

**GOVERNMENT OF KARNATAKA**  
**KARNATAKA STATE PRE – UNIVERSITY EDUCATION EXAMINATION BOARD**  
**II YEAR PUC EXAMINATION – APRIL / MAY – 2022**

**SCHEME OF EVALUATION**

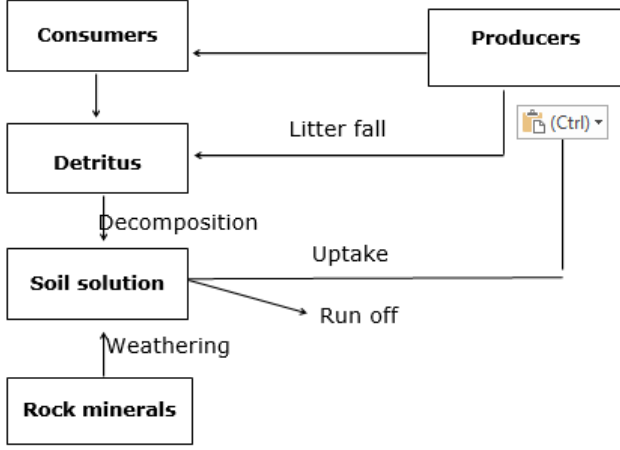
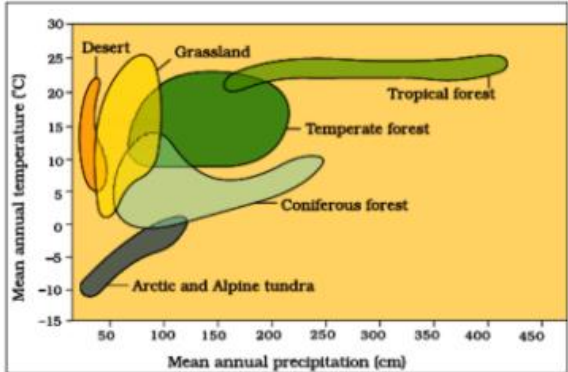
SUBJECT CODE : 36

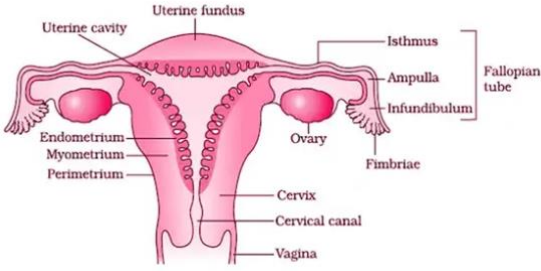
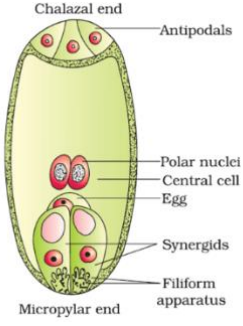
SUB : BIOLOGY

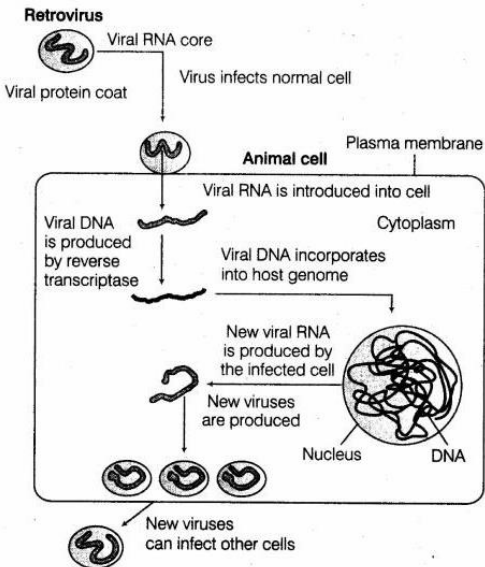
Q. No.	Answer / Value Points	Marks	Page No.
<b>PART – A</b>			
	<b>Answer any ten of the following questions in one word or one sentence each</b>	<b>10x 1=10</b>	
<b>1.</b>	<b>What is parthenogenesis?</b>	01	14
<b>Ans:</b>	The female gamete undergoes development to form new organisms without fertilisation		
<b>2.</b>	<b>Define polyembryony</b>	01	39
<b>Ans:</b>	Occurrence of more than one embryo in a seed is referred to as polyembryony		
<b>3.</b>	<b>Mention the organic resistant material present in the exine of pollengrains</b>	01	23
<b>Ans:</b>	Sporopollenin		
<b>4.</b>	<b>Write the scientific name of the plant from which coca alkaloid is obtained</b>	01	159
<b>Ans:</b>	Erythroxyllum coca		
<b>5.</b>	<b>Give one example for pleiotropy</b>	01	288
<b>Ans:</b>	Phenylketonurea		
<b>6.</b>	<b>Write one symptom of Turner's syndrom</b>	01	91
<b>Ans:</b>	Females are sterile ovaries are rudimentary lack of secondary sexual characters (Any one symptom 1 mark)		
<b>7.</b>	<b>What is the function of DNA ligase?</b>	01	197
<b>Ans:</b>	The DNA fragments have the same kind of sticky ends and these can be joined together by DNA ligases		
<b>8.</b>	<b>Give one example for hormone releasing IUDs</b>	01	60
<b>Ans:</b>	Progestasert, LNG – 20 (Mention any one – 1 mark)		
<b>9.</b>	<b>Write an example for auto immune disease.</b>	01	153
<b>Ans:</b>	Rhematoid Arthritis		
<b>10.</b>	<b>Write the use of Nucleopolyhedrovirus.</b>	01	187
<b>Ans:</b>	These are species specific, narrow spectrum insecticidal applications <b>OR</b> Used as biological control agents.		
<b>11.</b>	<b>What is plasmid?</b>	01	194
<b>Ans:</b>	Autonomously replicating circular extra – chromosomal DNA found in bacteria / salmonella typhimurium		
<b>12.</b>	<b>What are biofertilisers?</b>	01	188
<b>Ans:</b>	Biofertilisers are organisms that enrich the nutrient quality of the soil.		
<b>13.</b>	<b>Write the function of statins.</b>	01	183
<b>Ans:</b>	They function / work as blood cholesterol lowering agents.		
<b>14.</b>	<b>What are transgenic animals?</b>	01	211
<b>Ans:</b>	Animals that have had their DNA manipulated to possess and express an extra (foreign) gene are known as the transgenic animals		
<b>15.</b>	<b>What do you mean by endemism?</b>	01	266
<b>Ans:</b>	Species confined to specific region and not found anywhere else.		

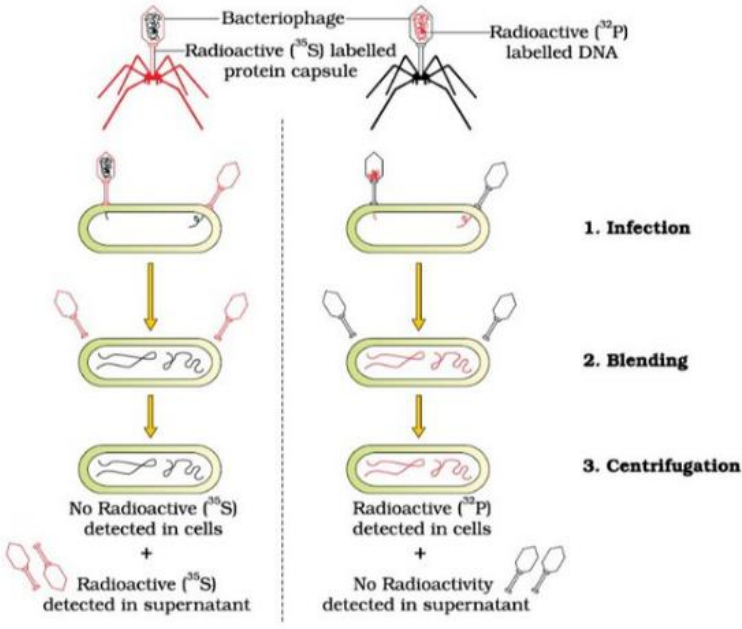
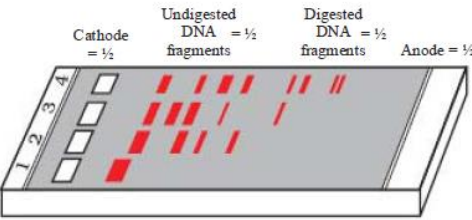


Q. No.	Answer / Value Points	Marks	Page No.
	<b>PART – C</b>		
	<b>Answer any Five of the following questions in 40 to 80 words each, wherever applicable</b>	<b>5x3=15</b>	
<b>26.</b> <b>Ans:</b>	<b>Cleistogamous flowers are invariably autogamous. Justify the statement</b> In cleistogamous flowers the anthers and stigma lie close together. When anthers dehisce in the flower buds pollen grains come in contact with stigma to effect pollination. As there is no chance cross pollen landing on the stigma, cleistogamous flowers are invariably autogamous.	03	28
<b>27.</b> <b>Ans:</b>	<b>Mention the stages of sexual reproduction?</b> Pre-fertilisation, Fertilisation, Post – fertilisation (1M for each)	03	10
<b>28.</b> <b>Ans:</b>	<b>Describe the role of oxytocin hormone in parturition.</b> The release of oxytocin from the maternal pituitary is triggered by foetal ejection reflex. Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin. The stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contractions leading to the expulsion of the baby out of the uterus through the birth canal.	03	54
<b>29.</b> <b>Ans:</b>	<b>Write two symptoms of down's syndrome and write the chromosome number in down's syndrome.</b> <b>Symptoms:</b> i) The affected individual is short statured with small round head ii) Furrow tongue and partially opened mouth iii) Palm is broad with characteristics palm crease. iv) Physical psychomotors and mental development is retarded (Any two – 2 marks) <b>Chromosome number</b> Trisomy of 21 or 45AA + XX / 45AA + XY	03	90
<b>30.</b> <b>Ans:</b>	<b>With reference transcription in eukaryotes, explain the following terms.</b> i) <b>Splicing:</b> Here the introns are removed and exons are joined in a definite order. ii) <b>Capping :</b> Addition of an unusual nucleotide 'methyl guanosine triphosphate' to the 5 <sup>1</sup> – end of hn RNA. iii) <b>Tailing:</b> Addition of 200 –300 adenylate residues to the 3' – end of hn RNA in template independent manner. (1M each)	03	111
<b>31.</b> <b>Ans:</b>	<b>Mention the common approaches for the treatment of cancers.</b> i) Surgery ii) Radiation therapy iii) Immunotherapy (01 M each mentioning)	03	158
<b>32.</b> <b>Ans:</b>	<b>What is ozone hole? Write any two effects of UV – B rays on skin.</b> A large area of thinned ozone layer (1M) 2 effects of UV – B rays on skin. a) Ageing of skin b) Damage to skin cells c) Various types of skin cancers (Any two – 2 M)	03	283
<b>33.</b>	<b>Give the scheme of simplified model of phosphorus cycling in terrestrial ecosystem.</b>	03	255

Q. No.	Answer / Value Points	Marks	Page No.
Ans:	 <pre> graph TD     Producers --&gt; Consumers     Consumers --&gt; Detritus     Producers -- Litter fall --&gt; Detritus     Detritus -- Decomposition --&gt; Soil_solution[Soil solution]     Rock_minerals[Rock minerals] -- Weathering --&gt; Soil_solution     Soil_solution -- Uptake --&gt; Producers     Soil_solution -- Run off --&gt; Run_off[Run off] </pre>		
34. Ans:	<p>Give the graphic representation fo biome distribution with respect to annual temperature and precipitation</p> 	03	220
35. Ans:	<p>What is micropropagation? Write its significance and mention one example for it.</p> <p><b>Defination of micropropagation:</b> Method of producing thousands of plants through tissue culture is called micropropagation.</p> <p><b>Significance :</b> The plants produced by micropropagation are genetically identical to the original plant.</p> <p><b>Example:</b> Tomato, Banana, Apple,</p>	03	177
<b>PART – D [SECTION – I]</b>			
<b>Answer any four of the following questions in 200 to 250 words each, wherever applicable</b>		<b>4x5=20</b>	
36. Ans:	<p>a) Write the procedre of IVF – ET technique</p> <p>b) Write the procedre of ICSI technique</p> <p>a) <b>Procedure of IVF – ET technique :</b></p> <ul style="list-style-type: none"> <li>- IVF – ET [Invitro fertilisation and followed embryo transfer] is one of method of fertilisation outside the body.</li> <li>- In this method, popularly known as test tube baby programme,</li> <li>- Ova from the wife/donor (female) and sperms from the husband/ donor (male) are collected and are induced to form zygote or early embryo (with up to 8 blastomeres) could be the transferred to the fallopian tube to complete the further development.</li> </ul>	5	64
	<p>b) <b>Procedure of ICSI</b></p> <ul style="list-style-type: none"> <li>- Intra cytoplasmic sperm injection (ICSI) is a specialised procedure to form an embryo in the laboratory in which a sperm is directly injected into the ovum</li> </ul>		

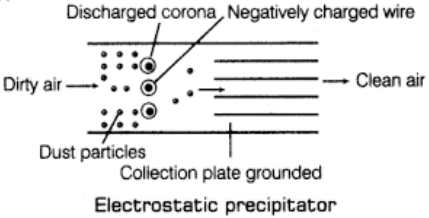
Q. No.	Answer / Value Points	Marks	Page No.																
<p><b>37.</b> <b>Ans:</b></p>	<p><b>Sketch and label the sectional view of human female reproductive system.</b></p>  <p>The diagram shows a frontal section of the female reproductive system. Labels include: Uterine cavity, Uterine fundus, Isthmus, Ampulla, Fallopian tube, Infundibulum, Fimbriae, Ovary, Endometrium, Myometrium, Perimetrium, Cervix, Cervical canal, and Vagina.</p>	05	45																
<p><b>38.</b> <b>Ans:</b></p>	<p><b>Define megasporogenesis. Describe the internal structure of a mature embryo sac of a angiosperm flower.</b></p> <p>Defination : The process of formation of megaspores from the megaspore mother cell is called megasporogenesis.</p> <p>Internal structure of mature embryosac diagram.</p> <p>Explanation:</p> <ol style="list-style-type: none"> <li>1. 3 antipodals at the chalazal end</li> <li>2. polar nuclei in the centre</li> <li>3. egg(n) and synergids</li> <li>4. 7 cells 8 nuclei condition mentioning</li> </ol>  <p>The diagram shows a longitudinal section of an embryo sac. Labels include: Chalazal end, Antipodals, Polar nuclei, Central cell, Egg, Synergids, Filiform apparatus, and Micropylar end.</p>	05	25, 26																
<p><b>39.</b> <b>Ans:</b></p>	<p><b>Write the schematic representation of one gene inheritance in pisum sativum</b></p> <p>Mendel crossed a true – breeding tall pea plant with a true breeding dwarf plant all the offspring in F-1 generation were tall indicating that tallness is dominant over dwarf</p> <p>He allowed F-1 tall plants for self pollination. In F-2 both tall and dwarf plants were produced in the ratio 3 : 1</p> <p>Re-appearance of dwarf character in F-2 generation indicates that alleles for tallness and dwarf character have segregated during gamete formation</p> <p>Parents phenotype – Pure Tall X Pure Dwarf</p> <p>P Pure Tall x Pure Dwarf (Genotypes) TT tt</p> <p>Types of gametes T t</p> <p>F<sub>1</sub> Monohybrid Tt Hybrid Tall</p> <p>Types of gametes by F<sub>1</sub> T t</p> <p>Selfing/ Inbreeding</p> <table border="1" data-bbox="542 1713 869 1915"> <tr> <td colspan="2" rowspan="2"></td> <td colspan="2">Female gametes</td> </tr> <tr> <td>T</td> <td>t</td> </tr> <tr> <td rowspan="2">F<sub>2</sub></td> <td rowspan="2">Male gametes</td> <td>T</td> <td>TT Tall</td> </tr> <tr> <td>t</td> <td>Tt Tall</td> </tr> <tr> <td colspan="2"></td> <td></td> <td>tt Dwarf</td> </tr> </table> <p>F<sub>2</sub> Punnet's square or Checker board</p> <p><b>Phenotypic ratio</b> 3 Tall : 1 Dwarf 75% : 25%</p> <p><b>Genotypic ratio in F<sub>2</sub></b> Pure Tall : Hybrid Tall : Pure Dwarf 1 TT : 2 Tt : 1 tt</p>			Female gametes		T	t	F <sub>2</sub>	Male gametes	T	TT Tall	t	Tt Tall				tt Dwarf	05	73
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		t	Tt Tall																
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Q. No.	Answer / Value Points	Marks	Page No.
<p><b>40.</b> <b>Ans:</b></p>	<p><b>Write any five salient features of genetic code.</b></p> <ol style="list-style-type: none"> <li>The codon is triplet. 61 codons code for amino acids and 3 codons do not code for any amino acids, hence they function as stop codons.</li> <li>One codon codes for only one amino acid, hence, it is unambiguous and specific.</li> <li>Some amino acids are coded by more than one codon, hence the codon is degenerated.</li> <li>The codon is read in mRNA in a continuous fashion. There are no punctuations.</li> <li>The code is nearly universal : for example, for bacteria to human UUU would code for Phenylalanine (phe). Some exceptions to this rule have been found in mitochondrial codons, and in some protozoans.</li> <li>AUG has dual functions. It codes for Methionine (met), and it also act as initiator codon.</li> </ol> <p>(Any 5 One Mark Each)</p>	05	112
<p><b>41.</b> <b>Ans:</b></p>	<p><b>Give the schematic representation of the replication of retrovirus.</b></p>  <p>The diagram illustrates the replication cycle of a retrovirus. It starts with a retrovirus consisting of a viral RNA core and a viral protein coat. The virus infects a normal cell. The viral RNA is introduced into the cytoplasm of the animal cell. Reverse transcriptase produces viral DNA. The viral DNA then incorporates into the host genome in the nucleus. New viral RNA is produced by the infected cell, and new viruses are produced, which can infect other cells.</p>	05	155
<p><b>42.</b> <b>Ans:</b></p>	<p><b>Write a detailed note on adaptive radiations</b></p> <p>The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats) is called adaptive radiation.</p> <p>Example 1 : Darwins finches During the Galapagos Islands journey, Darwin observed many small black birds / Finches in the island. All the varieties, he conjectured, evolved in the same island itself. From original seed eating features, many other forms with altered beaks arose, enabling them to become insectivorous and vegetarian finches.</p> <p>Example 2: Australian Marsupials A number of marsupials, each different from the other evolved from an ancestral stock but all within the Australian continent.</p> <p>Convergent evolution : When more than one adaptive radiation appeared to have occurred in an isolated geographical area (representing different habitats) one can call this convergent evolution.</p> <p>Example : Placental mammals Placental mammals in Australia also exhibit adaptive radiation in evolving into varieties of such placental mammals each of which appears to be 'similar' to a corresponding marsupial.</p> <p>Example: Placental wolf, Tasmanian wolf – marsupial</p>	05	133, 134

Q. No.	Answer / Value Points	Marks	Page No.
<p>43.</p> <p>Ans:</p>	<p><b>Describe the Hershey – chase experiment to prove that the DNA is genetic material</b></p>  <ul style="list-style-type: none"> <li>• Hershey &amp; Chase grew some bacteriophage viruses on medium counting radioactive phosphorus (<math>P^{32}</math>) and some others on medium containing radioactive sulphur (<math>S^{35}</math>)</li> <li>• Viruses grown in <math>P^{32}</math> got radioactive DNA because only DNA contains phosphorus. Viruses grown in <math>S^{35}</math> got radioactive protein because protein contains sulphur.</li> <li>• These preparations were used separately to infect E.coli.</li> <li>• After infection, the E.coli cells were gently agitated in a blender to remove the virus particles from the bacteria.</li> <li>• Then the culture was centrifuged to separate lighter virus particles from heavier bacterial cells.</li> <li>• Bacterial infected with viruses having radioactive DNA were radioactive i.e., DNA had passed from the virus to bacteria. Bacteria infected with viruses having radioactive proteins were not radioactive i.e., proteins did not enter the bacteria from the viruses. This process that DNA is the genetic material.</li> </ul> <p>(only scheme 2M)</p>	05	101, 102
<b>SECTION – II</b>			
<b>Answer any three of the following in 200 – 250 words each wherever applicable</b>		<b>5x3=15</b>	
<p>44.</p> <p>Ans:</p>	<p><b>With a neat labelled diagram, explain the technique of gel electrophoresis in rDNA technology.</b></p> 	05	198

Q. No.	Answer / Value Points	Marks	Page No.
	<p><b>Explanation:</b></p> <ul style="list-style-type: none"> <li>- The cutting of DNA by REN results in the fragmetns of DNA.</li> <li>- Fragments are then separated by gel electrophoresis technique.</li> <li>- Separation of negatively charged molecules under electric field through a medium/matrix.</li> <li>- The DNA fragments separate (resolve)according to their size, through sieving effect provided by agarose gel.</li> <li>- The separated DNA fragments can be visualised only after staining the DNA with compound known as Ethidium bromide followed by exposure to UV radiations.</li> <li>- Bright orange coloured bands of DNA in a Ethidium bromide stained gell exposed to UV.</li> <li>- The separated of DNA bands are cut out from the agrose gel and process extracted from the gel piece. This process is elution.</li> <li>- The DNA fragmetns are purified can be used for constructing recombinant DNA by joining them with cloning vectors. (3M)</li> </ul>		
<p><b>45.</b> <b>Ans:</b></p>	<p><b>Explain the important points for the successful beekeeping.</b> The following points are important for successful bee-keeping.</p> <ol style="list-style-type: none"> <li>i. Knowledge of the nature and habits of bees</li> <li>ii. Selection of suitable location for keeping the beehives.</li> <li>iii. Catching the hiving of swarms (group of bees)</li> <li>iv. Management of beehives during different seasons, and</li> <li>v. Handling and collection of honey and of beeswax.</li> </ol>	05	168
<p><b>46.</b> <b>Ans:</b></p>	<p><b>Describe the secondary treatment process of sewage treatment.</b></p> <ul style="list-style-type: none"> <li>• The effluent obtained from primary treatment is passed into large aeration tanks where it is constantly agitated air is pumped into it. This allows vigorous growth of useful aerobic microbes into flocs.</li> <li>• Flocs are the masses of bacteria associated with fungal filaments to form mesh like structure.</li> <li>• While growing, the microbes consume major part of organic matter. This significantly reduces the BOD (biochemical oxygen demand)</li> <li>• BOD refers to the amount of the oxygen that would be consumed if all the organic matter in one litre of water were oxidised by bacteria.</li> <li>• The BOD test measures the rate of uptake of oxygen by micro-organisms, the greater the BOD of waste water, more is its polluting potential.</li> <li>• The effluent is then passed into a settling tank where the bacterial ‘flocs’ are allowed to sediment and the sediment is called activated sludge.</li> <li>• A small part of the activated sludge is pumped back into the aeration tank to serve as the inoculum.</li> <li>• The remaining major part of the sludge is pumped into large tanks called anerobic sludge diagesters where other kinds of bacteria grow anaerobically which digest the bacteria and the fungi in the sludge.</li> <li>• During digeston, bacteria produce a mixture of gases such as methane, hydrogen sulphide and carbon dioxide which form biogas.</li> <li>• The effluent from the secondary treatment plant is generally released into natural water bodies like rivers and steams.</li> </ul>	05	184
<p><b>47.</b> <b>Ans:</b></p>	<p><b>Give an account on the development of Bt. Cotton plant.</b></p> <ul style="list-style-type: none"> <li>• Some strains of <i>Bacillus thuringiensis</i> have proteins that kill insects like coleopterans (beetles), lepidopterans (tobacco budworm, armyworm) &amp; dipterans (flies, mosquitoes).</li> <li>• <i>B. thuringiensis</i> forms protein crystals during particular phase of their growth.</li> <li>• These crystals contain a toxic insecticidal protein</li> </ul>	05	208, 209



Q. No.	Answer / Value Points	Marks	Page No.
	<ul style="list-style-type: none"> <li>• These insecticidal do not kill the <i>Bacillus</i> as it exists as inactive protoxins.</li> <li>• When an insect ingests the toxin, it becomes active due to alkaline pH of the gut which solubilise the crystals. Toxin binds to surface of mid-gut epithelial cells creating pores. It causes cell swelling and lysis and death of the insect.</li> <li>• <b>Bt toxin genes</b> were isolated from <i>B. thuringiensis</i> and incorporated into crop plants such as cotton.</li> <li>• Most Bt toxins are insect-group specific. They are coded by <b>cry genes</b>. E.g. proteins encoded by <i>cryIAc</i> &amp; <i>cryIIAb</i> genes control cotton bollworms.</li> </ul>		
<p><b>48.</b></p> <p><b>Ans:</b></p>	<p><b>Write a note on Decomposition process.</b></p> <ul style="list-style-type: none"> <li>• Decomposers break down complex organic matter into inorganic substances like carbon dioxide, water and nutrients and the process is called decomposition.</li> <li>• Dead plant remains such as leaves, bark, flowers and dead remains of animals, including fecal matter is called detritus.</li> <li>• Detritus is the raw material for decomposition.</li> <li>• Detritivores are the organisms break down detritus into smaller particles. Example-Earthworm</li> <li>• The important steps in the process of decomposition are fragmentation, leaching, catabolism, humification and</li> <li>• <b>Fragmentation</b> is the breaking down of detritus into smaller particles.</li> <li>• The process by which water-soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts is called as <b>leaching</b>.</li> <li>• The process by which bacterial and fungal enzymes degrade detritus into simpler inorganic substances called as <b>catabolism</b>.</li> <li>• <b>Humification</b> is the accumulation of a dark coloured amorphous substance called humus.</li> <li>• The humus is further degraded by some microbes and release of inorganic nutrients occur by the process known as mineralisation.</li> </ul> <p><b>Factor affecting the rate of decomposition</b></p> <ul style="list-style-type: none"> <li>• Large amount of oxygen is required for decomposition as it is an energy requiring process.</li> <li>• <b>Chitin</b> and <b>lignin</b> present in detritus slower the rate of decomposition.</li> <li>• Nitrogen and water-soluble substances like sugars in detritus increases the rate of decomposition.</li> <li>• Warm and moist environment favour decomposition whereas low temperature, dryness and anaerobiosis inhibit decomposition.</li> </ul>	05	243, 244
<p><b>49.</b></p> <p><b>Ans:</b></p>	<p><b>With a neat labelled diagram, explain the process of removal of air pollutants by using electrostatic precipitator</b></p>  <ul style="list-style-type: none"> <li>• Electrostatic precipitator can remove over 99 per cent particulate matter present in the exhaust from a thermal power plant.</li> <li>• It has electrode wires that are maintained at several thousand volts, which produce a corona that releases electrons.</li> </ul>	05	271

Q. No.	Answer / Value Points	Marks	Page No.
	<ul style="list-style-type: none"> <li>• The electrons attach to dust particles giving them a net negative charge.</li> <li>• The collecting plates are grounded and attract the charged dust particles.</li> <li>• The velocity of air between the plates must be low enough to allow the dust to fall.</li> </ul>		
<p><b>50.</b> <b>Ans:</b></p>	<p><b>Define the following terms:</b></p> <p><b>a) Adaptations:</b> Adaptation is any attribute of the organism (morphological, physiological, behavioural) that enables the organism to survive and reproduce in its habitat.</p> <p><b>b) Natality:</b> Natality refers to the number of births during a given period in the population that are added to the initial density.</p> <p><b>c) Mortality:</b> Mortality is the number of deaths in the population during a given period.</p> <p><b>d) Immigration:</b> Immigration is the number of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration.</p> <p><b>e) Emigration:</b> Emigration is the number of individuals of the population who left the habitat and gone elsewhere during the time period under consideration.</p>	05	228