



महाराष्ट्र शासन
शालेय शिक्षण व क्रीडा विभाग
राज्य शैक्षणिक संशोधन व प्रशिक्षण परिषद, महाराष्ट्र
७०८ सदाशिव पेठ, कुमठेकर मार्ग, पुणे ४११०३०

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	<p>The outer layer of pollen grain is thick and made up of complex ,non-biodegradable substance called as.....</p> <p>A. lignin B. cellulose C. pectin D. Sporopollenin</p>	<p>Correct answer 1 mark</p>	1	3
2	<p>Sporoderm is made up of</p> <p>A. exosporium and endosporium B. outer integuments and inner integument C. testa and tegmen D. exine and intine</p>	<p>Correct answer 1 mark</p>	1	3
3	<p>The number of meiotic and mitotic divisions necessary for development of female gametophyte in angiosperms is...</p> <p>A. 1 meiosis and 2 mitosis B. 1 mitosis and 3 meiosis C. 1 meiosis and 1 mitosis D. 1 meiosis and 3 mitosis.</p>	<p>Correct answer 1 mark</p>	1	5
4	<p>Identify the odd one with respect to pollinating agent.</p> <p>A. Baobab B. Bottle brush C. Kadamb D. Sausage</p>	<p>Correct answer 1 mark</p>	1	8

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

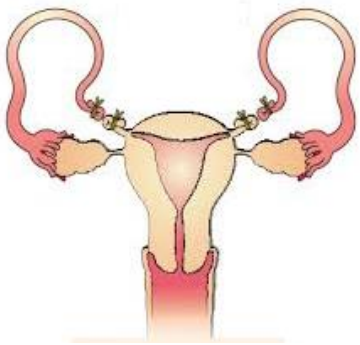
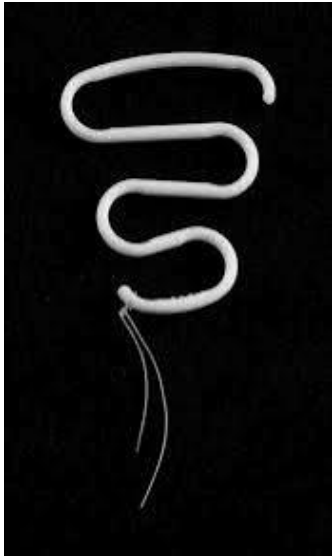
2 marks				
1	Draw a well labelled diagram of T.S. anther.	Four correct labels ½ mark each	1	3
2	Describe the structure of pollen grain.	Wall layers, ploidy and fate of pollen grain. Formation through meiosis. Each point ½ mark	1	3
3	Draw a well labelled diagram of male gametophyte of angiosperms.	Diagram-1 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

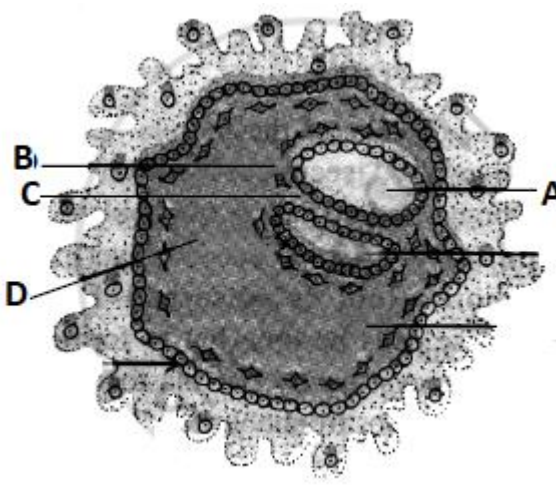
10	Explain various categories of apomixis.	1 mark each type	1	14
4 marks				
1	Describe the structure of anatropus ovule with the help of labelled diagram.	Structure -2 marks Diagram with four correct labels -2 marks	1	4
2	Describe the development of female gametophyte of angiosperms with the help of 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

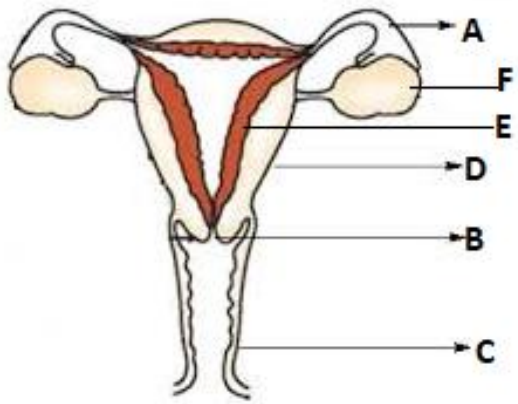
Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	The primary sex organ in human males is A. prostate gland B. seminal vesicle C. penis D. testis	Correct answer 1 mark	2	20
2	Seminal fluid is ----- in nature. A. acidic B. neutral C. sugary D. alkaline	Correct answer 1 mark	2	21
3	Which of the following is not a part of uterus? A. body B. cervix C. fundus D. cornua	Correct answer 1 mark	2	24
4	Menarche, 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..... A. <i>Trepenoma</i> B. Neisseria C. <i>Entamoeba</i> D. <i>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.	Hyaluronidase	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 from 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. F1 × F1</p> <p>B. F1 × Recessive parent</p> <p>C. F1 × Dominant parent</p> <p>D. F1 × 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

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

	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 <i>Drosophila</i> 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 ¹⁵N			
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

	<p>A Peptidase</p> <p>B <u>Peptidyl transferase</u></p> <p>C Nitrogenase</p> <p>D Nitrate reductase</p>			
12	<p>Exon segments are reunited after splicing by</p> <p>A RNA primase</p> <p>B RNA protease</p> <p>C <u>RNA polymerase</u></p> <p>D RNA ligase</p>	1	4	79
13	<p>In lac operon, lactose acts as:</p> <p>A <u>Inducer</u></p> <p>B Co-inducer</p> <p>C Repressor</p> <p>D Co-repressor</p>	1	4	87
14	<p>A unit of lac-operon which in the absence of lactose, suppresses the activity of operator gene is :</p> <p>A Structural gene</p> <p>B <u>Regulatory gene</u></p> <p>C Repressor protein</p> <p>D Promoter gene</p>	1	4	86
15	<p>A DNA segment has 75 cytosine and 40 thymine nucleotides. What shall be the total number of phosphates in the DNA segment?</p> <p>A 115</p> <p>B <u>230</u></p> <p>C 75</p> <p>D 220</p>	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	_____ is considered as connecting link between ape and man. A <u>Australopithecus</u> B <i>Homo habilis</i> C <i>Homo erectus</i> D Neanderthal man	<i>Australopithecus</i>	5	114
2	Humans are most closely related to _____. A Marsupial B Lemur C <u>Chimpanzees</u> D Tarsier	Chimpanzees	5	113
3	The proportion of an allele in the gene pool to the total number of alleles at a given locus is called _____. A gene pool B <u>gene frequency</u> C gene flow D genetic drift	gene frequency	5	100
4	Transfer of a part of chromosome or set of genes to a non-homologous chromosome is called _____. A deletion B duplication C inversion D <u>translocation</u>	translocation	5	101
5	Any random fluctuation in allele frequency, occurring in the natural population by pure chance is called _____. A gene pool B gene mutation C genetic recombination	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 border="1"> <thead> <tr> <th>Ancestors</th> <th>Special features</th> </tr> </thead> <tbody> <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> </tbody> </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 _____	1	6	120
	A <u>Cellulose</u> B Lignin C Starch D Pectin			
7	Cell wall is _____	1	6	120
	A <u>Selectively Permeable</u> B <u>Freely Permeable</u> C Non Permeable D Impermeable			
8	Plasma Membrane is _____	1	6	120
	A <u>Selectively Permeable</u> B Freely Permeable C Non Permeable D Impermeable			
9	Root hair is _____ extension of epiblema cells	1	6	120
	A Cytoplasmic B Protoplasmic C Nucleoplasmic D Cellulosic			
10	Fine soil particles imbibe or absorb water and hold it. This is called as _____	1	6	120
	A <u>Hygroscopic Water</u> B Gravitational Water C Combined Water D Capillary Water			
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
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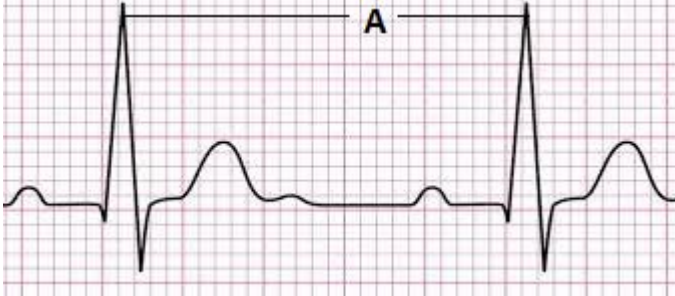
Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	A farmer is fed up of weeds in his Wheat farm. Which of the following chemicals he can use to overcome the problem? A IBA B IAA C NAA D <u>2,4 – D</u>	1	7	139
2	Gibberellins are synthesised from _____. A Acetic acid B <u>Mevalonic acid</u> C Tryptophan D Ethephon	1	7	140
3	First natural cytokinin was obtained from _____. A Rice plants B Tobacco callus C <u>Maize grains</u> D Human urine	1	7	140
Single sentence answers				
1	Buyers often complain that a particular fruit merchant uses some chemical to ripen fruits in his shop. Name the chemical he must be using to do so.	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			

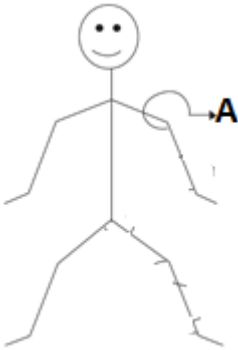
	<p style="text-align: center;">A</p> <p>i) Epinasty of flower ii) Natural auxin iii) Flowering in Litchi iv) Bolting of Beet</p>	<p style="text-align: center;">B</p> <p>a)GA3 b)NAA c)IAA d)Ethylene</p>	½ marks for each correct pair = 2	7	141 139 140 140
2	<p>A gardener wants to give bushy appearance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

Question no.	Question	Marking Scheme	Chapter No.	Page No.
MCQ				
1	<p>In human respiration, chemical energy is released in the form of ____.</p> <p>A) Acetyl co-enzyme A B) ADP C) ADPH₂ D) <u>ATP</u></p>	1 mark	8	156
2	<p>Alveoli provide the surface area for exchange of _____.</p> <p>A) food B) enzymes C) <u>gases</u> D) hormones</p>	1 mark	8	156
3	<p>The movement of diaphragm, intercostal muscles and rib cage helps in _____.</p> <p>A) digestion B) circulation C) excretion D) <u>respiration</u></p>	1 mark	8	156
4	<p>The volume of air that remains in the lungs after maximum respiration is _____.</p> <p>A) 1000 to 1100 ml B) <u>1100 to 1200 ml</u> C) 2000 to 3000 ml D) 5200 to 5800 ml</p>	1 mark	8	
5	<p>Find out the example in which due to absence of respiratory pigment transport of respiratory gases does not takes place.</p> <p>A) <u>Cockroach</u> B) Scoliodon C) Frog D) Human</p>	1 mark	8	163
6	<p>Which of the following has thickest wall?</p> <p>A) Right auricle B) Right ventricle C) Left auricle D) <u>Left ventricle</u></p>	1 mark	8	170
7	<p>The phase of contraction of heart is termed as ____.</p> <p>A) diastole B) <u>systole</u> C) heart beat D) heart sound</p>	1 mark	8	171

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

Single sentence answer

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

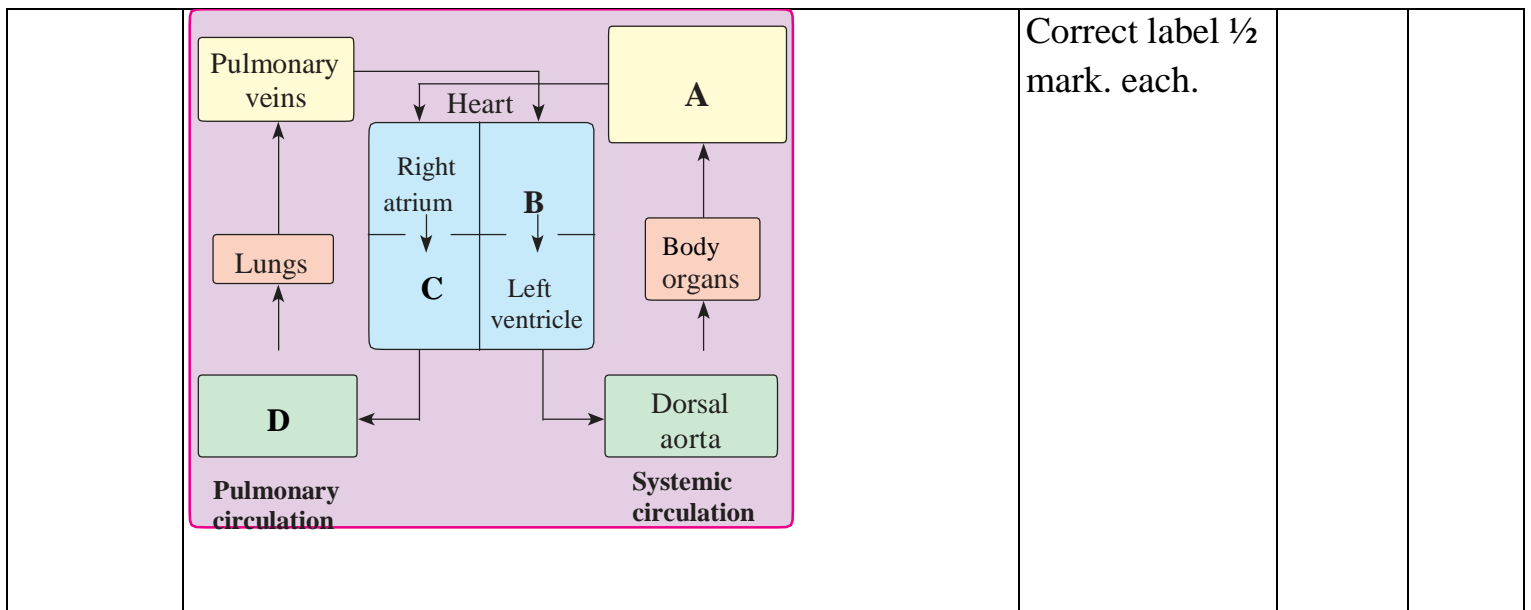
10	Identify the pulse point 'A' from below given diagram. <div style="text-align: center;">  </div>	1 mark	8	174
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2 marks

1	Fill in the blanks with the help of chart. <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th style="width: 25%;">Organism</th> <th style="width: 25%;">Habitat</th> <th style="width: 50%;">Respiratory surface/ organ</th> </tr> </thead> <tbody> <tr> <td>Coelenterates</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>Spiders</td> <td>-----</td> <td>-----</td> </tr> </tbody> </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: 1 mark 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






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	<p>With the help of chart identify and write the function of any four leucocytes.</p> <table border="1" data-bbox="259 1956 1047 2556"> <thead> <tr> <th data-bbox="259 1956 360 2085">Type</th> <th data-bbox="360 1956 678 2085">Leucocytes</th> <th data-bbox="678 1956 870 2085">Name of cell</th> <th data-bbox="870 1956 1047 2085">Function</th> </tr> </thead> <tbody> <tr> <td data-bbox="259 2085 360 2556" rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">Granulocytes</td> <td data-bbox="360 2085 678 2282"></td> <td data-bbox="678 2085 870 2282">-----</td> <td data-bbox="870 2085 1047 2282">-----</td> </tr> <tr> <td data-bbox="360 2282 678 2556"></td> <td data-bbox="678 2282 870 2556">-----</td> <td data-bbox="870 2282 1047 2556">-----</td> </tr> </tbody> </table>	Type	Leucocytes	Name of cell	Function	Granulocytes		-----	-----		-----	-----	½ mark. for each correct name ½ mark. for each correct function.	8	166-167
Type	Leucocytes	Name of cell	Function												
Granulocytes		-----	-----												
		-----	-----												

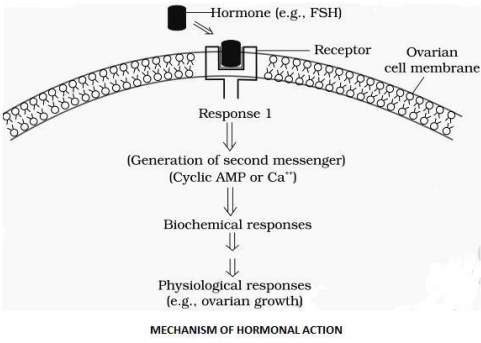
			<p>-----</p>	<p>-----</p>			
	Agranulocytes		<p>-----</p>	<p>-----</p>			
			<p>-----</p>	<p>-----</p>			
<p>3</p>	<p>Draw labelled diagram of internal structure of human heart.</p> <p>Label right atrium, mitral valve, left ventricle and pulmonary semilunar valve.</p> <p>Write a function of Eustachian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

Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	Diffused type of nervous system is seen in _____. A <u>Hydra</u> B <i>Planaria</i> C Cockroach D Earthworm	<i>Hydra</i>	9	182
2	Planaria shows _____ type of nervous system. A nerve net. B <u>ladder</u> C ganglionated D brain	ladder	9	183
3	In order for a stimulus to be effective, the stimulus must have a minimum intensity called _____ stimulus. A subliminal B depolarised C <u>threshold</u> D polarised	threshold	9	186
4	The resting potential of a neuron is _____. A 30 millivolts B -30 millivolts C 70 millivolts D <u>-70 millivolts</u>	-70 millivolts	9	189
5	The third ventricle of brain is connected to the fourth ventricle of brain through _____. A Foramen of Monro B <u>Duct of Sylvius</u> C Metacoel D Eustachian tube	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>  <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 border="1" data-bbox="272 1747 876 2083"> <thead> <tr> <th>Secretion</th> <th>Adults</th> <th>Children</th> </tr> </thead> <tbody> <tr> <td>Hypo secretion</td> <td></td> <td></td> </tr> <tr> <td>Hyper secretion</td> <td></td> <td></td> </tr> </tbody> </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>	Hormones - 2 mark Disease – 1 mark	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	<p>Complete the flowchart of the process of conduction of nerve impulse.</p> <pre> graph TD A[Application of stimulus on a resting nerve] --> B[Permeability of membrane changes] B --> C[] C --> D[positive ions inside axon increases] D --> E[] E --> F[Polarity reverses and depolarisation takes place] F --> G[Repolarisation - potassium gates open] G --> H[] H --> I[] I --> J[Axoplasm becomes negatively charged and ECF becomes positive again] </pre>	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	When the ELISA test was conducted on an immune-suppressed person, he tested positive for a pathogen. a) Identify the disease the patient is suffering from. b) Name the causative entity. c) Mention the cells of the body that are attacked by the pathogen.	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>Streptomyces venezuelae</u> D <i>Streptomyces griseus</i>	1	11	261
8	Indian curd is prepared by inoculating milk with _____. A <u>Lactobacillus acidophilus</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. <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">A</td> <td style="width: 50%; text-align: center;">B</td> </tr> <tr> <td>i. Atlas 66</td> <td>a) vit A</td> </tr> <tr> <td>ii. Rice</td> <td>b) vit C</td> </tr> <tr> <td>iii. Spinach</td> <td>c) protein</td> </tr> <tr> <td>iv. bitter gourd</td> <td>d) Iron</td> </tr> </table>	A	B	i. Atlas 66	a) vit A	ii. Rice	b) vit C	iii. Spinach	c) protein	iv. bitter gourd	d) Iron	1/2mark for each correct pair	11	253
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ii. Rice	b) vit C													
iii. Spinach	c) protein													
iv. bitter gourd	d) Iron													
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														
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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										
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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 style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: center; width: 50%;">A</th> <th style="text-align: center; width: 50%;">B</th> </tr> </thead> <tbody> <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>iii. Phosphate solubilizer</td> <td>c) <i>Nostoc</i></td> </tr> <tr> <td>iv. Endomycorrhizae</td> <td>d) <i>Micrococcus</i></td> </tr> </tbody> </table>	A	B	i. Symbiotic N ₂ fixing bacteria	a) VAM	ii. Free-living N ₂ fixing bacteria	b) <i>Rhizobium</i>	iii. Phosphate solubilizer	c) <i>Nostoc</i>	iv. Endomycorrhizae	d) <i>Micrococcus</i>	1 mark for each correct pair	11	266
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Question no.	Question	Marking scheme	Chapter No.	Page No.
MCQ				
1	The technique which involves addition or deletion of genes is.... A <u>genetic engineering</u> B gene therapy C gene splicing D gene piracy	1	12	273
2	ECoRI is obtained from... A <i>Escherichia coli</i> R13 B <u>Escherichia coli Ry13</u> C <i>Escherichia coli</i> R225 D <i>Escherichia coli</i> RC	1	12	275
3	The enzyme restriction endonuclease ... A <u>cuts double strand of DNA</u> B joins strand of DNA C cuts RNA strand D cuts single stranded DNA	1	12	275
4	Ti plasmid being used for introducing genes in plants obtained from.... A <i>Agrobacterium rhizogenes</i> B <i>Escherichia coli</i> C <i>Agrobacterium</i> T20 D <u>Agrobacterium tumefaciens</u>	1	12	277
	Polymerase chain reaction is most useful in.... A <u>DNA amplification</u> B DNA synthesis C protein synthesis D selective replication of DNA	1	12	274
5	In Bt cotton a transgenic plant, Bt refers to.... A bold cotton B <u>Bacillus thuringiensis</u>	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>Azatobacter</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	An association of individuals of different species living in the same habitat and having functional interactions is called as... A <u>biotic community.</u> B population. C ecosystem. D tropical niche.	1	13	293
2	Community is defined as.... A Group of similar Angiosperms. B <u>interacting populations.</u> C interacting ecosystem D group of mangroves.	1	13	293
3	Regional and local variations within each biome lead to the formation of variety of... A <u>Habitats</u> B niches C species D genus	1	13	293
4	Maximum absorption of rainfall water is done by.... A <u>tropical evergreen forest.</u> B tropical deciduous forest. C coniferous forest. D deserts	1	13	293
5	The cattle egret and grazing cattle in close association is a classic example of... A Mutualism. B Parasitism. C <u>Commensalism.</u> D Competition	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

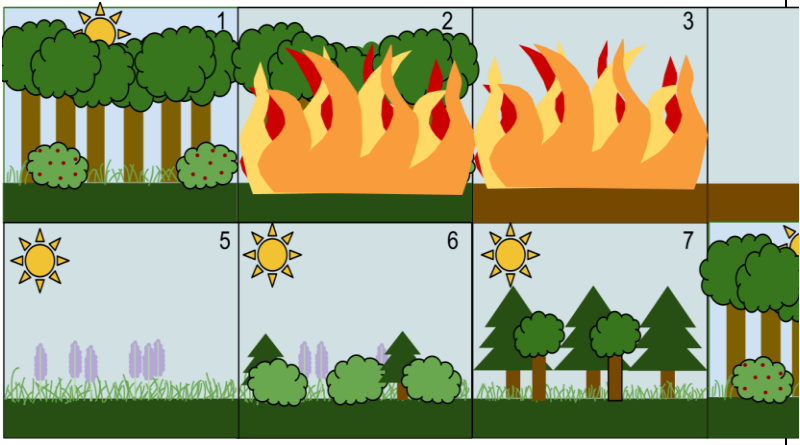
		Correct example and explanation-2 marks		
3	Explain any three important characteristics of population.	Three correct characters- 1 mark each	13	297
4	Explain different population interactions with examples.	Any three types- 1 mark each	13	301
5	What is Commensalism? Explain it with suitable example.	Definition- 1 mark Correct explanation and example-2 marks	13	304
6	Explain the role of any three abiotic factors affecting the environment.	Three factors 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	Lichens taking roots on bare rocks are an example of _____. A. climax community B. <u>pioneer species</u> C. climax species D. secondary succession	1 mark	14	Pg. 317
2	Growth of new grasses and shrubs on a patch of forest burnt down by forest fire, is a an example of _____ A. secondary succession B. pioneer species C. climax species D. primary succession	1 mark	14	Pg. 319 Fig. 14.14
3	All types of ecological succession whether on land or in water always reaches _____ A. climax community B. pioneer species C. climax species D. secondary succession	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	<p>Explain the following sequence of succession after a forest fire.</p> 	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
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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 1 mark+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

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