies out shortly.

9. Which part of the human eye helps in changing the focal length of the eye lens?
Ans: Ciliary muscles.
10. A pencil partly immersed in water in a glass tumbler appears to be bent at the interface of air and water. Name the phenomenon of light responsible for it.
Ans: Refraction of light.
11. Sitting in her parlour one night, Chitra sees the reflection of her cat in the living room window. If the image of her cat makes an angle of 40° with the normal, at what angle does Chitra see the reflected image of the cat?
Ans: $i = r = 40^\circ$. Chitra sees the cat reflected at an angle of 80° .
12. Why do the lines of the magnetic field not cross each other? (HY 2016)
Ans: If the magnetic lines intersect, at the point of intersection, two tangents are possible. This means that, there are two different directions magnetic field at the same point which is not possible.
13. What is the magnetic field midway between two parallel conductors carrying same amount of current in the same direction and in the opposite direction?
Ans: When current in two parallel conductors are equal and in the same direction, midway between the conductors the magnetic fields are equal but in the opposite direction. Hence, the net field is zero.
When current in two parallel conductors are equal and in the opposite direction, the fields due to the current carrying conductors are equal and in the same direction. Hence the net field is the sum of the fields.
14. How can an AC generator be converted into a DC generator?
Ans: Slip rings are replaced by a split ring type commutator.
15. Compute the position of the object placed in front of a concave mirror of focal length 'f' so that the image formed is of the same size of the object.



Ans: When an object is placed at C, the image formed in front of a concave mirror is of the same size as that of the object.

$$\therefore u = R = 2f$$

19. a. What is meant by dispersion of white light?
b. Why do we get different colours of light?
c. Draw a ray diagram to show dispersion of white light in a glass prism.

Ans : a. The splitting up of white light into its seven colours on passing through a refracting medium like a glass prism is called dispersion of light.
b. (i) The dispersion of white light occurs because the different colours of light bend through different angles with respect to the incident ray, as they pass through the prism.
(ii) The red light bends the least while the violet the most.
(iii) Hence, the rays of each colour emerge along different paths and thus become distinct.

c.

