



महाराष्ट्र शासन
शालेय शिक्षण व क्रीडा विभाग
राज्य शैक्षणिक संशोधन व प्रशिक्षण परिषद, महाराष्ट्र

७०८ सदाशिव पेठ, कुमठेकर मार्ग, पुणे ४११०३०

संपर्क क्रमांक (०२०) २४४७ ६९३८

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Question Bank

Standard:- 12th (Science)

Subject:- BIOLOGY (056)

March 2021

सूचना

१. फक्त विद्यार्थ्यांना प्रश्नप्रकारांचा सराव करून देण्यासाठीच
२. सदर प्रश्नसंचातील प्रश्न बोर्डाच्या प्रश्नपत्रिकेत येतीलच असे नाही याची नोंद घ्यावी.

BIOLOGY (056)**QUESTION BANK**

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	The outer layer of pollen grain is thick and made up of complex ,non-biodegradable substance called as..... A. lignin B. cellulose C. pectin D. Sporopollenin	Correct answer 1 mark	1	3
2	Sporoderm is made up of A. exosporium and endosporium B. outer integuments and inner integument C. testa and tegmen D. exine and intine	Correct answer 1 mark	1	3
3	The number of meiotic and mitotic divisions necessary for development of female gametophyte in angiosperms is... A. 1 meiosis and 2 mitosis B. 1 mitosis and 3 meiosis C. 1 meiosis and 1 mitosis D. 1 meiosis and 3 mitosis.	Correct answer 1 mark	1	5
4	Identify the odd one with respect to pollinating agent. A. Baobab B. Bottle brush C. Kadamb D. Sausage	Correct answer 1 mark	1	8

5	<p>In vitro pollen germination and pollen tube elongation can be induced by-----</p> <p>-</p> <p>A. boric acid</p> <p>B. glucose</p> <p>C. lactose</p> <p>D. sucrose</p>	<p>Correct answer</p> <p>1 mark</p>	1	9
6	<p>Self-incompatibility is found in flowers of plants.....</p> <p>A. <i>Calotropis</i></p> <p>B. maize</p> <p>C. <i>Thea</i></p> <p>D. <i>Gloriosa</i></p>	<p>Correct answer</p> <p>1 mark</p>	1	9
7	<p>Porogamy refers to entry of pollen tube through.....</p> <p>A. integuments</p> <p>B. chalaza</p> <p>C. micropyle</p> <p>D. stigma</p>	<p>Correct answer</p> <p>1 mark</p>	1	10
8	<p>..... is an example of helobial endosperm.</p> <p>A. <i>Adoxa</i></p> <p>B. coconut</p> <p>C. <i>Asphodelus</i></p> <p>D. sunflower</p>	<p>Correct answer</p> <p>1 mark</p>	1	11
9	<p>The single shield shaped cotyledon in monocot seed is known as</p> <p>A. coleoptile</p> <p>B. scutellum</p> <p>C. aleurone layer</p> <p>D. perisperm</p>	<p>Correct answer</p> <p>1 mark</p>	1	13
10	<p>The example of dicot endospermic seed is</p>	<p>Correct answer</p> <p>1 mark</p>	1	13

	A. castor B. pea C. mango D. bean			
	Single sentence answers	Key word in answer		
1	Why anther is called as tetrasporangiate structure?	Presence of four pollen sacs in dithecus anther	1	3
2	At which stage pollen grains are shed from the anther in Angiosperms?	Bicelled stage	1	4
3	What is hilum with respect to ovule?	Place of attachment of funiculus with main body of ovule.	1	4
4	What is protandry?	Condition where androecium matures earlier the gynoecium	1	9
5	Name any one plant in which double fertilization was discovered?	<i>Fritillaria</i> or <i>Lilium</i>	1	10
6	Why fertilization process in angiosperms is called as double fertilization?	Both male gametes are used.	1	10
7	Which is the most common type of endosperm in angiospermic families?	Nuclear type	1	11
8	What is the role of suspensor during the development of embryo?	Pushes embryo into the endosperm	1	12
9	What is adventive polyembryony?	Embryo develops from somatic cells or integuments	1	14
10	Name the hormone produced by unfertilised ovary responsible for enlargement of ovary into fruit.	Indole -3 acetic acid / auxins	1	15

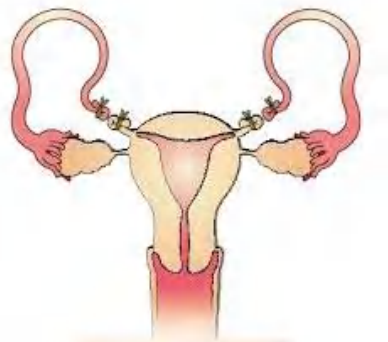
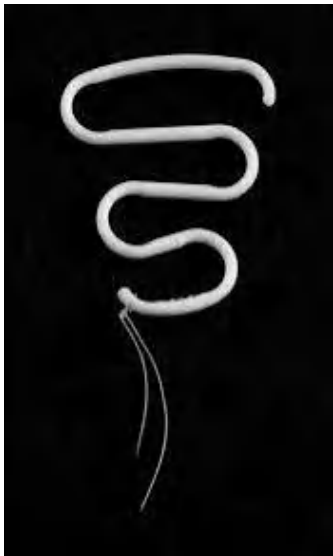
2 marks				
1	Draw a well labelled diagram of T.S. anther.	Four correct labels ½ mark each	1	3
2	Describe the structure of pollen grain.	Wall layers, ploidy and fate of pollen grain. Formation through meiosis. Each point ½ mark	1	3
3	Draw a well labelled diagram of male gametophyte of angiosperms.	Diagram-1 mark, Any two correct labels (male gamete, tube nucleus and pollen tube) ½ mark each.	1	4
4	Describe the structure of female gametophyte of angiosperms.	4 points ½ mark each	1	5
5	Mention various adaptations for wind pollination.	Any four points ½, mark each.	1	6
6	What are the different adaptations shown by bird pollinated flowers?	Any four points ½ mark each	1	8
7	Explain heterostyly and herkogamy with suitable example.	Meaning ½ mark and example ½ mark each.	1	9
8	Give the significance of double fertilization.	Any four points, ½ mark each	1	10 & 11
9	Mention significance of fruit and seed formation.	Two points 2 marks	1	14
10	Give an account of polyembryony.	Meaning-1/2 mark Reason-1/2 mark	1	15

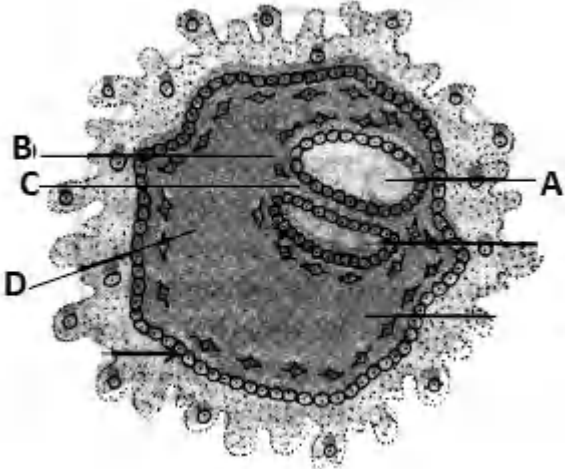
		Types ½ mark each		
3 marks				
1	Describe internal structure of anther (diagram is not expected).	Three wall layers -1/2 mark each Tapetum-structure and function-1 marks Pollen mother cell nature/function-1/2 mark	1	3
2	Explain the development of male gametophyte in angiosperms (diagram is not expected).	Development inside anther-1 and ½ marks Development over stigma-1 and 1/1 marks	1	4
3	Explain water pollination in detail with its types.	Definition-1 mark Each type with example-1 mark	1	7
4	Give an account of any two biotic agents for pollination along with their adaptations.	Three adaptations for each agency- 1 and ½ mark	1	7/8
5	Explain any two contrivances or outbreeding devices for pollination.	1 and ½ marks for correct contrivances.	1	8/9
6	Describe the process of fertilization in angiosperms with the help of diagram.	Process – 2 marks Diagram-1 mark	1	10
7	Write a note on different types of endosperms in angiosperms.	Each type -1 mark	1	11
8	Describe the development of dicot embryo in flowering plants.	six sequential stages carrying ½ mark each	1	11/12
9	Draw a well labelled diagram of monocot seed you have studied.	Any six labels-1/2 mark each	1	13

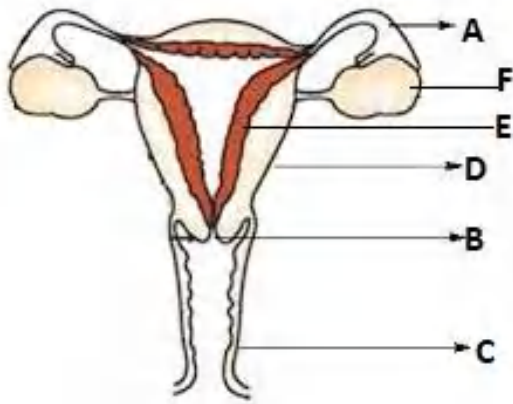
10	Explain various categories of apomixis.	1 mark each type	1	14
4 marks				
1	Describe the structure of anatropus ovule with the help of labelled diagram.	Structure -2 marks Diagram with four correct labels -2 marks	1	4
2	Describe the development of female gametophyte of angiosperms with the help of diagram.	Process upto 7 celled 8 nucleate stage -2 marks Sequential diagrams -2 marks	1	5
3	Give an account of various abiotic agencies used in pollination along with their adaptations for pollination.	2 marks for each agency	1	6/7
4	Give an account of pollen pistil interaction in detail.	Meaning- 1 mark Recognition of pollen and germination – 1 mark significance- 1 mark	1	9
5	Describe the process of double fertilization in angiosperms and add a note on its significance.	Process- 2 marks Significance (two points) -2 marks	1	10/11

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	The primary sex organ in human males is A. prostate gland B. seminal vesicle C. penis D. testis	Correct answer 1 mark	2	20
2	Seminal fluid is ----- in nature. A. acidic B. neutral C. sugary D. alkaline	Correct answer 1 mark	2	21
3	Which of the following is not a part of uterus? A. body B. cervix C. fundus D. cornua	Correct answer 1 mark	2	24
4	Meanrch, menstrual cycle and menopause are controlled by----- A. thyrotropic hormone B. gonadotropic hormone C. somatotropic hormone D. corticotropin	Correct answer 1 mark	2	26
5	Nebenkern is ----- A. acrosome of sperm B. neck of sperm C. middle piece of sperm D. mitochondrion of sperm	Correct answer 1 mark	2	29

6	Nervous system develops from..... of embryonic layer. A. endoderm B. chorion C. ectoderm D. mesoderm	Correct answer 1 mark	2	35
7	The average period of pregnancy in human lasts for..... days of pregnancy. A. 280 B. 270 C. 266 D. 290	Correct answer 1 mark	2	35
8 is not a permanent method of birth control. A. vasectomy B. tubectomy C. withdrawal D. castration	Correct answer 1 mark	2	39
9	The organism which causes Gonorrhoea is..... <i>A. Trepenoma</i> B. Neisseria <i>C. Entamoeba</i> <i>D. Salmonella</i>	Correct answer 1 mark	2	43
10	How many pairs of testis are present in human male? A. 2 pairs B. 1 pair C. only one testis D. only one ovary	Correct answer 1 mark	2	21
	Single sentence answers	Key word in answer		
1	Name the enzyme secreted by the prostate gland.	Acid phosphatase	2	21

2	What is glans penis?	Swollen tip of externa genitalia or penis	2	22
3	What is atresia with respect to ovary in human females?	Large scale destruction of primordial follicles.	2	23
4	Name the hydrolytic enzyme secreted by the acrosome.	Hyluronidase	2	29
5	What is morula?	16-32 celled stage develops during cleavage	2	33
6	What is the function of inner cell mass?	Embryo proper develops form these cells	2	33
7	Name the embryonic layer from which heart, blood and blood vessels develop.	Mesoderm	2	35
8	Identify the permanent birth control method in given diagram. 	Tubectomy	2	41
9	What is the use of tablet 'Saheli'?	Oral contraceptive pill	2	41
10	Identify the IUD in the given diagram. 	Lippes loop	2	15

2 marks				
1	Draw a well labelled diagram of L.S. human testis.	Four correct labels-½ mark each	2	20
2	Describe the structure of Graafian follicle.	Four correct points -Each point ½ mark	2	24
3	Write a short note on fallopian tube.	Three correct parts-1 and ½ marks Any one function-1/2 mark	2	24
4	Give an account of external genitalia in human females.	Any four parts-½ mark each	2	25
5	Explain the structure of secondary oocyte.	Any four points ½, mark each.	2	30
6	Write an account of cleavage during embryonic development in humans.	Any four points with morula stage-½ mark each	2	33
7	Identify the parts labelled in the given diagram. 	Each label-1/2 mark	2	34
8	What is lactation? Which hormone is responsible for its regular secretion?	Two correct points -1 mark each	2	38
9	Mention any two different goals of RCH programme.	Two correct points-1 mark each.	2	39

10	What is MTP? Upto which month it is	Four correct points-1/2 mark each.	2	41
3 marks				
1	Describe the histology of testis with help of labelled diagram.	Structure- 2 marks Diagram with two correct labels -1 mark	2	20
2	Identify the labels from the given diagram. 	Each correct label – ½ mark	2	22
3	Describe the histological structure of human ovary (diagram not expected).	Three correct points-1 mark each.	2	23
4	Explain the structure of human sperm with labelled diagram.	Structure -2 marks Diagram with any two correct labels-1 mark	2	29
5	Describe the process of oogenesis in human female.	Three stages with correct explanation-1 mark each	2	29-30
6	Write a note on implantation.	Correct explanation, three points-1 mark each.	2	34
7	Human pregnancy shows three prominent trimesters. Answer the following question based on these trimester. i) What is morning sickness during first trimester? ii) Name the hormone secrete in second trimester.	1 mark each	2	35-36

	iii) The organ which secretes hormone in second trimester is...			
8	Explain the process of parturition.	Correct explanation of three stages- 1 mark each	2	38
9	Explain any three measures to achieve goals of RCH.	Any three correct methods-1 mark each.	2	39
10	Explain any three methods that can be used to overcome infertility.	Any three methods-1 mark each	2	43-44
4 marks				
1	Write an account of seminal vesicle and bulbourethral gland in male reproductive system.	Three correct points-1 and ½ marks Any one function-1/2 mark For each gland	2	21
2	Explain ovarian cycle with its different phases.	Four phases- 1 mark each	2	26-27
3	Describe the process of spermatogenesis with the help of diagram.	Three stages-3 marks Diagram with two correct labels-1 mark	2	28-29
4	Explain mechanism of fertilization in humans.	Movement of sperm- 1 mark Entry of sperm- 1 mark Activation of sperm-1 mark Syngamy 1 mark	2	31-32
5	Write in detail any four temporary methods of birth control.	Any four method with correct explanation -1 mark each.	2	39-40

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>The three principles of Mendelism are</p> <p>A. Dominance, segregation and independent assortment</p> <p>B. Linkage, segregation and independent assortment</p> <p>C .Linkage, dominance and segregation</p> <p>D. Linkage, dominance and Independent assortment.</p>	Correct answer – 1mark	3	52
2	<p>Which one of the following is back cross?</p> <p>A. $F_1 \times F_1$</p> <p>B. $F_1 \times$ Recessive parent</p> <p>C. $F_1 \times$ Dominant parent</p> <p>D. $F_1 \times$ Any parent</p>	Correct answer – 1mark	3	53
3	<p>RR (Red) Antirrhinum is crossed with white (WW) one. Offspring (RW) are pink .This is an example of</p> <p>A. Dominant -recessive</p> <p>B. Incomplete dominance</p> <p>C. Hybrid</p> <p>D. Supplementary genes</p>	Correct answer – 1mark	3	54
4	<p>The word chromosome was coined by</p> <p>A. Benda</p> <p>B. Waldeyer</p> <p>C. Robert Hooke</p> <p>D. T.H.Morgan</p>	Correct answer – 1mark	3	57

5	Nullisomy is represented by..... A. (2n-1) B. (2n-2) C.(2n+1) D.(2n+2)	Correct answer – 1mark	3	57
6	Identify the odd one:- A. Monoploidy B.Diploidy C.Polyploidy D.Hyperploidy	Correct answer – 1mark	3	57
7	In humans, the sex chromosome complement is A.XX-XY B. XX-XO C.ZZ-ZO D. ZW-ZZ	Correct answer – 1mark	3	64
8	A family has five daughters and expecting sixth child. The chance of its beings a son is A. zero B.25% C.50% D. 100%	Correct answer – 1mark	3	64
9	In human beings 45 chromosomes/single X/XO abnormality causes A. Down's syndrome B. Klinefelter's syndrome C. Turner's syndrome D. Edward's syndrome	Correct answer – 1mark	3	67
10	Webbed neck is characteristic of ... syndrome. A.XXX	Correct answer – 1mark	3	67

	B. YY C. XXY D. XO			
	Single sentence answers	Key word in answer		
1	Define inheritance.	Transmission of characters from generation to generation	3	49
2	What is allelomorph?	Alternating forms of genes	3	50
3	What is test cross?	Cross between F1 plant and its recessive parent	3	53
4	Define euploidy.	Chromosome number in a cell is exact multiple of primary basic number.	3	57
5	Give on example of complete linkage.	X- chromosome of Drosophila male.	3	59
6	How many linkage groups are present in <i>Drosophila melanogaster</i> ?	4 linkage groups	3	59
7	Which genes show straight inheritance?	Y-linked genes	3	62
8	How drones are produced in honey bees?	Parthenogenetically .	3	66
9	What is the reason for 21 st trisomy?	Non disjunction or failure of separation of chromosomes or autosomes during gametogenesis.	3	66
10	Give the example of X- monosomy you have studied.	Turner’s syndrome.	3	67
2 marks				
1	Discuss any two points due to which Mendel got success in his experiment?	1 mark each	3	49/ 50

2	Give any two points of difference between homozygous and heterozygous.	1 mark each.	3	50
3	Explain test cross with suitable example and state its ratios.	Representation of cross- 1 mark Ratio(phenotypic and genotypic) -1 mark	3	53
4	Give an account of incomplete dominance with suitable example.	Representation of cross- 1 mark Ratio(phenotypic and genotypic) -1 mark	3	54
5	Explain codominance in colour coat in cattle with checker board method.	Representation of cross- 1 mark Ratio(phenotypic and genotypic) -1 mark	3	54
6	Write an account of chromosomal theory of inheritance.	Four correct points -2 marks	3	56
7	Write a note on sex linkage.	Complete sex linkage – 1 mark Incomplete sex linkage -1 mark	3	59
8	Differentiate between complete and incomplete linkage.	Two correct points- 2 marks	3	59
9	Explain mechanism of sex determination in birds.	Correct explanation -1 mark Representation – 1 mark	3	65
10	Give detail account of thalassemia.	Correct explanation Two points-1 mark Symptoms any two- 1 mark	3	66

3 marks				
1	Enlist dominant and recessive characters in pea plant with respect to position of flower, colour of seed and colour of pod in tabulated form.	Each correct character -1/2 mark	3	49
2	Give an account of pleiotropy with suitable example.	Correct explanation -1 mark Representation – 1 mark Ratio-1 mark	3	55
3	Describe the structure of sex chromosomes with the help of labelled diagram.	Structure of X and Y chromosomes – 1 mark each and diagrams- 1 mark	3	58
4	What is autosomal inheritance? Explain different disorders due to autosomal inheritance.	Definition-1 mark Widow's peak-1 mark Phenylketonuria-1 mark	3	61
5	Explain inheritance pattern of colour blindness with suitable chart.	Explanation- 1mark Representation 2 marks	3	62
6	Write a note on bleeder's disease and its inheritance with suitable chart.	Explanation- 1mark Representation 2 marks	3	63-64
7	Explain the mechanism of sex determination in humans with suitable chart.	Explanation -2 mark Representation -1 mark	3	65
8	Write a note on Down's syndrome.	Reason for trisomy- 1 mark Any four symptoms-2 marks	3	66
9	What are the different characters that develop due to Klinefelter's syndrome?	Reason for X-monosomy- 1 mark Any four symptoms-2 marks	3	67
10	Give reasons for development of Turner's syndrome and also mention its symptoms.	Reason -1 mark	3	67

		Any four symptoms-2 marks		
4 marks				
1	Define inheritance. Give statements for various laws of inheritance.	Definition- 1 mark Statements for 3 laws- 1 mark each	3	52
2	Explain intragenic and intergenic interaction with the help of example.	Intragenic interaction any one example from incomplete dominance or codominance-2 marks Intergenic interaction- Pleiotropy- 2marks	3	54/ 55
3	Explain structure of chromosomes with labelled diagram.	Structure- 2 marks Diagram with any four correct labels- 2 marks	3	57- 58
4	Give detail account of sex linked inheritance.	Definition- 1 mark X-linked inheritance- 1 mark Y-linked inheritance- 1 mark	3	62
5	Give an account of one Mendelian and one chromosomal disorder you have studied.	Mendelian disorder Thalassemia- Explanation-1 mark Symptoms-any two- 1 mark Chromosomal disorders:- Down's syndrome/ turner's syndrome/ Klinefelter's syndrome- any one Explanation- 1 mark Any two symptoms-1 mark	3	66- 67

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	Find the odd one out: A H ₂ A B H ₃ C H ₂ B D <u>H₁</u>	1	4	73
2	What happened when heat killed S-cells along with live R-cells were injected into mice? A <u>Mice died and showed live S-cells</u> B Mice survived and showed live S-cells C Mice died and showed live R-cells D Mice died and showed dead R-cells	1	4	71
3	Find out the double ring compound : A <u>Adenine</u> B Uracil C Cytosine D Thymine	1	4	76
4	If a DNA has 20 Adenine and 30 cytosine bases. What will be the total number of purine bases in the given sample? A 20 B <u>50</u> C 30 D 100	1	4	76
5	Semiconservative mechanism of DNA was detected using: A ³⁵ S B ¹⁴ C C ³² P	1	4	77

	D <u>¹⁵N</u>			
6	<p>A template strand of DNA has base sequence CATGATTAC. New strand synthesized on it will be :</p> <p>A GATCAUATG</p> <p>B GTACTAACG</p> <p>C GAACTAATG</p> <p>D <u>GTACTAATG</u></p>	1	4	76
7	<p>During DNA replication, the separated strands of DNA are prevented from recoiling by</p> <p>A DNA primase</p> <p>B Sigma factor</p> <p>C Rho-factor</p> <p>D <u>SSBP</u></p>	1	4	75
8	<p>In which of the following synthesis of DNA strand is not involved directly?</p> <p>A m RNA</p> <p>B t RNA</p> <p>C Another DNA strand</p> <p>D <u>Protein</u></p>	1	4	83
9	<p>Wobble hypothesis is related with</p> <p>A Ambiguity in codon</p> <p>B Purine pyrimidine equality</p> <p>C Genetic code is triplet</p> <p>D <u>Degeneracy of genetic code and economy of tRNA molecules in the cell</u></p>	1	4	82
10	<p>During elongation of polypeptide chain, sigma factor is :</p> <p>A <u>Functionless</u></p> <p>B Retained for specific function</p> <p>C Released for re-use</p> <p>D Required during closing of chain</p>	1	4	84
11	<p>Enzyme required for peptide formation is :</p>	1	4	83

	A Peptidase B <u>Peptidyl transferase</u> C Nitrogenase D Nitrate reductase			
12	Exon segments are reunited after splicing by A RNA primase B RNA protease C <u>RNA polymerase</u> D RNA ligase	1	4	79
13	In lac operon, lactose acts as: A <u>Inducer</u> B Co-inducer C Repressor D Co-repressor	1	4	87
14	A unit of lac-operon which in the absence of lactose, suppresses the activity of operator gene is : A Structural gene B <u>Regulatory gene</u> C Repressor protein D Promoter gene	1	4	86
15	A DNA segment has 75 cytosine and 40 thymine nucleotides. What shall be the total number of phosphates in the DNA segment? A 115 B <u>230</u> C 75 D 220	1	4	76
Single sentence answers				
1	What is the principle of DNA profiling?	1	4	89
2	What is the use of southern blotting in DNA fingerprinting?	1	4	90
3	Enlist the genes in Lac operon	1	4	86

4	What is meant by an operon?	1	4	86
5	AUG codon gives _____ & _____ amino acids in prokaryotes & Eukaryotes respectively.	1	4	84
6	What is meant by activation of amino acids?	1	4	84
7	What is the role of Mg^{++} in Translation?	1	4	84
8	What are the different types of mutations?	1	4	82
9	Enlist the names of enzymes used in semiconservative replication of DNA?	1	4	75,76
10	What is central dogma of molecular biology?	1	4	77
11	What type of isotopes used in semiconservative replication experiment?	1	4	76,77
12	What is the function of RNA primer?	1	4	76
13	What is the function of SSBP?	1	4	75
14	Define RFLP'	1	4	89
15	Define Heterochromatin	1	4	74
2 marks				
1	Differentiate between Heterochromatin & Euchromatin'	Two points 1 mark each	4	74
2	How t-RNA acts as an adapter molecule? Explain in detail with the help of a diagram.	Explanation 1 mark diagram-1 mark	4	82,83
3	Define mutation. State its two types	Definition-1 mark Each type:- ½ mark	4	82
4	Describe Hershey-Chase experiment in detail.	Correct explanation-2 marks	4	71,72
5	Explain the role of Lactose as inducer in Lac-operon.	Correct explanation-2 marks	4	87
6	Draw neat and labelled diagram of Nucleosome.	Four correct labels-2 marks	4	73
7	Write a note on: packaging of DNA in prokaryotes.	Correct explanation, four	4	73

		points-1/2 mark each.		
8	Write a note on: packaging of DNA in Eukaryotes.	Correct explanation, four points-1/2 mark each.	4	74
9	Explain Avery, McCarty and MacLeod's experiment in detail	Correct explanation, four points-1/2 mark each.	4	71
10	Draw neat and labelled diagram of Replication Fork.	Four correct labels- ½ mark each	4	75
3 marks				
1	Explain the Griffith's experiment in detail with diagram.	Explanation-2 marks Diagram-1 mark	4	70,71
2	Describe any three characteristics of Genetic code.	1 mark each	4	81,82
3	Mention any three objectives of Human Genome project.	1 mark each	4	88,89
4	Explain different step involved in DNA Fingerprinting.	Six correct steps in sequence ½ mark each	4	89
5	Draw a neat and labelled diagram of transcription and processing of hn-RNA	Three steps-1 mark each	4	79
6	Draw a neat and labelled diagram explaining Meselson's and Stahl's experiment.	Three steps-1 mark each	4	77
7	How Meselson and Stahl explained the concept of Semiconservative Replication of DNA experimentally?	Correct explanation, three points- 3marks	4	76,77
8	Explain the concept of operon.	Role of three enzymes- 1 mark each	4	86
9	Give diagrammatic representation of Lac-operon in the presence of inducer.	Three correct labels- 1 mark each	4	87
10	Define Genomics. Give any two applications of the genomics.	Definition-1 mark Two applications- 1 mark each	4	87,88

4 marks				
1	Describe the process of semiconservative replication of DNA with the help of neat and labelled diagram.	Four correct points-2 marks Diagram with four correct labels-2 marks	4	75,76
2	Describe the mechanism of translation with the help of neat and labelled diagram.	Three correct points -3 marks Diagram with two labels-1 mark	4	83,84,85
3	Explain processing of hn-RNA with the help of neat and labelled diagram.	Three steps-3 marks Diagram showing any one step correctly-1 mark	4	78,79
4	With respect to lac- operon explain the following terms:- i) regulator gene ii) promoter gene iii) structural gene iv) inducer	Each term- 1 mark	4	86,87
5	Define DNA fingerprinting? State any three applications of it.	Definition-1 mark Three applications-3 marks	4	89,90

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>_____ is considered as connecting link between ape and man.</p> <p>A <u>Australopithecus</u></p> <p>B <i>Homo habilis</i></p> <p>C <i>Homo erectus</i></p> <p>D Neanderthal man</p>	<i>Australopithecus</i>	5	114
2	<p>Humans are most closely related to _____.</p> <p>A Marsupial</p> <p>B Lemur</p> <p>C <u>Chimpanzees</u></p> <p>D Tarsier</p>	Chimpanzees	5	113
3	<p>The proportion of an allele in the gene pool to the total number of alleles at a given locus is called _____.</p> <p>A gene pool</p> <p>B <u>gene frequency</u></p> <p>C gene flow</p> <p>D genetic drift</p>	gene frequency	5	100
4	<p>Transfer of a part of chromosome or set of genes to a non-homologous chromosome is called _____.</p> <p>A deletion</p> <p>B duplication</p> <p>C inversion</p> <p>D <u>translocation</u></p>	translocation	5	101
5	<p>Any random fluctuation in allele frequency, occurring in the natural population by pure chance is called _____.</p> <p>A gene pool</p> <p>B gene mutation</p> <p>C genetic recombination</p>	Genetic drift	5	101

	D <u>genetic drift</u>			
Single sentence answers				
1	Define the term ‘Mendelian population’.	Interbreeding population	5	100
2	Define Gene pool.	Total number of genes	5	100
3	Name the ancestor of human also known as man with ape brain.	<i>Australopithecus</i>	5	114
4	Name the ancestor of human nicknamed as Handy man	<i>Homo habilis</i>	5	114
5	Whose fossils were discovered at the site of Shivalik hills, India?	<i>Ramapithecus</i>	5	114
2 marks				
1	Mention any two developments in human which helped him to move around safely on land.	2 points – 2 marks	5	115
2	Distinguish New world and old world monkeys based on their tail along with their examples.	1 point – 1 mark Example – 1 mark	5	113
3	What is hybrid sterility?	Definition – 1 mark Example - 1 mark	5	103
4	What led to better utilization of hands for holding objects effectively and better motor skills?	2 points – 2 marks	5	115
5	Describe modern man.	2 points – 2 marks	5	114
6	Distinguish between Australopithecus and Neanderthal man	2 points – 2 marks	5	114
7	Distinguish between <i>Homo erectus</i> and Neanderthal man	2 points – 2 marks	5	114
3 marks				
1	Name any three types of premating isolating mechanisms.	3 points – 3 marks	5	102
2	Name any three types of postmating isolating mechanisms.	3 points – 3 marks	5	103
3	Explain Geographical Isolation	3 points – 3 marks	5	102
4	Write down the three main concepts of modern synthetic theory.	3 points – 3 marks	5	100

5	What is chromosomal aberration? Give any two types of aberrations found in population.	Definition -1 mark 2 types – 2 marks	5	101								
6	Complete the table based on the special features of Human ancestors showing their cultural and social development.	1 - used fire 2 – Neanderthal 3 – <i>Homo habilis</i>	5	114								
	<table><tr><td>Ancestors</td><td>Special features</td></tr><tr><td><i>Homo erectus</i></td><td></td></tr><tr><td></td><td>Buried their dead</td></tr><tr><td></td><td>Made tools from stones</td></tr></table>				Ancestors	Special features	<i>Homo erectus</i>			Buried their dead		Made tools from stones
	Ancestors				Special features							
	<i>Homo erectus</i>											
					Buried their dead							
	Made tools from stones											
7	Write a note on <i>Homo habilis</i>	3 points – 3 marks	5	114								
4 marks												
1	What is genetic variation? Explain any three factors responsible for genetic variation.	Definition – 1 mark Any 3 factors – 3 marks	5	100								
2	Explain the concept of Natural Selection with the example of Industrial Melanism.	8 points – 4 marks	5	102								

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>Water present in the form of hydrated oxides of Silicon, Aluminium is called _____</p> <p>A Hygroscopic Water</p> <p>B Gravitational Water</p> <p>C <u>Combined Water</u></p> <p>D Capillary Water</p>	1	6	120
2	<p>Most plant cells and tissues constitutes _____% water</p> <p>A <u>90-95 %</u></p> <p>B 70-80 %</p> <p>C 10-25 %</p> <p>D 0-20 %</p>	1	6	119
3	<p>_____ type of tissues are present in epiphytic roots</p> <p>A Meristematic</p> <p>B Parenchyma</p> <p>C <u>Velamen</u></p> <p>D Epithelial</p>	1	6	119
4	<p>In the zone of absorption, epidermal cells form unicellular hair like extensions called _____</p> <p>A Epiblema cells</p> <p>B Roots</p> <p>C <u>Root hairs</u></p> <p>D Velamen tissues</p>	1	6	119
5	<p>Outer layer of root hair is made up of _____</p> <p>A Cellulose</p> <p>B Lignin</p>	1	6	120

	C Starch D <u>Pectin</u>			
6	Inner layer of root hair is made up of _____ A <u>Cellulose</u> B Lignin C Starch D Pectin	1	6	120
7	Cell wall is _____ A Selectively Permeable B <u>Freely Permeable</u> C Non Permeable D Impermeable	1	6	120
8	Plasma Membrane is _____ A <u>Selectively Permeable</u> B Freely Permeable C Non Permeable D Impermeable	1	6	120
9	Root hair is _____ extension of epiblema cells A Cytoplasmic B Protoplasmic C Nucleoplasmic D Cellulosic	1	6	120
10	Fine soil particles imbibe or absorb water and hold it. This is called as _____ A <u>Hygroscopic Water</u> B Gravitational Water C Combined Water D Capillary Water	1	6	120
Single sentence answers				
1	Why water acts as a thermal buffer?	1	6	119
2	Define : Root hair	1	6	119

3	What is meant by Gravitational water?	1	6	120
4	What is meant by Hygroscopic water?	1	6	120
5	What is meant by Combined water?	1	6	120
6	What is meant by Capillary water?	1	6	120
7	What is the composition of outer layer of root hair?	1	6	120
8	What is the composition of inner layer of root hair	1	6	120
9	From which type of cells, root hair is originated	1	6	120
10	Which type of tissue is present in epiphytic roots?	1	6	119
2 marks				
1	Why water is called as ‘Elixir of Life’?	Correct explanation- two points-1 mark each	6	119
2	What are the different types of water?	Any two types- 1 mark each	6	120
3	Draw a neat and labelled diagram of “Structure of Root hair”.	Four correct labels-2 marks	6	119
4	Explain the structure of root hair.	Four correct points-2 marks	6	120
5	In which forms water is available to roots for absorption?	Any two forms- 1 mark each	6	120
6	Explain the different properties of water.	Any two- 2 marks	6	119
3 marks				
1	Draw a neat and labelled diagram of Root tip showing root hair zone.	Three correct labels – 1 mark each	6	119
2	Draw a neat and labelled diagram of Root hair.	Three correct labels – 1 mark each	6	119
3	Write a note on morphological structure of root.	Three correct regions of root-1 mark each	6	119,120
4	How roots can act as a water absorbing organ?	Three correct points- 1 mark each	6	119

4 marks				
1	Explain the structure of root hair with the help of neat and labelled diagrams.	Four correct points- 2 marks Diagram with two correct labels-2 marks	6	119,120

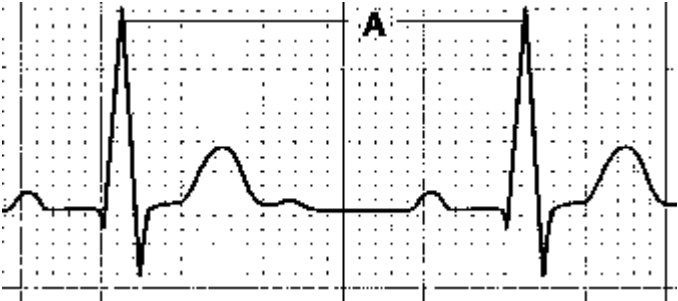
Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>A farmer is fed up of weeds in his Wheat farm. Which of the following chemicals he can use to overcome the problem?</p> <p>A IBA</p> <p>B IAA</p> <p>C NAA</p> <p>D <u>2,4 – D</u></p>	1	7	139
2	<p>Gibberellins are synthesised from _____.</p> <p>A Acetic acid</p> <p>B <u>Mevalonic acid</u></p> <p>C Tryptophan</p> <p>D Ethephon</p>	1	7	140
3	<p>First natural cytokinin was obtained from _____.</p> <p>A Rice plants</p> <p>B Tobacco callus</p> <p>C <u>Maize grains</u></p> <p>D Human urine</p>	1	7	140
Single sentence answers				
1	<p>Buyers often complain that a particular fruit merchant uses some chemical to ripen fruits in his shop.</p> <p>Name the chemical he must be using to do so.</p>	1	7	141
2	Why is ABA known as antitranspirant?	1	7	141
3	Name the tissue that transports hormones within the plant body?	1	7	139
2 marks				
1	Match the column A with B			

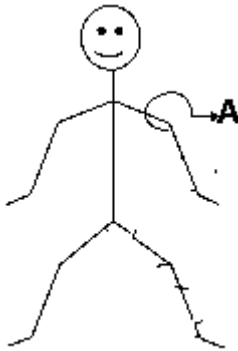
	<div>A</div> <div>i) Epinasty of flower ii) Natural auxin iii) Flowering in Litchi iv) Bolting of Beet</div>	<div>B</div> <div>a)GA3 b)NAA c)IAA d)Ethylene</div>	½ marks for each correct pair = 2	7	141 139 140 140
2	<div>A gardener wants to give bushy appearance to plants in our college campus.</div> <div>i) What should he do to achieve the same?</div> <div>ii) Which property of phytohormones he must be aware of?</div>	1+ 1=2	7	139	
3 marks					
1	<div>Write the name of ____</div> <div>a) First hormone discovered in plants. b) Biological name of fungus from which Gibberellins were first isolated. c) The name given to the first cytokinin by Skoog and Miller.</div>	1+1+1=3	7	139 140 140	
2	<div>Write the name of ____</div> <div>a) Gaseous growth hormone known to you. b) Standard bio assay method for auxins. c) Hormone that can overcome the requirement of vernalization.</div>	1+1+1=3	7	141 142 140	
4 marks					
1	<div>Name the phytohormone related with the given phenomenon</div> <div>a) Apical dominance b) Bolting of Cabbage c) Artificial ripening of fruit d) Acts as Antitranspirant by closing stomata</div>	1 mark to each sub qn =4	7	139 140 141 141	
2	<div>Write full form of-</div> <div>a) IAA b) IBA c) NAA d) 2,4-D</div>	1 mark to each sub qn =4	7	139	

Question no.	Question	Marking Scheme	Chapter No.	Page No.
MCQ				
1	In human respiration, chemical energy is released in the form of ____. A) Acetyl co-enzyme A B) ADP C) ADPH ₂ D) <u>ATP</u>	1 mark	8	156
2	Alveoli provide the surface area for exchange of _____. A) food B) enzymes C) <u>gases</u> D) hormones	1 mark	8	156
3	The movement of diaphragm, intercostal muscles and rib cage helps in _____. A) digestion B) circulation C) excretion D) <u>respiration</u>	1 mark	8	156
4	The volume of air that remains in the lungs after maximum respiration is _____. A) 1000 to 1100 ml B) <u>1100 to 1200 ml</u> C) 2000 to 3000 ml D) 5200 to 5800 ml	1 mark	8	
5	Find out the example in which due to absence of respiratory pigment transport of respiratory gases does not takes place. A) <u>Cockroach</u> B) Scoliodon C) Frog D) Human	1 mark	8	163
6	Which of the following has thickest wall? A) Right auricle B) Right ventricle C) Left auricle D) <u>Left ventricle</u>	1 mark	8	170
7	The phase of contraction of heart is termed as _____. A) diastole B) <u>systole</u> C) heart beat D) heart sound	1 mark	8	171




8	<p>The free edges of cuspid valves are attached to the papillary muscles of the heart by fibres are called _____.</p> <p>A) <u>chordae tendinae</u> B) columnae carnaeae C) connecting fibres D) autorhythmic fibres</p>	1 mark	8	170
9	<p>Ventricular depolarization is represented by _____.</p> <p>A) P wave B) <u>QRS complex</u> C) T wave D) P and T waves</p>	1 mark	8	176
10	<p>The erythropoeitic tissue in adult is mainly found in _____.</p> <p>A) kidney B) liver C) <u>red bone marrow</u> D) spleen</p>	1 mark	8	165

Single sentence answer

1	<p>Name the cartilage which divides the nasal cavity into right and left nasal chambers.</p>	1 mark	8	154
2	<p>Give the function of epiglottis.</p>	1 mark	8	155
3	<p>Define total lung capacity.</p>	1 mark	8	158
4	<p>Sachin shows symptoms of inflammation of the sinuses and mucous discharge due to viral and bacterial infection. Identify the disorder.</p>	1 mark	8	161
5	<p>Define haematology.</p>	1 mark	8	164
6	<p>Which type of blood flows through pulmonary veins?</p>	1 mark	8	164
7	<p>In between which layers of pericardium, pericardial fluid is present?</p>	1 mark	8	168
8	<p>How many molecules of haemoglobin are found in each erythrocyte?</p>	1 mark	8	165
9	<p>Identify ‘A’ from the following ECG.</p> 	1 mark	8	176

10	Identify the pulse point ‘A’ from below given diagram. 	1 mark	8	174									
2 marks													
1	Fill in the blanks with the help of chart. <table border="1" data-bbox="251 747 959 1029"><tr><td>Organism</td><td>Habitat</td><td>Respiratory surface/ organ</td></tr><tr><td>Coelenterates</td><td>-----</td><td>-----</td></tr><tr><td>Spiders</td><td>-----</td><td>-----</td></tr></table>	Organism	Habitat	Respiratory surface/ organ	Coelenterates	-----	-----	Spiders	-----	-----	½ mark each	8	154
Organism	Habitat	Respiratory surface/ organ											
Coelenterates	-----	-----											
Spiders	-----	-----											
2	Define Bohr effect and Haldane effect.	1 mark each	8	158									
3	Give any two effects of carbon monoxide poisoning.	2 points: 1 mark each	8	158									
4	Define intracellular transport and extracellular transport.	1 mark each	8	162									
5	Name the pigment and enzyme found in erythrocytes?	1 mark each	8	165									
6	Draw diagram of conducting system of human heart. Label SA node and bundle of His.	Appropriate diagram: 1 mark. Each correct label: ½ mark	8	171									
7	How a portal vein differs from normal vein?	2 points: 1mark each	8	173									
3 marks													
1	Distinguish between inspiration and expiration.	3 points; 1 mark each	8	164									
2	Write a note on Hering-Breuer reflex.	3 points; 1 mark each	8	160-161									
3	Define Hamburger’s phenomenon. Add a note on it.	Definition: ½ mark. Note: 1 mark.	8	159									
4	Draw the chart of double circulation and label A, B, C and D.	1 mark. for chart	8	164									

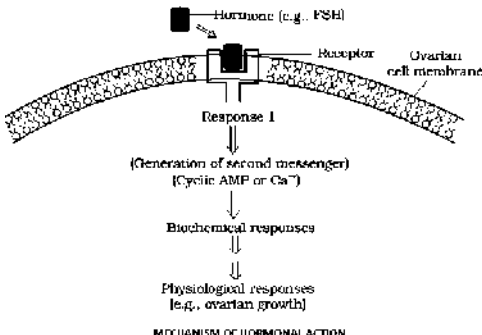
	<p>Pulmonary circulation</p> <p>Systemic circulation</p>	Correct label ½ mark. each.													
5	Write a note on coagulation of blood.	3 marks	8	167											
6	Define hypertension. Explain coronary artery disease and angina pectoris.	Definition: 1 mark. Explanation: 1 mark each.	8	175											
7	Draw diagrammatic representation of cardiac cycle. Explain ventricular systole.	Correct representation: 1 mark. Explanation: 2 marks.	8	172											
4 marks															
1	With the help of labelled diagram explain the exchange of gases between alveolus and capillary.	Appropriate diagram: 1 mark. Any 2 correct labels: 1 mark. Explanation: 2 marks	8	157											
2	With the help of chart identify and write the function of any four leucocytes.	½ mark. for each correct name ½ mark. for each correct function.	8	166-167											
	<table><tr><td>Type</td><td>Leucocytes</td><td>Name of cell</td><td>Function</td></tr><tr><td rowspan="2">Granulocytes</td><td></td><td>-----</td><td>-----</td></tr><tr><td></td><td>-----</td><td>-----</td></tr></table>	Type	Leucocytes	Name of cell	Function	Granulocytes		-----	-----		-----	-----			
Type	Leucocytes	Name of cell	Function												
Granulocytes		-----	-----												
		-----	-----												

				-----	-----			
	Agranulocytes			-----	-----			
				-----	-----			
3	Draw labelled diagram of internal structure of human heart. Label right atrium, mitral valve, left ventricle and pulmonary semilunar valve. Write a function of Eustachian and tricuspid valve found in human heart.					Appropriate diagram: 1 mark. Each correct label: ½ mark Function: ½ mark each	8	170

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>Diffused type of nervous system is seen in _____.</p> <p>A <u>Hydra</u></p> <p>B <i>Planaria</i></p> <p>C Cockroach</p> <p>D Earthworm</p>	<i>Hydra</i>	9	182
2	<p>Planaria shows _____ type of nervous system.</p> <p>A nerve net.</p> <p>B <u>ladder</u></p> <p>C ganglionated</p> <p>D brain</p>	ladder	9	183
3	<p>In order for a stimulus to be effective, the stimulus must have a minimum intensity called _____ stimulus.</p> <p>A subliminal</p> <p>B depolarised</p> <p>C <u>threshold</u></p> <p>D polarised</p>	threshhold	9	186
4	<p>The resting potential of a neuron is _____.</p> <p>A 30 millivolts</p> <p>B -30 millivolts</p> <p>C 70 millivolts</p> <p>D <u>-70 millivolts</u></p>	-70 millivolts	9	189
5	<p>The third ventricle of brain is connected to the fourth ventricle of brain through _____.</p> <p>A Foramen of Monro</p> <p>B <u>Duct of Sylvius</u></p> <p>C Metacoel</p> <p>D Eustachian tube</p>	Duct of Sylvius	9	193

6	Degeneration of dopamine producing neurons in the CNS causes _____ disease. A ADHD B Alzheimer’s C <u>Parkinson’s</u> D Fever	Parkinson’s	9	206
7	_____ is a mineralocorticoid secreted by Adrenal gland. A <u>Aldosterone</u> B Cortisol C Corticoid D Androgen	Aldosterone	9	214
8	_____ has an important role in the development of immune system by maturation of T lymphocytes. A Thyroxine B <u>Thymosin</u> C Aldosterone D Parathormone	Thymosin	9	214
9	Hyper secretion of growth hormone in childhood causes _____. A Acromegaly B Dwarfism C <u>Gigantism</u> D Goitre	Gigantism	9	210
10	_____ shows gastric contractions and inhibit the secretion of gastric juice. A Gastrin B Secretin C <u>Entero- gastrone</u> D Inhibin	Entero- gastrone	9	217
Single sentence answers				
1	Which cells of PNS secrete myelin sheath around the nerves?	Schwann cells	9	185
2	Give function of astrocytes in nervous system.			

		1 mark	9	185
3	What is the covering of nerve fascicule called?	Endoneurium	9	185
4	How electrical synapse differs from chemical synapse?	1 point – 1 mark	9	187
5	What is the function of red nucleus?	1 function – 1 mark	9	194
6	Define Saltatory conduction.	Definition – 1 mark	9	189
7	Name the hormone secreted by Pars intermedia in lower vertebrates.	Melanocyte stimulating hormone	9	211
8	Which disease is caused by hyper secretion of Glucocorticoids?	Cushing's disease	9	215
9	Which organ acts a temporary endocrine gland in females?	Placenta	9	216
10	Give one role of hormone therapy.	Definition – 1 mark	9	217
2 marks				
1	'Injury to the medulla oblongata causes sudden death' Explain.	2 points – 2 marks	9	194
2	Which two hormones are responsible for the regulation of calcium and phosphorus in the blood?	Calcitonin parathormone	9	213
3	Describe any two hormones produced by the ovaries	2 hormones – 2 marks	9	216
4	Name the glucocorticoid used in treatment of allergy and why?	Name – 1 mark Reason – 1 mark	9	215
5	Which hormone is secreted by Pineal gland? What is its function?	Name – 1 mark Function – 1 mark	9	211
6	Sketch and label T.S of Spinal cord.	Labelled diagram	9	195
7	Sketch and label V.S of Pituitary gland.	Labelled diagram	9	209

3 marks													
1	Write a note on meninges of Brain.	3 points – 3 marks	9	189									
2	Describe any three functions of hypothalamus.	3 points – 3 marks	9	193									
3	Name three Mixed cranial nerves along with their numbers.	3 – 3 marks	9	196									
4	Distinguish between Cerebrum and Cerebellum.	3 differences – 3 marks	9	191, 194									
5	<p>Answer the questions after observing the diagram given below.</p> <div></div> <p>1) What acts as the first messenger? 2) Why can't hormones like catecholamines enter their target cells through plasma membrane? 3) Name the mode of hormone action shown in the diagram.</p>	3 points – 3 marks	9	208									
6	<p>Complete the table based on disorders caused due to under secretion or over secretion of Thyroid gland.</p> <table><tr><td>Secretion</td><td>Adults</td><td>Children</td></tr><tr><td>Hypo secretion</td><td></td><td></td></tr><tr><td>Hyper secretion</td><td></td><td></td></tr></table>	Secretion	Adults	Children	Hypo secretion			Hyper secretion			3 points – 3 marks	9	212
Secretion	Adults	Children											
Hypo secretion													
Hyper secretion													
7	<p>Give the names of the hormones released by neurohypophysis.</p> <p>A boy shows excessive thirst and micturition because of deficiency of a hormone secreted by neurohypophysis. Name the disease he is suffering from.</p>	<p>Hormones - 2 mark</p> <p>Disease – 1 mark</p>	9	210									

4 marks				
1	Describe the functional areas of Cerebrum.	4 points -4 marks	9	192
2	Distinguish between Sympathetic and parasympathetic nervous system.	4 points -4 marks	9	199
3	Describe any four hormones secreted by Adenohypophysis.	4 hormones-4 marks	9	210
4	Write a note on the four different kinds of cell in Pancreas.	4 cells – 4 marks	9	215
5	Complete the flowchart of the process of conduction of nerve impulse. <div> <div>Application of stimulus on a resting nerve</div> <div>↓</div> <div>Permeability of membrane changes</div> <div>↓</div> <div></div> <div>↓</div> <div>positive ions insideaxon increases</div> <div>↓</div> <div></div> <div>↓</div> <div>Polarity reverses and depolarisation takes place</div> <div>↓</div> <div>Repolarisation - potassium gates open</div> <div>↓</div> <div></div> <div>↓</div> <div></div> <div>↓</div> <div>Axoplasm becomes negatively charged and ECF becomes positive again</div> </div>	4 points -4 marks	9	189

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	Immunity acquired after an infection is _____ immunity A. Artificial Acquired B. Passive C. Innate D. <u>Natural Acquired</u>	1 mark for correct answer	10	Pg. 223
2	Passive immunity is _____. A. Acquired through natural overt or latent infection B. Acquired through Vaccination C. <u>Acquired through readymade antibodies</u> D. Acquired by activating immune system of the body	1 mark for correct answer	10	Pg. 223
3	'Pathogens' are _____ A. Substances produced against any disease. B. Chemical substances produced by the host cells to kill the parasite animal. C. <u>Disease causing organisms.</u> D. Cells which kill the parasites	1 mark for correct answer	10	Pg. 228
4	Which one of the following diseases is a communicable? A. Rickets B. <u>Malaria</u> C. Diabetes D. Scurvy	1 mark for correct answer	10	Pg. 228

5	<p>Which one of the following is the most accurate definition of the term ‘health’?</p> <p>A. Health is the state of body and mind in a balanced condition.</p> <p>B. Health is the reflection of a smiling face.</p> <p>C. <u>Health is a state of complete physical, mental and social well-being.</u></p> <p>D. Health is the symbol of economic prosperity.</p>	1 mark for correct answer	10	Pg. 221
6	<p>AIDS is caused by _____</p> <p>A. Fungus</p> <p>B. <u>Virus</u></p> <p>C. Bacterium</p> <p>D. Helminth worm</p>	1 mark for correct answer	10	Pg. 237
7	<p>A person preparing food in an unhygienic place can be a major source of spread of disease _____</p> <p>A. Pneumonia</p> <p>B. Syphilis</p> <p>C. <u>Typhoid</u></p> <p>D. Cancer</p>	1 mark for correct answer	10	Pg. 232
8	<p>Carcinoma is cancer of _____ cells.</p> <p>A. <u>Epithelial</u></p> <p>B. Connective tissue</p> <p>C. Bone</p> <p>D. Blood</p>	1 mark for correct answer	10	Pg. 235
9	<p>Inactive gene that can cause cancer is called _____</p> <p>A. Transposon</p> <p>B. <u>Proto-oncogene</u></p>	1 mark for correct answer	10	Pg. 236

	C. Tumour promoter gene D. Tumour suppressor gene			
10	antiviral proteins released by cells infected by the virus are called _____ A. histamines B. <u>interferons</u> C. pyrogens D. allergens	1 mark for correct answer	10	Pg. 222
Single sentence answers				
1	Define ‘Health’, as given by WHO.	1 mark	10	Pg. 221
2	What are Non-communicable diseases?	1 mark	10	Pg.228
3	Name the causative pathogen of Ascariasis.	1 mark	10	Pg.230
4	What is ‘serology’	1 mark	10	Pg.226
5	Name the vector of malarial pathogen.	1 mark	10	Pg. 229
6	What are congenital diseases?	1 mark	10	Pg.228
7	Name the vector of pathogen responsible for filariasis.	1 mark	10	Pg. 232
8	When a drug addict is not allowed to take drugs he shows certain typical symptoms. What are these symptoms termed as?	1 mark	10	Pg. 242
9	What is ‘Leukemia’?	1 mark	10	Pg. 235
10	Define ‘Adolescence’.	1 mark	10	Pg. 239
2 Marks				
1	Enlist the four types of T- lymphocytes, responsible for immune response of our body	½ mark for each	10	Pg. 224

2	Enlist any four barriers that contribute to innate immunity.	½ mark for each	10	Pg. 222
3	Enlist any four therapies used to treat a cancer patient.	½ mark for each	10	Pg. 236
4	Give any four the symptoms of Ascariasis.	½ mark for each	10	Pg. 230
5	State the significance of mother's milk to a new-born.	1 mark for correct answer	10	Pg.223
6	Enlist any two features of Acquired immunity.	1 mark for each	10	Pg. 222-223
7	Sketch and label – Structure of Antibody	½ mark for diagram and 1 ½ marks for three labels	10	Pg. 225
3 Marks				
1	<p>When the ELISA test was conducted on an immune-suppressed person, he tested positive for a pathogen.</p> <p>a) Identify the disease the patient is suffering from.</p> <p>b) Name the causative entity.</p> <p>c) Mention the cells of the body that are attacked by the pathogen.</p>	1 mark each	10	Pg. 237
2	Explain the importance of epithelial surface in innate immunity.	1 mark each	10	Pg. 225
3	Explain any three causes of substance abuse during adolescence.	1 mark each	10	Pg. 241
4	Explain the three stages of adolescence.	1 mark each	10	Pg. 239

5	Give the preventive measures of AIDS	½ mark each	10	Pg.238
6	a) How is a tumor formed in the body? b) What are the two types of tumor? c) Which of these under goes metastasis?	1 mark each	10	Pg. 234
7	Explain the mode of transmission of HIV.	1 mark each	10	Pg. 237
4 Marks				
1	Explain the various types of acquired immunity.	1 mark each	10	Pg. 223
2	Explain the clinical manifestation of AIDS.	1 mark each	10	Pg. 238
3	Explain any four therapies used in treatment of cancer.	1 mark each	10	Pg. 236

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	Wheat -Atlas 66 has high contents of _____. A <u>protein</u> B vitamin C carbohydrates D Fats	1	11	253
2	Species of ____ is involved in cheese formation. A <u>Penicillium</u> B <i>Lactobacillus</i> C <i>Saccharomyces</i> D <i>Leuconostoc</i>	1	11	259
3	<i>Aspergillus niger</i> is used to prepare vit ____ A D B B2 C B12 D <u>C</u>	1	11	260
4	<i>Saccharomyces cerevisiae</i> is used to produce enzyme ____. A <u>Invertase</u> B Pectinase C Lipase D Cellulase	1	11	261
5	Select the odd one from given herbicides. A <u>Cactoblastis</u> B <i>Alternaria</i> C <i>Fusarium</i> D <i>Phytophthora</i>	1	11	266
6	_____ associated with plants like <i>Azolla</i> and <i>Cycas</i> can be used as a biofertilizers. A <u>Anabaena</u>	1	11	266

	B <i>Nostoc</i> C <i>Plectonema</i> D <i>Oscillatoria</i>			
7	Antibiotic Chloromycetin is obtained from _____. A <i>Streptomyces erythreus</i> B <i>Penicillium chrysogenum</i> C <u><i>Streptomyces venezuelae</i></u> D <i>Streptomyces griseus</i>	1	11	261
8	Indian curd is prepared by inoculating milk with _____. A <u><i>Lactobacillus acidophilus</i></u> B <i>Lactobacillus bulgaricus</i> C <i>Penicillium roquefortii</i> D <i>Penicillium camembertii</i>	1	11	259
Single sentence answer				
1	What is biofortification?	1	11	252
2	Name biofortified wheat variety for high protein content.	1	11	253
3	What is the main function of a fermenter?	1	11	259
4	Name the chamber in which the suspended objects are filtered and removed during sewage treatment?	1	11	262
5	What is mycorrhiza?	1	11	267
6	Name the tank to which the sewage water is passed after the preliminary treatment?	1	11	263
7	What are flocs with respect to sewage treatment	1	11	263
8	Small part of activated sludge is passed back into primary sedimentation tank.	1	11	263

	If the above statement is correct then rewrite as it is and in case it is incorrect then reframe it.			
2 marks				
1	Rearrange the names of tanks used in sewage treatment as per the flow of procedure. a) settling tank b) Grit Chamber c) aeration tanks d) primary sedimentation tank.	½ mark for each correct position	11	263
2	Give names of two organisations which provide most commonly used models of biogas plants.	1+1	11	264
3	A young girl is health conscious. Her dietician advised her to include mushrooms in her diet. What must be the reason?	Two points _ 1mark each	11	259
4	Match the column A with B and rewrite correct pairs. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> A i. Atlas 66 ii. Rice iii. Spinach iv. bitter gourd </div> <div style="text-align: center;"> B a)vit A b) vit C c)protein d)Iron </div> </div>	1/2mark for each correct pair	11	253
5	Name two bacteria which are responsible for fermenting dough of idli, dosa.	Two names_ 1mark each	11	259
6	Name two acids produced by using <i>Aspergillus niger</i> ?	Two names _ 1mark each	11	260
7	Name two amino acids found in fortified Maize variety?	Two names_ 1mark each	11	253
3 marks				
1	Match the column A with B and rewrite correct pairs <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> A I. Mycoherbicides II. Bacterial herbicides III. Insects as herbicides </div> <div style="text-align: center;"> B a)<i>Cactoblastis</i> b) <i>Alternaria</i> c)<i>Xanthomonas</i> </div> </div>	1 mark for each correct pair	11	265

2	State any three benefits of using Biogas.	1 mark for each correct point	11	264										
3	Write chemical reactions to represent Methanogenesis.	1 mark for each correct reaction	11	264										
4	Describe the structure of a biogas plant.	3points, 1 mark each	11	264										
5	State any three benefits of mycorrhiza.	1 mark for each correct point	11	267										
6	State any three benefits of Biofertilizers.	1 mark for each correct point	11	268										
7	Match the column A with B and rewrite correct pairs. <table><tr><td>A</td><td>B</td></tr><tr><td>1) citric acid</td><td>a) in medicine for solubility of Ca⁺⁺</td></tr><tr><td>2) fumaric acid</td><td>b) confectionary</td></tr><tr><td>3) gluconic acid</td><td>c) in resins as wetting agents</td></tr></table>	A	B	1) citric acid	a) in medicine for solubility of Ca ⁺⁺	2) fumaric acid	b) confectionary	3) gluconic acid	c) in resins as wetting agents	1 mark for each correct pair	11	260		
A	B													
1) citric acid	a) in medicine for solubility of Ca ⁺⁺													
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4 marks														
1	Match the column A with B and rewrite correct pairs. <table><tr><td>A</td><td>B</td></tr><tr><td>a)<i>Penicillium roquefortii</i></td><td>i)Alcohol</td></tr><tr><td>b)<i>Lactobacillus bulgaricus.</i></td><td>ii) Cheese</td></tr><tr><td>c)<i>Lactobacillus acidophilus</i></td><td>iii) Yoghurt</td></tr><tr><td>d)<i>Saccharomyces cerevisiae</i></td><td>iv)curd</td></tr></table>	A	B	a) <i>Penicillium roquefortii</i>	i)Alcohol	b) <i>Lactobacillus bulgaricus.</i>	ii) Cheese	c) <i>Lactobacillus acidophilus</i>	iii) Yoghurt	d) <i>Saccharomyces cerevisiae</i>	iv)curd	1 mark for each correct pair	11	259
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2	Explain the process of sewage water treatment before it can be discharged into natural bodies.	2points = 1 mark for each step. 4steps = 4 mark	11	262- 263										
3	<p>Match the column A with B and rewrite correct pairs.</p> <table><tr><th>A</th><th>B</th></tr><tr><td>i. Symbiotic N2 fixing bacteria</td><td>a) VAM</td></tr><tr><td>ii. Free-living N2 fixing bacteria</td><td>b)<i>Rhizobium</i></td></tr><tr><td>ii. Phosphate solubilizer</td><td>c) <i>Nostoc</i></td></tr><tr><td>iv. Endomycorrhizae</td><td>d) <i>Microccocus</i></td></tr></table>	A	B	i. Symbiotic N2 fixing bacteria	a) VAM	ii. Free-living N2 fixing bacteria	b) <i>Rhizobium</i>	ii. Phosphate solubilizer	c) <i>Nostoc</i>	iv. Endomycorrhizae	d) <i>Microccocus</i>	1 mark for each correct pair	11	266
A	B													
i. Symbiotic N2 fixing bacteria	a) VAM													
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Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>The technique which involves addition or deletion of genes is....</p> <p>A <u>genetic engineering</u></p> <p>B gene therapy</p> <p>C gene splicing</p> <p>D gene piracy</p>	1	12	273
2	<p>ECoRI is obtained from...</p> <p>A <i>Escherichia coli</i> R13</p> <p>B <u>Escherichia coli Ry13</u></p> <p>C <i>Escherichia coli</i> R225</p> <p>D <i>Escherichia coli</i> RC</p>	1	12	275
3	<p>The enzyme restriction endonuclease ...</p> <p>A <u>cuts double strand of DNA</u></p> <p>B joins strand of DNA</p> <p>C cuts RNA strand</p> <p>D cuts single stranded DNA</p>	1	12	275
4	<p>Ti plasmid being used for introducing genes in plants obtained from....</p> <p>A <i>Agrobacterium rhizogenes</i></p> <p>B <i>Escherichia coli</i></p> <p>C <i>Agrobacterium</i> T20</p> <p>D <u>Agrobacterium tumefaciens</u></p>	1	12	277
	<p>Polymerase chain reaction is most useful in....</p> <p>A <u>DNA amplification</u></p> <p>B DNA synthesis</p> <p>C protein synthesis</p> <p>D selective replication of DNA</p>	1	12	274
5	<p>In Bt cotton a transgenic plant, Bt refers to....</p> <p>A bold cotton</p> <p>B <u>Bacillus thuringiensis</u></p>	1	12	283

	C beta carotene D tumor inducing bacteria			
7	In transgenic crop substance provitamin A is obtained in.... A <u>rice</u> B tomato C canola D sugarcane	1	12	283
8	In Anaemia the Recombinant protein....is produced by r-DNA technology. A Relasein B <u>Insulin</u> C Erythroprotein D Antoitrsin	1	12	280
9	In biotechnology GMO refers to.... A generation mediated organisms B <u>genetically modified organisms</u> C good modified organisms D gross modified organisms	1	12	282
10	First biopatent to genetically engineered bacterium.... A <u>Pseudomonas</u> B <i>Agrobacterium</i> C <i>Azotobacter</i> D <i>E. coli</i> .	1	12	289
Single sentence answers				
1	In which transgenic plant the substance Flavonoids obtained as antioxidants.	1	12	283
2	What is Germline therapy?	1	12	282
3	Which Recombinant proteins is obtained for Hepatitis-B by r-DNA technology.	1	12	280
4	What is plasmid?	1	12	277
5	What is Palindromic sequence?	1	12	276
6	Alu-I is obtained from which organism?	1	12	275

7	What is the role of Taq-polymerase in PCR technology?	1	12	274
8	Bt-cotton shows adverse effect on the population of which butterfly?	1	12	288
2 marks				
1	What is Biopiracy? Explain it with respect to Turmeric.	Definition-1 mark Two correct points-1 mark	12	290
2	How Biotechnology is applicable with respect to Genomics?	Any two correct points-2 marks	12	279
3	Explain how transgenic fish is commercially beneficial.	Any two correct points-2 marks	12	287
4	Write any two human disorders and to cure which recombinant proteins are produced?	Two points-1 mark each	12	280
5	For production of edible vaccines plants are used. Explain this any one example.	Correct explanation-1 mark Example-1 mark	12	285
6	Write a note on uses of somatic cell gene therapy.	Any two applications-1 mark each	12	282
7	Define vector? write any two examples,	Definition -1 mark Two examples-1/2 mark each.	12	277
3 marks				
1	Explain traditional use of Biotechnology.	Three correct points-1 mark each	12	272
2	Define biotechnology? Which are the basic principles and process of biotechnology?	Definition-1 mark	12	272

		Basic process and principles-2 marks		
3	What is gene cloning? Explain different tools used for it.	Definition-1 mark Any two types of tools-1 mark each	12	273
4	Explain types of enzymes used in biotechnology?	Three correct points function of enzyme-1 mark	12	275
5	What is Recognition sequence? Explain in brief.	Definition-1 mark Explanation- two correct points- 2marks	12	275
6	Define Biotechnology? How it is used in production of Human insulin.	Definition 1 mark Two correct points in production process- 1 mark each	12	280
7	What is GM plant? Write its different advantages.	Definition-1 mark Any two advantages- 2 marks	12	283
4 marks				
1	What is PCR? Explain different steps involved in it.	Definition-1 mark Three step- 1 mark each	12	274
2	Explain the following terms with respect to rDNA technology i) passanger DNA	Each term-1 mark	12	277

	ii) Chimeric DNA iii) Transformed cell iv) restriction site			
3	Define biotechnology. Give any three application of it?	Definition-1 mark Any three application-1 mark each	12	279
4	Which are different adverse effect of biotechnology on human health and environment?	Any four points- 1 mark each	12	288
5	Explain biopatent and Biopiracy with different examples?	Correct explanation- two points- 2 marks each	12	289

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>An association of individuals of different species living in the same habitat and having functional interactions is called as...</p> <p>A <u>biotic community.</u></p> <p>B population.</p> <p>C ecosystem.</p> <p>D tropical niche.</p>	1	13	293
2	<p>Community is defined as....</p> <p>A Group of similar Angiosperms.</p> <p>B <u>interacting populations.</u></p> <p>C interacting ecosystem</p> <p>D group of mangroves.</p>	1	13	293
3	<p>Regional and local variations within each biome lead to the formation of variety of...</p> <p>A <u>Habitats</u></p> <p>B niches</p> <p>C species</p> <p>D genus</p>	1	13	293
4	<p>Maximum absorption of rainfall water is done by....</p> <p>A <u>tropical evergreen forest.</u></p> <p>B tropical deciduous forest.</p> <p>C coniferous forest.</p> <p>D deserts</p>	1	13	293
5	<p>The cattle egret and grazing cattle in close association is a classic example of...</p> <p>A Mutualism.</p> <p>B Parasitism.</p> <p>C <u>Commensalism.</u></p> <p>D Competition</p>	1	13	305

6	<p>The ecological niche of population is a ...</p> <p>A geographical area where it lives.</p> <p><u>B set of conditions and resources that it uses.</u></p> <p>C habitat of organisms</p> <p>D place of origin of organisms</p>	1	13	294
7	<p>Tropical dense forests are due to...</p> <p>A high rainfall and low temperature</p> <p><u>B high rainfall and warm temperature</u></p> <p>C low rainfall and high temperature</p> <p>D low rainfall and low temperature</p>	1	13	295
8	<p>Polar bears show hibernation during...</p> <p><u>A winter</u></p> <p>B summer</p> <p>C rainy season</p> <p>D favourable conditions</p>	1	13	297
9	<p>In Logistic growth curve lag phase shows...</p> <p>A fast growth</p> <p><u>B initial stage of growth</u></p> <p>C stationary phase of growth</p> <p>D diminishing phase of growth</p>	1	13	300
10	<p>The number of deaths under ideal conditions is known as</p> <p><u>A Absolute mortality</u></p> <p>B Realized mortality</p> <p>C Absolute natality</p> <p>D Realized natality</p>	1	13	298
Single sentence answers				
1	Define Absolute Mortality.	1	13	298
2	How absolute Natality differs from Realized Natality.	1	13	298
3	What is population ecology?	1	13	298
4	Define the term spatial niche.	1	13	295

5	What is ESS?	1	13	298
6	Define the term Habitat.	1	13	294
7	Rearrange the terms population, Biome, Community and Organisms in ecological hierarchy	1	13	293
8	What Allen's rule indicates in adaptation?	1	13	297
2 marks				
1	Show the graphical representation of mean annual rainfall with respect to mean annual temperature.	Any two correct representations- 1 mark each	13	293
2	Define the term Biome and population.	1 mark each	13	293
3	How Habitat differs from Niche?	Any two correct points- 1 mark each	13	294
4	How 'Temperature' as an abiotic factor plays a role in ecology?	Any two correct points- 1 mark each	13	295
5	Define the term Adaptation. State its two advantages.	Definition- 1 mark Any two advantages-1/2 mark each	13	297
6	What is Mortality? What are its two types?	Definition- 1 mark Each type-1/2 mark	13	298
7	Define the term population interactions. State its two types	Definition- 1 mark Each type-1/2 mark	13	301
3 marks				
1	Define Niche with its different types.	Definition – 1 mark Any two types -1 mark each	13	295
2	Define mutualism. Explain its one type.	Definition -1 mark	13	302

		Correct example and explanation-2 marks		
3	Explain any three important characteristics of population.	Three correct characters- 1 mark each	13	297
4	Explain different population interactions with examples.	Any three types- 1 mark each	13	301
5	What is Commensalism? Explain it with suitable example.	Definition- 1 mark Correct explanation and example-2 marks	13	304
6	Explain the role of any three abiotic factors affecting the environment.	Three factor5s with correct explanation- 1 mark each	13	295
7	Explain different types of growth models.	Two types – 1 and ½ mark each	13	300
4 marks				
1	Define population growth. Explain different types of age pyramids.	Definition – 1 mark Any three pyramids- 1 mark each	13	299
2	Which are different biotic and abiotic factors involved in ecology and how they play their role?	Any two biotic and abiotic factors with correct explanation- 2 marks each	13	294
3	What is population interaction? Explain the interactions in Mutualism and Competition.	Definition -1 mark Mutualism and commensalism correct explanation-1 and ½ mark each	13	302

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	<p>Lichens taking roots on bare rocks are an example of _____.</p> <p>A. climax community</p> <p>B. <u>pioneer species</u></p> <p>C. climax species</p> <p>D. secondary succession</p>	1 mark	14	Pg. 317
2	<p>Growth of new grasses and shrubs on a patch of forest burnt down by forest fire, is a an example of _____</p> <p>A. secondary succession</p> <p>B. pioneer species</p> <p>C. climax species</p> <p>D. primary succession</p>	1 mark	14	Pg. 319 Fig. 14.14
3	<p>All types of ecological succession whether on land or in water always reaches _____</p> <p>A. climax community</p> <p>B. pioneer species</p> <p>C. climax species</p> <p>D. secondary succession</p>	1 mark	14	Pg. 318
Single sentence answers				
1	What is ‘Sere’?	1 mark	14	Pg. 316
2	Define ‘Ecological succession’	1 mark	14	Pg. 316
3	What is ‘Climax community’?	1 mark	14	Pg. 317

2 Marks				
1	Name the types of succession of plants based on the nature of habitat.	1 mark each	14	Pg. 317
2	Give reasons – ‘Primary succession is always slower than secondary succession’	1 mark each	14	Pg. 317
3 Marks				
1	What are ‘pioneer species’? Give two examples of them.	1 mark each	14	Pg. 317
2	Explain the following sequence of succession after a forest fire. <div data-bbox="284 822 1078 1257"> </div>	1 mark each	14	Pg. 317
Answer the following – 4 Marks				
1	Explain the progress of ecological succession in newly formed volcanic island.	1 mark each	14	Pg. 317

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	Dodo bird, stellar sea cow and passenger pigeon are few examples of extinction due to _____. A habitat loss B hunting C Alien species invasion D <u>overexploitation</u>.	1	15	326
2	Select the odd example with respect to types of conservation strategies. A Pawra tribals in Satpuda have protected varieties of corn with different coloured kernels. B Kanha forest as tiger reserve. C <u>Crocodile bank of Chennai</u> D Sacred groves	1	15	328
3	India boasts a handsome share of ____ % of total biodiversity wealth of the earth. A 2.4 B <u>8.1</u> C 14 D 22	1	15	325
Single sentence answers				
1	What is ‘Hello Forest’?	1	15	341
2	Name the Japanese method of plantation adapted by our government.	1	15	341
3	A medicinal plant <i>Rauwolfia vomitoria</i> shows variations in concentration of reserpine from location to location. What type of level of biodiversity is this?	1	15	322
2 marks				
1	Write full form of ____ i) IUCN ii) NBA	1+1	15	326

				330
2	Give any four factors that favour high speciation at lower altitudes.	½ mark each =2	15	323
3	With the help of any one example explain Alien species invasion as one of the causes of Biodiversity losses.	Meaning 1mark+exa 1 mark	15	326
3 marks				
1	Enlist any six categories into which a given species is placed once it has been thoroughly evaluated by IUCN.	1/2mark each =3	15	327
2	The reasons for conservation of biodiversity can be classified into three categories. Name them and describe each in brief.	½ mark name+1/2 mark describe	15	328
4 marks				
1	Describe any four measures to achieve Mission Harit Maharashtra	1mark each	15	341