# Blow Up Syllabus

## II PUC BIOLOGY (36)

| UNIT VI : REPRODUCTION – 29 HOURS | | |
|---|---|---|
| 1 | **Chapter 1 : Reproduction in Organisations** | **5 Hrs** |
| | **1.1 Asexual Reproduction**<br>Budding (yeast), Binary fission, encystation and sporulation (Amoeba) with diagramatic explanation, Zoospore (Chlamydomonas),conidia(penicillium),buds(hydra) gemmules (sponges) and Fragmentation<br>Vegetative propagation - Definition and mentioning the vegetative propagules like runner, sucker rhizome (ginger and banana), tuber (potato), offset(water hyacinth) bulbil (agave) and leaf buds (Bryophyllum) | 2Hrs |
| | 1.2 Sexual Reproduction - Definition, phases of life cycle-juvenile, reproductive and senescence phases, oestrus and menstrual cycles.<br>**Events in sexual reproduction**<br>1.2.1 Pre-fertilization Events<br>1.2.1.1 Gametogenesis<br>1.2.1.2 Gamete Transfer<br>1.2.2 Fertilisation, types (external and internal fertilization); parthenogenesis | 2 Hrs |
| | 1.2.3 Post-fertilization events<br>1.2.3.1 The Zygote<br>1.2.3.2 Embryogenesis, Oviparous and Viviparous animals | 1 Hr |
| 2 | **Chapter 2 : Sexual Reproduction in Flowering Plants** | **10 Hrs** |
| | 2.1 Flower L S of flower<br>2.2 Pre-fertilization : Structure and Events<br>2.2.1 Stamen, Microsporangium and Pollen Grain<br>2.2.2 Pistil, Megasporangium (ovule) and Embryo sac | 3 ½ Hrs |
| | 2.2.3 Pollination Kinds of pollination, Agents of pollination<br>Out breeding devices, Pollen pistil interaction, Artificial hybridization | 3 ½ Hrs |
| | 2.3 Double Fertilization<br>2.4 Post-fertilization : Structures and events<br>2.4.1 Endosperm<br>2.4.2 Embryo<br>2.4.3 Seed<br>2.5 Apomixis and Polyembryony | 3 Hrs |

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| 3 | **Chapter 3 : Human Reproduction** | **9 Hrs** |
| | 3.1: The male reproductive system | 1 ½ Hrs |
| | 3.2 The female reproductive system | 1 ½ Hrs |
| | 3.3 Gametogenesis | 3 Hrs |
| | 3.4 Menstrual Cycle | 1 Hr |
| | 3.5 Fertilisation and Implantation<br>3.6 Pregnancy and Embryonic Development | 1 Hr |
| | 3.7 Parturition and Lactation | 1 Hr |

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| 4 | **Chapter 4 : Reproductive and Strategies** | **5 Hrs** |
| | 4.1 Reproductive Health Problems and Strategies | 1 Hrs |
| | 4.2 Population Explosion and Birth Control | 1 ½ Hrs |
| | 4.3 Contraception and Medical Termination of Pregnancy (MTP)<br>4.4 Sexually transmitted Diseases (STD s) | 1 Hr |
| | 4.5 Infertility | 1 ½ Hrs |

**UNIT VII : GENETICS AND EVOLUTION – 30 HOURS**

| | | |
|---|---|---|
| 5 | **Chapter 5 : Principle of Inheritance and Variation** | **12 Hrs** |
| | 5.1 Mendel s Laws of Inheritance | 1 Hr |
| | 5.2 Inheritance of One Gene<br>5.2.1 Law of Dominance<br>5.2.2 Law of Segregation<br>5.2.2.1 Incomplete Dominance<br>5.2.2.2 Co-dominance | 3 Hrs |
| | 5.3 Inheritance of Two Genes<br>5.3.1 Law of Independent Assortment<br>5.3.2 Chromosomal theory of Inheritance<br>5.3.3 Linkage and Recombination | 4 ½ Hrs |
| | 5.4 Sex Determination<br>5.4.1 Sex Determination in Human | 1 Hr |
| | 5.5 Genetic Disorders<br>5.6.2 Mendelian Disorders<br>5.6.3 Chromosomal Disorders | 2 ½ Hrs |
| 6 | **Chapter 6 : Molecular Basis of Inheritance** | **12 Hrs** |
| | 6.1 The DNA<br>6.1.1 Structure of Polynucleotide chain<br>6.1.2 Packaging of DNA Helix | 1 Hrs |

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| | 6.2 The search for Genetic Material<br>6.2.1 The Genetic Material is DNA(Griffith and Avery experiments)<br>6.2.2 Properties of Genetic Material (DNA versus RNA) | 2 Hrs |
| | 6.3 RNA World<br>6.4 Replication<br>6.4.2 The Machinery and the Enzymes | 1 Hr |
| | 6.5 Transcription<br>6.5.1 Transcription Unit<br>6.5.2 Transcription Unit and the Gene<br>6.5.3 Types of RNA and the process of transcription | 2 Hrs |
| | 6.6 Genetic Code<br>6.6.2 t RNA the Adapter Molecule | 2 Hrs |
| | 6.7 Translation | 1 Hr |
| | 6.8 Regulation of Gene Expression<br>6.8.1 The Lac Operon | 1 Hr |
| | 6.9 Human Genome Project<br>6.9.1 Salient Features of Human Genome<br>6.9.2 Application and Future Challenges (excluding methodologies)<br>6.10 DNA Fingerprinting | 1 Hr<br><br><br>1 Hr |
| 7 | **Chapter 7 : Evolution** | **6 Hours** |
| | 7.1 Origin of Life | 1 Hr |
| | 7.2 Evolution of Life Forms A Theory<br>7.3 Evidences for Evolution (homology, analogy and embryological: Mentioning the paleontological evidence) | 2 Hr |
| | 7.4 Adaptive Radiation in Darwin s Finches | ½ Hr |
| | 7.6 Mechanism of Evolution | ½ Hr |
| | 7.7 Hardy Weinberg Principle (mentioning of 5 factors affecting Hardy-Weinberg equilibrium) | 1 Hr |
| | 7.9 Origin and Evolution of Man (mentioning the stages of human evolution) | 1 Hr |
| | **UNIT VIII : BIOLOGY IN HUMAN WELFARE – 25 HRS** | |
| 8 | **CHAPTER 8 : HUMAN HEALTH AND DISEASE** | **10 Hours** |
| | 8.1 Pathogen definition, Mentioning of diseases, causes and symptoms of Typhoid, Pneumonia, Common cold Malaria (excluding life-cycle of Plasmodium), Amoebiosis, Ascariasis and Filariasis (excluding prevention and control) | 2 Hrs |

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| | 8.2 IMMUNITY<br>8.2.1 - Innate immunity<br>8.2.2 Acquired immunity (including antibody structure)<br>8.2.4 Vaccination and immunization<br>8.2.5 Allergies (short notes)<br>8.2.6 Autoimmunity definition | 3 Hrs | |
| | 8.3 AIDS<br>Causes<br>HIV replication in detail<br>Symptoms<br>Diagnostic test<br>Prevention | 1 Hr | |
| | 8.4 CANCER<br>Definition<br>Types (Benign and malignant only)<br>Causes<br>Detection<br>Diagnosis<br>Treatment | 1 Hr | |
| | 8.5 DRUGS AND ALCOHOL ABUSE<br>Opioids (excluding chemical structure),<br>Cannabinoids (excluding chemical structure).<br>Cocaine<br>Hallucinogens<br>Sedatives<br>Smoking ( effects of tobacco smoke)<br>8.5.1 Adolescence and Drug abuse<br>8.5.2 Addiction and Dependence (including withdrawal symptoms)<br>8.5.3 Effects of drug abuse<br>8.5.4 Prevention and Control | 3 Hrs | |
| 9 | **CHAPTER 9 – STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION** | | **9 Hours** |
| | 9.1 ANIMAL HUSBANDRY<br>9.1.1 Management of farms and farm animals<br>9.1.1.1 Dairy farm management<br>9.1.1.2 Poultry farm management<br>9.1.2 Animal Breeding<br>Inbreeding<br>Outbreeding<br>Outcrossing<br>Cross breeding<br>Interspecific hybridization<br>Controlled breeding (AI and MOET) | 4 Hrs | |
| | 9.2 PLANT BREEDING<br>9.2.1 Plant breeding detailed account (Steps in breeding to be explained) | 4 Hrs | |

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| | 9.3 SINGLE CELL PROTEIN | ½ Hr | |
| | 9.4 TISSUE CULTURE | ½ Hr | |
| 10 | **CHAPTER 10 : MICROBES IN HUMAN WELFARE** | | **6 Hrs** |
| | 10.1 MICROBES IN HOUSEHOLD PRODUCTS<br>(Curds, Doughening and Alcohol i.e., Toddy) | 1 Hr | |
| | 10.2 MICROBES IN INDUSTRIAL PRODUCT<br>10.2.1 Fermented beverages<br>10.2.2 Antibodies<br>10.2.3 Chemicals, Enzymes and other molecules | 2 Hrs | |
| | 10.3 MICROBES IN SEWAGES TREATMENT<br>(Detailed account of Primary treatment, Secondary treatment and BOD concept)<br>Ganga Action Plan (To be mentioned)<br>Yamuna Action Plan (To be mentioned)<br>10.4 MICROBES IN THE PRODUCTION OF BIOGAS<br>(Including a typical biogas plant)<br>10.5 MICROBES AS BIOCONTROL AGENTS | 1 Hr<br><br><br><br>1 Hr<br><br>½ Hr | |
| | 10.6 MICROBES AS BIOFERTILIZERS | ½ Hr | |
| | **UNIT IX – BIOTECHNOLOGY : 12 Hours** | | |
| 11 | **CHAPTER 11 : BIOTECHNOLOGY : PRINCIPLES AND PROCESSES** | | **7 Hrs** |
| | 11.1 Principles of Biotechnology<br>11.2 Tools of Recombination DNA Technology<br>11.2.1 Restriction Enzymes<br>11.2.2 Cloning Vectors<br>11.2.3 Competent Host<br>11.3 Processes of Recombinant DNA Technology<br>11.3.1 Isolation of the Genetic Material (DNA)<br>11.3.2 Cutting o DNA at Specific Locations<br>11.3.4 Insertion of Recombination DNA into the Host cell/Organism<br>11.3.5 Obtaining the Foreign Gene Product<br>11.3.6 Downstream Processing | | |
| 12 | **CHAPTER 12 : BIOTECHNOLOGY AND ITS APPLICATIONS** | | **5 Hrs** |
| | 12.1 Biotechnology Applications in Agriculture(Bt cotton only)<br>12.2 Biotechnological Applications in Medicine<br>12.2.1 Genetically engineered insulin<br>12.2.2 Gene Therapy<br>12.4 Ethical Issues | | |

| UNIT X – ECOLOGY : 24 Hours | | |
|---|---|---|
| 13 | CHAPTER 13 : ORGANISMS AND POPULATIONS | 7 Hrs |
| | 13.1 Organisms and its environment | ½ Hr |
| | 13.1.1 Major abiotic factors | ½ Hr |
| | 13.1.2 Responses to abiotic factors<br>13.1.3 AdAptations | 1 Hr<br>½ Hr |
| | 13.2. Populations<br>13.2.1 Population attributes | 1 Hr |
| | 13.2.2 Population growth | 1½ Hrs |
| | 13.2.4 Population interactions | 2 Hrs |
| 14 | CHAPTER -14 : ECOSYSTEM | 6 ½ Hrs |
| | 14.1 Ecosystem structure and function<br>14.2. Productivity<br>14.3 Decomposition | 1 ½ Hrs |
| | 14.4. Energy flow<br>14.5 Ecological pyramids | 2 Hrs |
| | 14.6 Ecological succession<br>14.6.1 Succession of plants | 1 ½ Hrs |
| | 14.7 Nutrient cycling<br>14.7.1 Ecosystem carbon cycle<br>14.7.2 Ecosystem phosphorous cycle<br>Note: Simple schematic representation to be given. | 1 Hr |
| | 14.8. Ecosystem services | ½ Hr |
| 15 | CHAPTER – 15 – BIODIVERSITY AND CONSERVATION | 3 ½ Hrs |
| | 15.1 Biodiversity-Types<br>15.1.1 Biodiversity of world and India | ½ Hr |
| | 15.1.3 The importance of species diversity to the ecosystem | 1 Hr |
| | 15.1.4 Loss of biodiversity<br>15.2 Biodiversity conservation | 1 Hr |
| | 15.2.1 Why should we conserve biodiversity?<br>15.2.2 How do we conserve biodiversity? | 1 Hr |
| 16 | Chapter -16 : Environmental issues | 7 Hrs |
| | 16.1. Air pollution and its control. | 1 Hr |
| | 16.2. Water pollution and its control.<br>16.2.1 Domestic sewage and industrial effluents | 1 Hr |
| | 16.2.2 A case study of integrated waste water treatment | 1 Hr |
| | 16.3 Solid wastes<br>16.3.1 A case study of remedy for plastic waste<br>16.4 Agrochemicals and their effects. | 1 ½ Hrs |

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| | 16.5. Radioactive wastes.<br>16.6 Green house effect and global warming<br>16.7 Ozone depletion in the stratosphere | 1 ½ Hrs |
| | 16.8. Degradation by improper resource utilization and maintenance.<br>16.9 Deforestation<br>16.9.1 A case study of people s participation in conservation of forests. | 1 Hr |
| | **Total number of teaching Hours** | **120 Hrs** |

# Design of Question Paper

Class : II PUC

Subject : Biology

Code : 36

Time : 3Hours 15 Minutes*(of which minutes for reading the questions Paper).*

Max.Marks:70

**The weightage of the distribution of marks over different dimensions of the question paper shall be as follows:**

A. Weightage to Objectives:

| Objective | Weightage % | Marks |
|---|---|---|
| Knowledge | 40% | 42 |
| Understanding | 30% | 33 |
| Application | 15% | 15 |
| Skill | 15% | 15 |

Note : 1% or 2% variation is allowed per objective.

## B. Weightage to unit/chapter in Biology

| Unit | Chapter No | Description | No of Hours | Marks | Total Marks |
|---|---|---|---|---|---|
| VI | 1 | Reproduction in organisms | 05 | 05 | 25 |
| | 2 | Sexual reproduction in flowering plants | 10 | 08 | |
| | 3 | Human reproduction | 09 | 07 | |
| | 4 | Reproductive Health | 05 | 05 | |
| VII | 5 | Principle of Inheritance and variation | 12 | 10 | 25 |
| | 6 | Molecular Basis of inheritance | 12 | 10 | |
| | 7 | Evolution | 06 | 05 | |
| VIII | 8 | Human health and diseases | 10 | 08 | 22 |
| | 9 | Strategies for enhancement of food products | 09 | 08 | |
| | 10 | Microbes in Human welfare | 06 | 06 | |
| IX | 11 | Biotech : Principles and Processes | 07 | 06 | 11 |
| | 12 | Biotech : Application | 05 | 05 | |
| X | 13 | Organism and Population | 07 | 06 | 22 |
| | 14 | Ecosystem | 06 1/2 | 06 | |
| | 15 | Biodiversity and Conservation | 03 1/2 | 04 | |
| | 16 | Environmental Issues | 07 | 06 | |
| Total | | | 120 | | 105 |

**Note** Variation of one mark per chapter/unit is allowed. However the total marks should not exceed 105.

## C. Weightage to forms of Questions:

| Part | Type of questions | Main | Number of question to be set | Number of question to be answered | Units to be covered |
|---|---|---|---|---|---|
| A | 1 mark –Very short answer(VSA) | | 10 | 10 | All Units (05 Units) |
| B | 2 marks –short answer(SA1) | | 8 | 5 | |
| C | 3 marks –short answer(SA2) | | 8 | 5 | |
| D | 5 marks –long answer(LA) | Sec-I | 06 | 04 | |
| | | Sec-II | 05 | 03 | |

## D. Weightage to level of difficulty:

| Level | Weightage% | Marks |
|---|---|---|
| Easy | 40% | 28 |
| Average | 40% | 28 |
| Difficult | 20% | 14 |

General instructions:

- Questions should be clear, unambiguous understandable and free from grammatical errors.
- Questions which are based on same concepts, law, fact etc. and which generate the same answer should not be repeated under different forms(VSA,SA and LA)

## BLUE PRINT FOR SUMMATIVE ASSESSMENT
## 2nd YEAR PUC -SUBJECT: BIOLOGY (36)
## CHAPTER-WISE WEIGHTAGE

| UNIT NO | HOURS | CHAPTER | HOURS | MARKS PER UNIT | KNOWLEDGE | | | | UNDERSTANDING | | | | APPLICATION/ APPRECIATION | | | | SKILL | | | | TOTAL | | | | TOTAL MARKS | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | | |
| **UNIT VI. REPRODUCTION** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VI | 29 | 1.REPRODUCTION IN ORGANISMS | 5 | 25 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | 1 | - | 5 | |
| | | 2. SEXUAL REPRODUCTION IN FLOWERING PLANTS | 10 | | - | - | - | - | - | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 8 | |
| | | 3.HUMAN REPRODUCTION | 9 | | 1 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 2 | - | - | 1 | 7 | |
| | | 4. REPRODUCTIVE HEALTH | 5 | | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 5 | |
| **UNIT VII. GENETICS AND EVOLUTION** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VII | 36 | 5. PRINCIPLES OF INHERITANCE AND VARIATION | 12 | 26 | - | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | 1 | 10 | |
| | | 6. MOLECULAR BASIS OF INHERITANCE | 12 | | - | - | - | 1 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 2 | 10 | |
| | | 7. EVOLUTION | 6 | | 1 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - | 6 | |
| **UNIT VIII. BIOLOGY AND HUMAN WELFARE** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VIII | 25 | 8. HUMAN HEALTH AND DISEASE | 10 | 21 | 1 | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 1 | - | - | 2 | 1 | 1 | - | 7 | |
| | | 9. STRATEGIES FOR ENHANCEMENT OF FOOD PRODUCTION | 9 | | 1 | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | 1 | 1 | - | 1 | 8 | |
| | | 10. MICROBES INHUMAN WELFARE | 6 | | 1 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 6 | |
| **UNIT IX. BIOTECHNOLOGY** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IX | 12 | 11.BIOTECHNOLOGY:PRICNIPLES AND PROCESSES | 7 | 11 | 1 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 | - | - | 1 | 1 | 1 | - | 6 | |
| | | 12. BIOTECHNOLOGY AND ITS APPLICATIONS | 5 | | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 | 5 | |
| **UNIT X. ECOLOGY** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X | 24 | 13. ORGANISMS AND POLULATION | 7 | 22 | - | - | - | - | - | - | 1 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 6 | |
| | | 14 ECOSYSTEM | 6½ | | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 2 | - | 6 | |
| | | 15. BIODIVERSITY AND CONSERVATION | 3½ | | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 2 | - | - | 4 | |
| | | 16. ENVIRONMENTAL ISSUES | 7 | | - | - | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 6 | |
| | 120 | TOTAL | 120 | 105 | | | | | | | | | | | | | | | | | 10 | 8 | 8 | 11 | 105 | |

MODEL QUESTION PAPER
SUBJECT: BIOLOGY (36)
2nd year PUC

**Time: 3 Hours and 15 minutes** **Max Marks: 70**

**GENERAL INSTRUCTIONS:**

**i) This question paper consists of four parts A, B, C and D .Part D consists of two parts, Section-I and Section-II.**
**ii) All the Parts are Compulsory.**
**iii) Draw diagrams wherever necessary. Unlabelled diagrams or illustrations do not attract any marks.**

## PART-A

**Answer the following questions in One Word or One Sentence each: -** 10x1=10

1. Name the hormone that induces rupturing of Graafian follicle.
2. Sertoli cells are very much essential during spermatogenesis. Why?
3. Define term 'saltation'.
4. Name the pathogen that causes amoebiasis.
5. What is micropropagation?
6. What are Flocs?
7. Mention significance of gel electrophoresis in rDNA technology.8. Why the cells of malignant tumors are considered dangerous?
9. Why Western Ghats are considered as one of the biodiversity hotspots?
10. "Some animals, if unable to migrate, might avoid the stress by escaping in time". Justify the statement citing one example.

## PART-B

**Answer any FIVE of the following questions in 3-5 sentences each, wherever applicable:** 5x2=10

11. What is parthenogenesis? Name an animal showing this.
12. Differentiate between incomplete dominance and co dominance.
13. "Darwin's finches represent one of the best examples for adaptive radiation". Comment.
14. Draw a neat labeled diagram of an antibody molecule.
15. What happens if there is a continuous inbreeding in animals? Discuss the strategy to overcome the problem associated with continuous inbreeding.
16. Draw a neat labeled diagram of sparged stirred tank bioreactor.
17. Write a note on co-extinction.
18. "India is rich in genetic diversity". Justify this statement by giving two examples.

## PART-C

**Answer any FIVE of the following Questions in 40-80 words each, wherever applicable.** 5x3=15

19. Name the following:
i) Asexual reproductive structures of *Hydra*.
ii) Vegetative propagules of *Agave*.
iii)The plant that flowers once in twelve years.
20. Differentiate between Microsporogenesis and megasporogenesis.
21. By using Punnet square, schematically represent the dihybrid cross experiment conducted by Mendel using seed color and seed shape of pea as characters.
22. a) Write a note on homologous organs. (2)
b) Write the scientific name of man like primate who probably lived in East African grasslands about 3-4 million years ago. (1)

23. Describe the effects of drug abuse.
24. Write a note on downstream processing.
25. Draw a simplified schematic representation of phosphorous cycle.
26. Define ecological succession. Mention the two types of succession in plants based on the nature of the habitat. What is a pioneer species?

## PART-D

### *Section-I*

**Answer any FOUR of the following questions on 200-250 words each, wherever applicable. 4x5=20**

27. Explain how some plants are adapted for achieving pollination through wind.
How *Vallisneria and* seagrasses achieve pollination?
28. a) Draw a neat labelled diagram of sectional view of seminiferous tubule(3).
b) Explain the mechanism of parturition with the help of fetal ejection reflex (2).
29. What is infertility? How infertility is treated by assisted reproductive technologies like IVF-ET and ZIFT?
30. What are the salient features of double helical structure of DNA?
31. Draw the schematic structure and explain the different regions of a transcription unit.
32. Discuss the contribution of Sutton and Boveri by making a comparison between the behavior of chromosomes and genes during meiosis, to explain Mendel's Laws.

### *Section-II*

**Answer any THREE of the following questions in 200-250 words each, wherever applicable. 3x5=15**

33. Explain the main steps involved in the breeding of a new genetic variety of crop plants.
34. "Genetically modified plants can reduce the use of chemical pesticides". Justify the statement. Write a note each on *Bt* toxin and *Bt* cotton.
35. a) Describe the roles of: i) Microbes in biogas production (2) ii) Mycorrhiza as biofertilizer (2)
b) Name the fungus that produces cyclosporin A (1).
36. a) Explain how Mediterranean orchid adapted to achieve pollination. (2)
b) Describe the importance of predators in an ecosystem (2).
c) What is Gause's "competitive exclusion principle"?
37. Describe the participation of people in the conservation of forests in India by taking Bishnói community incident and Chipko movement as examples. Add a note on Joint Forest Management.

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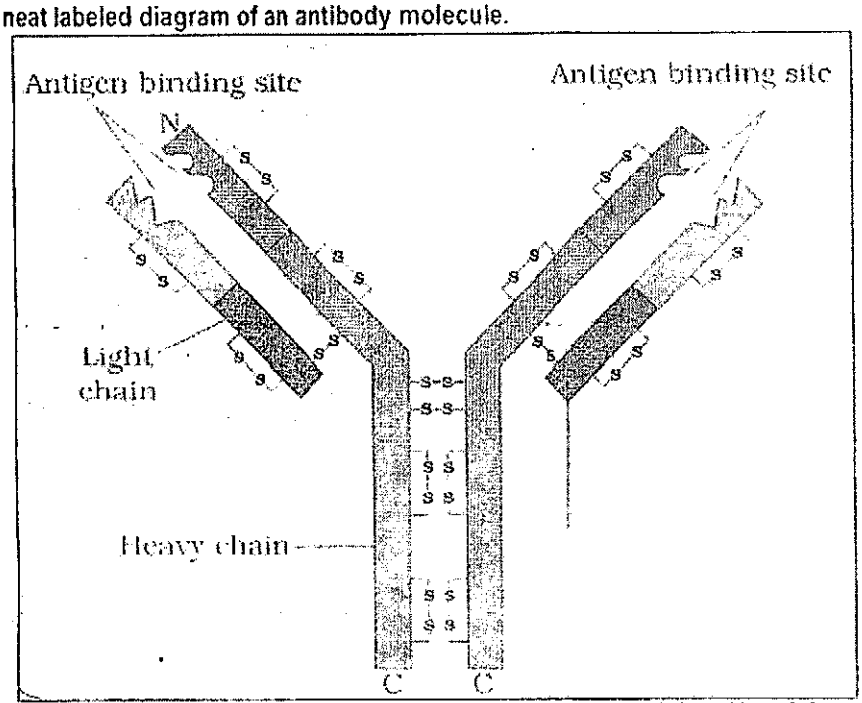
MODEL QUESTION PAPER
SUBJECT: BIOLOGY (36)
2nd year PUC

# ANSWERS

| QUE NO. | ANSWERS/VALUE POINTS | MARKS | REFER PAGE NO. (IN THE TEXT BOOK) |
|---|---|---|---|
| | PART-A<br>Answer the following questions in One Word or One Sentence each: - 10x1=10 | | |
| 1 | **Name the hormone that induces rupturing of Graafian follicle.**<br>LH/Luteinizing *Hormone* | 1 | 51 |
| 2 | **Sertoli cells are very much essential during spermatogenesis. Why?**<br>Sertoli cells provide nutrition to the germ cells during spermatogenesis. | 1 | 43 |
| 3 | **Define term 'saltation'.**<br>Single step large mutation that caused the speciation is called saltation. | 1 | 135 |
| 4 | **Name the pathogen that causes amoebiasis.**<br>***Entamoeba histolytica*** | 1 | 148 |
| 5 | **What is micropropagation?**<br>The method of producing large number of plantlets in a short period of time through tissue culture is called micropropagation. | 1 | 177 |
| 6 | **What are Flocs?**<br>Flocs are masses of bacteria associated with fungal filaments to form mesh like structures formed during secondary treatment of sewage. | 1 | 184 |
| 7 | **Mention significance of gel electrophoresis in rDNA technology.**<br>The fragments of DNA obtained after cutting of DNA by restriction endonucleases can be separated by Gel electrophoresis. | 1 | 198 |
| 8 | **Why the cells of malignant tumors are considered as dangerous?**<br>These cells grow very rapidly, invading and damaging the surrounding normal tissues.<br>**OR**<br>As the cells of malignant tumor actively divide and grow they also starve the normal cells by competing for vital nutrients.<br>**OR**<br>Cells sloughed from such tumors reach distant sites through blood, and wherever they get lodged in the body, they start a new tumor there.<br>-Any one -1 mark | 1 | 157 |
| 9 | **"Western Ghats are considered as one of the biodiversity hotspots". Why?**<br>Because Western Ghats are the regions with very high levels of species richness and high degree of endemism and hotspots are also regions of accelerated habitat loss. | 1 | 266 |
| 10 | **"Some animals, if unable to migrate, might avoid the stress by escaping in time". Justify the statement citing one example.**<br>For example,<br>Bears enter into a state called ***hibernation*** during winter to escape in time.<br>Some snails and fish go into ***aestivation*** to avoid summer-related problems such as heat and desiccation.<br>Many zooplankton species in lakes and ponds enter into a stage of suspended development called ***diapause***.<br>-Any one -1 mark | 1 | 225 |

**PART-B**

**Answer any FIVE of the following questions in 3-5 sentences each, wherever applicable:** 5x2=10

| | | | |
|---|---|---|---|
| 11 | **What is parthenogenesis? Name an animal showing this.**<br>The phenomenon of development of female gamete into a new organism without fertilization is called parthenogenesis.<br>-1 mark<br>Example: rotifers, honeybees and even some lizards and birds (turkey)<br>-Anyone-1 mark | 2 | 14 |
| 12 | **Differentiate between incomplete dominance and co dominance.**<br>Incomplete dominance is a condition where F1 has a phenotype that did not resemble either of the two parents and is in between the two.<br>Co-dominance is a condition in which the F-1 generation resembles both parents.<br>-2marks | 2 | 76-77 |
| 13 | **"Darwin's finches represent one of the best examples for adaptive radiation". Comment.**<br>In Galapagos Islands, Darwin observed the diversity of particular group of black birds that are later called Darwin's Finches.<br>There were many varieties of finches in the same island and all varieties evolved on the land itself.<br>From the original seed-eating features, many other forms with altered beaks evolved and this helped the finches to become insectivorous and vegetarian finches.<br>The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography or habitats is called **adaptive radiation**.<br>And Darwin's finches represent one of the best examples for adaptive radiation. | 2 | 132 - 133 |
| 14 | **. Draw a neat labeled diagram of an antibody molecule.**<br>  <br><br>-label- ½mark for each label | 2 | 151 |
| 15 | **What happens if there is a continuous inbreeding? Discuss the strategy to overcome the problem associated with continuous inbreeding.**<br>Continuous inbreeding reduces fertility and even productivity. This is called inbreeding depression<br>-1 mark<br>To overcome this problem, selected animals of breeding population should be mated with unrelated superior animals of the same breed. This helps in restoring fertility and yield.<br>-1 mark | 2 | 168 |

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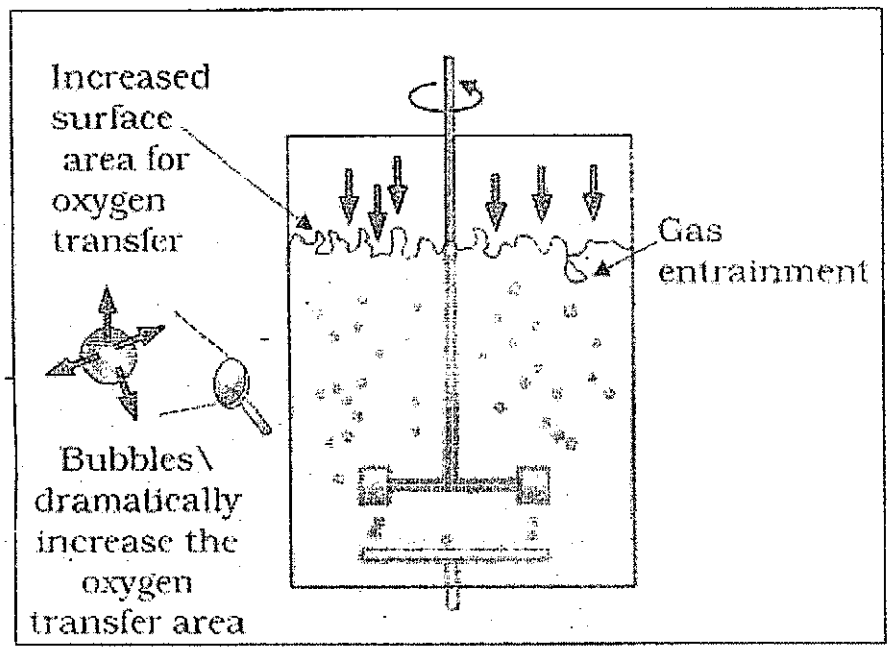
| 16 | **Draw a neat labeled diagram of sparged stirred tank bioreactor.**<br>  <br> | 2 | 204 |
| 17 | **Write a note on co-extinction.**<br>When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct.<br>When a host fish species becomes extinct, its unique assemblage of parasites also meets the same fate.<br>Another example is the case of a coevolved plant-pollinator mutualism where extinction of one invariably leads to the extinction of the other. | 2 | 265 |
| 18 | **"India is rich in genetic diversity". Justify this statement by giving two examples.**<br>Genetic diversity shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces.<br>India has more than 50,000 genetically different strains of rice,<br>India has more than1, 000 varieties of mango.<br>**-Any two examples- One mark for each example-2 marks** | 2 | 259 |
| | **PART-C**<br>**Answer any FIVE of the following Questions in 40-80 words each, wherever applicable.** | **5x3=15** | |
| 19 | **Name the following:**<br>i) Asexual reproductive structures of *Hydra.*<br>Buds<br>**-1 mark**<br>ii) Vegetative propagules of *Agave.*<br>Bulbils<br>**-1mark**<br>Iii) The plant that flowers once in twelve years<br>Neelakurunji/*Strobilanthus kunthiana*<br>**-1 mark** | 3 | 6-7 |

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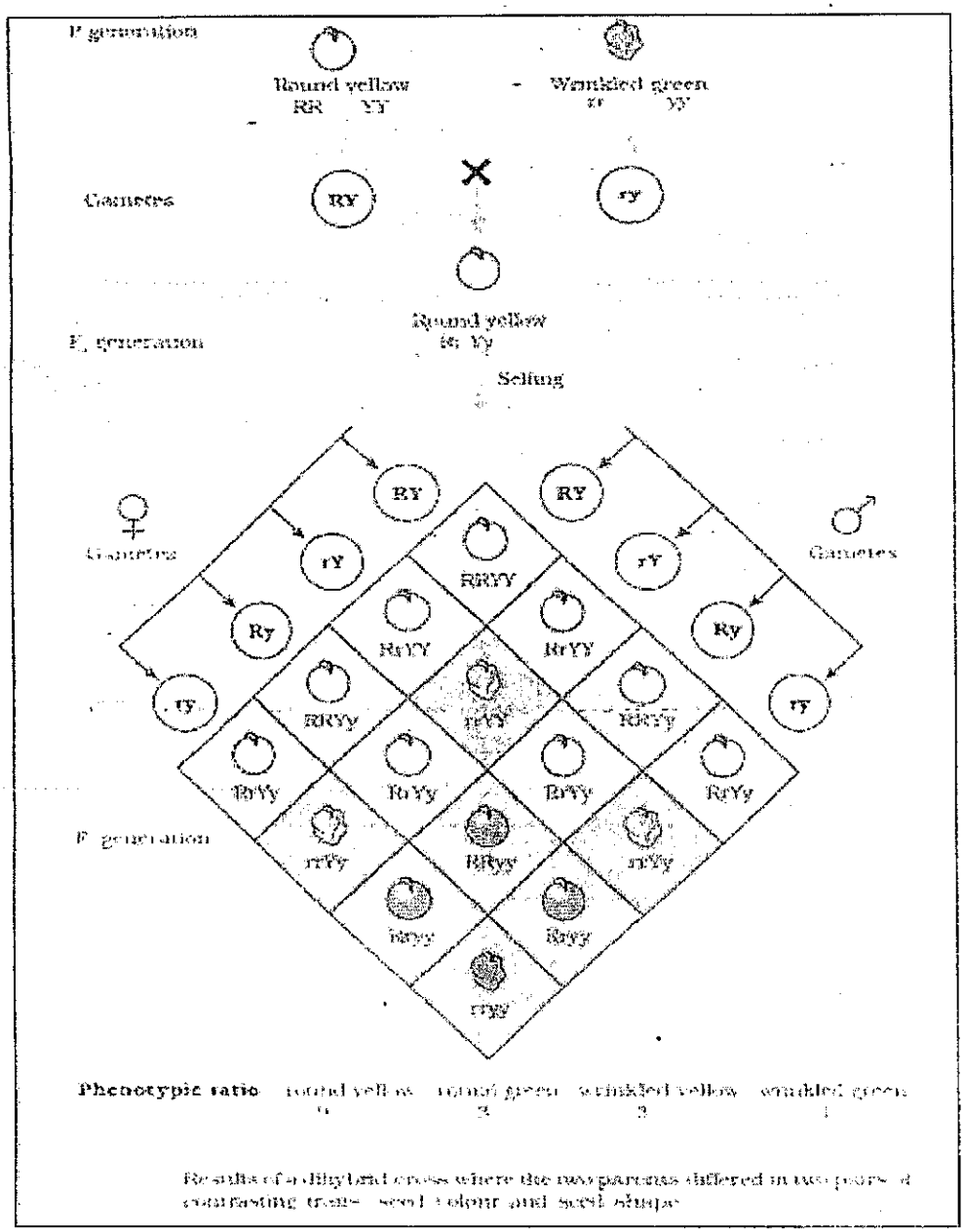
| 20 | **Differentiate between Microsporogenesis and megasporogenesis.**<br>Microsporogenesis and megasporogenesis:<br>Microsporogenesis is the process of formation of microspores from the pollen mother cell through meiosis, where as megasporogenesis is the process of formation of megaspore from megaspore mother cell.<br>**-1 mark**<br>Microsporogenesis occurs inside the pollen sac of anther whereas megasporogenesis occurs inside the ovule.<br>**-1 mark** | 3 | 22-25 |
| 21 | **By using Punnet square, schematically represent the dihybrid cross experiment conducted by Mendel using seed color and seed shape of pea as characters.**<br>  <br><br>{Note: diagrammatic representation of seeds is not needed}<br>**-3 marks** | 3 | 79 |

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| 22 | **a) Write a note on homologous organs. (2)**<br>Whales, bats, Cheetah and human (all mammals) share similarities in the pattern of bones of forelimbs.<br>These forelimbs perform different functions in these animals, they have similar anatomical structure, ie., all of them have humerus radius, ulna, carpals, metacarpals and phalanges in their forelimbs.<br>Hence, in these animals, the same structure developed along different directions due to adaptations to different needs and these structures are called **homologous structures.**<br>Homology indicates common ancestry. Other examples are vertebrate hearts or brains. In plants also, the thorn and tendrils of *Bougainvillea* and *Cucurbita* represent homology.<br>**-2 marks**<br>**b) Write the scientific name of man like primate who probably lived in East African grasslands about 3-4 million years ago. (1)**<br>*Australopithecines*<br>**-1 Mark** | 3 | 129 - 130 |
| 23 | **Describe the effects of drug abuse.**<br>The effects of drug abuse are<br>1. A drug/alcohol addict becomes the cause of mental and financial distress to his/her entire family and friends.<br>2.The most common warning signs of drug and alcohol abuse among youth include drop in academic performance, unexplained absence from school/college, lack of interest in personal hygiene, withdrawal, isolation, depression, fatigue, aggressive and rebellious behaviour, deteriorating relationships with family and friends, loss of interest in hobbies, change in sleeping and eating habits, fluctuations in weight, appetite, etc.<br>3. They (mis)use narcotic analgesics, anabolic steroids, diuretics and certain hormones in sports to increase muscle strength and bulk and to promote aggressiveness and as a result increase athletic performance.<br>4. The side-effects of the use of anabolic steroids in females include masculinisation (features like males), increased aggressiveness, mood swings, depression, abnormal menstrual cycles, excessive hair growth on the face and body, enlargement of clitoris, deepening of voice. In males it includes acne, increased aggressiveness, mood swings, depression, and reduction of size of the testicles, decreased sperm production, potential for kidney and liver dysfunction, breast enlargement, premature baldness, enlargement of the prostate gland. These effects may be permanent with prolonged use.<br>5. In the adolescent male or female, severe facial and body acne, and premature closure of the growth centers of the long bones may result in stunted growth.<br>6. The immediate adverse effects of drug abuse are manifested in the form of reckless behavior, vandalism and violence. Excessive doses of drugs may lead to coma and death due to respiratory failure, heart failure or cerebral hemorrhage.<br>7. Those who take drugs intravenously (direct injection into the vein using a needle and syringe), are much more likely to acquire serious infections like AIDS and hepatitis B.<br>**-Any three effects- 1 mark for each** | 3 | 161 - 162 |
| 24 | **Write a note on downstream processing.**<br>The downstream processing is an essential step where after completion of the biosynthetic stage of a drug, the product has to be subjected through a series of processes before it is ready for marketing as a finished product.<br>The processes include separation and purification, which are collectively called downstream processing.<br>The product has to be formulated with suitable preservatives. Such formulation has to undergo thorough clinical trials as in case of drugs. Strict quality control testing for each product is also required.<br>**-3marks** | 3 | 204 - 205 |

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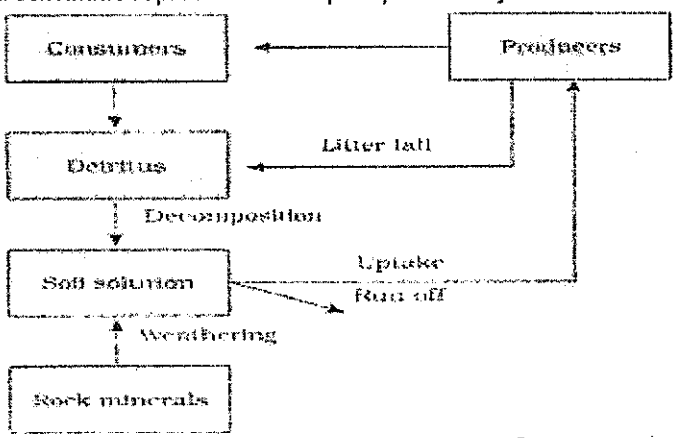
| 25 | **Draw a simplified schematic representation of phosphorous cycle.**<br>  <br><br>-3marks | 3 | 255 |
| 26 | **Define ecological succession. Mention the two types of succession in plants based on the nature of the habitat. What is a pioneer species?**<br>The gradual and fairly predictable change in the species composition of a given area is called ecological succession.<br>-1 mark<br>Types of succession: a) Hydrarch succession b) Xerarch succession.<br>-1 mark<br>Pioneer species are the species that invade a bare area during succession.<br>-1 mark | 3 | 250 - 256 |
| | **PART-D**<br>***Section-I***<br>**Answer any FOUR of the following questions on 200-250 words each, wherever applicable.** 4x5=20 | | |
| 27 | **Explain how some plants are adapted for achieving pollination through wind.**<br>**How *Vallisneria and* seagrasses achieve pollination?**<br><br>**Adaptations for achieving pollination through wind:**<br>Pollination by wind is more common amongst abiotic pollination and to achieve wind pollination, the pollen grains are light and non-sticky so that they can be transported in wind currents.<br>They often possess well-exposed stamens so that the pollens are easily dispersed into wind currents, and large often-feathery stigma to easily trap air-borne pollen grains.<br>Wind pollinated flowers often have a single ovule in each ovary and numerous flowers packed into an inflorescence<br>A good example is the corn cob, where the tassels are nothing but the stigma and style which wave in the wind to trap pollen grains.<br>-2 Marks<br>**Pollination in *Vallisneria and* seagrasses:**<br>In *Vallisneria*, the female flowers reach the surface of water by the long stalk and the male flowers or pollen grains are released on to the surface of water.<br>They are carried passively by water currents.<br>Some of them eventually reach the female flowers and the stigma.<br>In another group of water pollinated plants such as seagrasses, female flowers remain submerged in water and the pollen grains are released inside the water.<br>Pollen grains in many such species are long, ribbon like and they are carried passively inside the water. Some of them reach the stigma and achieve pollination.<br>In most of the water-pollinated species, pollen grains are protected from wetting by a mucilaginous covering.<br>-3 Marks | 5 | 29 |

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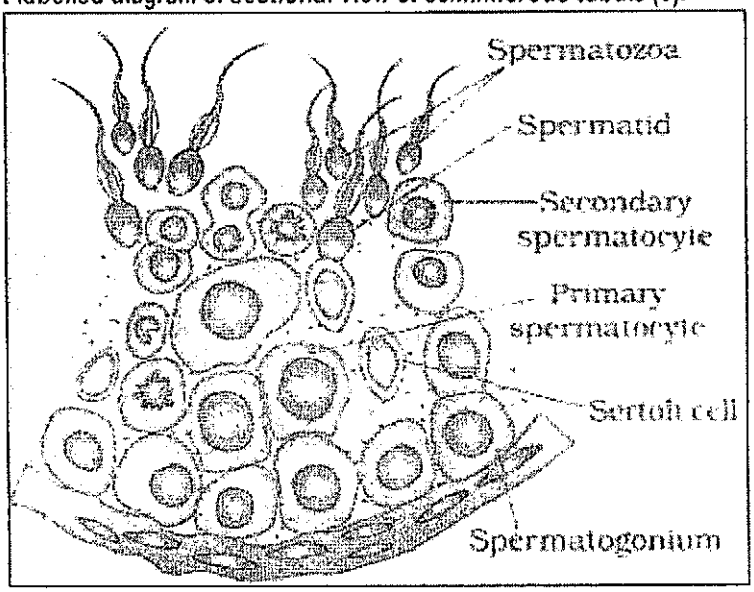
| 28 | **a) Draw a neat labelled diagram of sectional view of seminiferous tubule (3).**<br>  <br><br>**-½mark for each label-3 marks**<br>**b). Explain the mechanism of parturition with the help of fetal ejection reflex (2).**<br>Parturition is induced by complex neuro-endocrine mechanism.<br>The signals for parturition originate from the fully developed fetus and the placenta which induces mile uterine contractions called **fetal ejection reflex** and this triggers release of oxytocin from the maternal pituitary.<br>Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin.<br>The stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contraction, which results in the expulsion of baby from the uterus through birth canal.<br>**-2 marks** | 5 | 47<br><br>54 |
| 29 | **What is infertility? How infertility is treated by assisted reproductive technologies like IVF-ET and ZIFT?**<br>Infertility is the inability to produce children in spite of unprotected sexual co-habitation.<br>**-1Marks**<br>Infertile couples (male/female) could be assisted to have children through certain special techniques commonly known as **Assisted Reproductive Technologies (ART)**.<br>*In vitro* fertilization (IVF–fertilization outside the body in almost similar conditions as that in the body) followed by embryo transfer (ET) is one of such methods.<br>In this method, popularly known as test tube baby programme, ova from the wife/donor (female) and sperms from the husband/donor (male) are collected and are induced to form zygote under simulated conditions in the laboratory.<br>The zygote or early embryos (with up to 8 blastomeres) could then be transferred into the fallopian tube.<br>**-3Marks**<br>In zygote intra fallopian transfer (ZIFT) the zygote is transferred into the fallopian tube to complete its further development.<br>**-1 Mark** | 5 | 64 |
| 30 | **What are the salient features of double helical structure of DNA?**<br>The salient features of the Double-helix structure of DNA are as follows:<br>1. It is made of two polynucleotide chains, where the backbone is constituted by sugar-phosphate, and the bases project inside<br>2. The two chains have anti-parallel polarity. It means, if one chain has the polarity 5-'3', the other has 3'-5'. | 5 | 97-98 |

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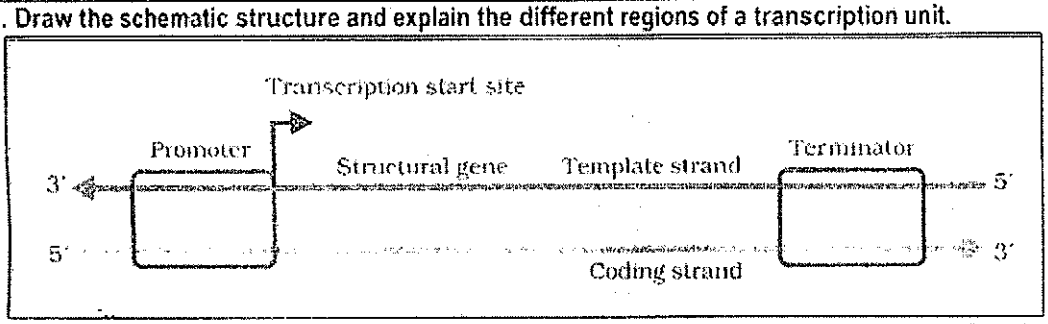
| | 3. The bases in two strands are paired through hydrogen bond forming base pairs. Adenine forms two hydrogen bonds with Thymine from opposite strand and vice-versa. Similarly, Guanine is bonded with Cytosine with three H-bonds. As a result, always a purine comes opposite to a pyrimidine. This generates approximately uniform distance between the two strands of the helix.<br>4. The two chains are coiled in a right-handed fashion. The pitch of the helix is 3.4 nm (a nanometer is one billionth of a meter, that is 10-9 m) and there are roughly 10 base pairs in each turn. Consequently, the distance between a base pair in a helix is approximately equal to 0.34 nm.<br>5. The plane of one base pair stacks over the other in double helix. This, in addition to H-bonds, confers stability of the helical structure.<br>**-Any five features-1mark for each feature** | | |
| 31 | **. Draw the schematic structure and explain the different regions of a transcription unit.**<br>  <br><br>**-2marks**<br>A transcription unit in DNA is defined primarily by the three regions in the DNA<br>**1. A promoter**<br>**2. The structural gene**<br>**3. A terminator**<br>The promoters and terminator flank the structural gene in a transcription unit. The promoter is located towards 5' end (upstream) of the structural gene. The promoter provides binding site for RNA polymerase.<br>Terminator is located towards 2' end (downstream) of the coding strand and it helps in ending the transcription process.<br>Structural genes are those that code for polypeptides and structural genes present in between promoter and terminator.<br>**-3 marks** | 5 | 108 - 109 |
| 32 | **Discuss the contribution of Sutton and Boveri by making a comparison between the behavior of chromosomes and genes during meiosis, to explain Mendel's Laws.**<br>Walter Sutton and Theodore Boveri noted that the behavior of chromosomes was parallel to the behavior of genes and used chromosome movement to explain Mendel's laws. Chromosomes as well as genes occur in pairs. The two alleles of a gene pair are located on homologous sites on homologous chromosomes.<br>**-1Mark**<br>**Comparison between the Behaviour of Chromosomes and Genes**<br>**Chromosomes** \| **Genes**<br>Occurs in pairs \| Occurs in pairs<br>Segregate at the time of gamete formation such that only one of each pair is transmitted to a gamete. \| Segregate at gamete formation such that only one of each pair is transmitted to a gamete.<br>Independent pairs segregate independently of each other. \| One pair segregates independently of another pair.<br>**-3 Marks**<br>Sutton and Boveri argued that the pairing and separation of a pair of chromosomes would lead to the segregation of a pair of factors they carried. Sutton united the knowledge of chromosomal segregation with Mendelian principles and called it the **Chromosomal theory of inheritance.**<br>**-1 Mark** | 5 | 80-83 |

| | *Section-II*<br>**Answer any THREE of the following questions in 200-250 words each, wherever applicable.** | **3x5=15** | |
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| 33 | **Explain the main steps involved in the breeding of a new genetic variety of crop plants.**<br>**(i) Collection of variability:**. Collection and preservation of all the different wild varieties, species and relatives of the cultivated species (followed by their evaluation for their characteristics) is a pre-requisite for effective exploitation of natural genes available in the populations.<br>**(ii) Evaluation and selection of parents:** The germplasm is evaluated so as to identify plants with desirable combination of characters. The selected plants are multiplied and used in the process of hybridization. Purelines are created wherever desirable and possible.<br>**(iii) Cross hybridization among the selected parents:** The desired characters have very often to be combined from two different plants (parents), for example high protein quality of one parent may need to be combined with disease resistance from another parent. This is possible by cross hybridizing the two parents to produce hybrids that genetically combine the desired characters in one plant.<br>**(iv) Selection and testing of superior recombinants:** This step consists of selecting, among the progeny of the hybrids, those plants that have the desired character combination. This step yields plants that are superior to both of the parents. These are self-pollinated for several generations till they reach a state of uniformity (homozygosity), so that the characters will not segregate in the progeny.<br>**(v) Testing, release and commercialization of new cultivars:** The newly selected lines are evaluated for their yield and other agronomic traits of quality, disease resistance, etc. This evaluation is done by growing these in the research fields and recording their performance under ideal fertilizer application, irrigation, and other crop management practices.<br>**-5 marks** | 5 | 171 |
| 34 | **"Genetically modified plants can reduce the use of chemical pesticides". Justify the statement. Write a note each on *Bt* toxin and *Bt* cotton.**<br>Since the genes introduced into the plants can produce the pest killing toxins in the plants itself, the farmers need not spray pesticides.<br>**-1 mark**<br>***Bt* toxin:**<br>*Bt* toxin is produced by a bacterium called *Bacillus thuringiensis*(Bt).<br>Some strains of *Bacillus thuringiensis* produce proteins that kill certain insects such as lepidopterans (tobacco budworm, armyworm), coleopterans (beetles) and dipterans (flies, mosquitoes).<br>*B. thuringiensis* forms protein crystals during a particular phase of their growth and these crystals contain a toxic insecticidal protein.<br>The activated toxin binds to the surface of midgut epithelial cells and creates pores that cause cell swelling and lysis and eventually cause death of the insect.<br>**-2Marks**<br>***Bt* cotton:**<br>*Bt* cotton is a transgenic cotton variety that contains a gene from a bacterium *Bacillus thuringiensis*. The product of the gene can kill the insect.<br>Specific *Bt* toxin genes were isolated from *Bacillus thuringiensis* and incorporated into the cotton plants.<br>The choice of genes depends upon the crop and the targeted pest, as most *Bt* toxins are insect-group specific.<br>The toxin is coded by a gene named *cry*. There are a number of them, for example, the proteins encoded by the genes *cryIAc* and *cryIIAb* control the cotton bollworms.<br>**-2 marks** | 5 | 208<br>209 |
| 35 | a) Describe the roles of: i) Microbes in biogas production (2)<br>ii) Mycorrhiza as biofertilizer (2)<br>**b) Name the fungus that produces cyclosporine A (1).** | 5 | |

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| | The roles of:<br>**i) Microbes in biogas production:**<br>Certain bacteria, which grow anaerobically on cellulosic material, produce large amount of methane along with $CO_2$ and $H_2$.<br>These bacteria are called methanogens. An example for methanogen is *Methanobacterium*.<br>The excreta or the dung of cattle is rich in these bacteria. The dung can be used for generation of biogas.<br>During the biogas production, slurry of cow dung is used in a biogas plant, where the methane is produced by these bacteria.<br>-2 marks<br>**ii) Mycorrhiza as biofertilizer**<br>Some fungi are also known to form symbiotic associations with plants.<br>They are called mycorrhiza. Many members of the genus *Glomus* form mycorrhiza.<br>The fungal symbiont in these associations absorbs phosphorus from soil and passes it to the plant.<br>Plants having such associations show other benefits also, such as resistance to root-borne pathogens, tolerance to salinity and drought, and an overall increase in plant growth and development.<br>-2 Marks<br>iii.The fungus that produces cyclosporin A is ***Trichoderma polysporum***<br>-1 mark | | 185 - 186<br>187 - 188<br>183 |
| 36 | **a) Explain how Mediterranean orchid adapted to achieve pollination. (2).**<br>**b) Describe the importance of predators in an ecosystem (2)**<br>**c) What is Gause's "competitive exclusion principle"? (1)**<br><br>**a) Explain how Mediterranean orchid adapted to achieve pollination. (2).**<br>Mediterranean orchid **Ophrys** employs a mechanism called 'sexual deceit'.<br>Mediterranean orchid has modified their flowers to attract the right pollinator insect and ensure guaranteed pollination by it.<br>In Mediterranean orchid, one petal of the flower resembles the female bee in colour and markings.<br>The male bee is attracted thinking that it is a female, and '**pseudocopulates**' with the flower.<br>As a result the pollination occurs. But bee does not get any benefits. This is a good example for co-evolution.<br>-2 marks<br>**b) Describe the importance of predators in an ecosystem (2)**<br>Predator keep prey populations under control.<br>Predator acts as a passage for transfer of energy across trophic level.<br>Predators also help in maintaining species diversity in a community, by reducing the intensity of competition among competing prey species.<br>Predators also help in maintaining species diversity in a community, by reducing the intensity of competition among competing prey species.<br>-Any four points-2 marks<br>**c) What is Gause's "competitive exclusion principle"?**<br>Gause's '**Competitive Exclusion Principle**' states that two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eliminated eventually.<br>-1 mark | 5 | 238<br>233 - 234<br>235 |
| 37 | **Describe the participation of people in the conservation of forests in India by taking Bishnoi community incident and Chipko movement as examples. Add a note on Joint Forest Management.**<br>**Bishnoi community incident:**<br>In 1731, the king of Jodhpur in Rajasthan asked one of his ministers to arrange wood for constructing a new palace and the minister and workers went to a forest near a village, inhabited by | 5 | 284 - 285 |

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| | Bishnois, to cut down trees.<br>The Bishnoi community is known for its peaceful co-existence with nature. The effort to cut down trees by the kings was thwarted by the Bishnois.<br>A Bishnoi woman Amrita Devi showed exemplary courage by hugging a tree and daring king's men to cut her first before cutting the tree.<br>Sadly, the king's men did not heed to her pleas, and cut down the tree along with Amrita Devi. Her three daughters and hundreds of other Bishnois followed her, and thus lost their lives saving trees.<br>**-2 Marks**<br>**Chipko movement:**<br>One significant movement in the conservation is the Chipko Movement of Garhwal Himalayas. In 1974, local women showed enormous bravery in protecting trees from the axe of contractors by hugging them and this were called the Chipko movement.<br>**-1 Mark**<br>**Joint Forest Management:**<br>Realizing the significance of participation by local communities, the Government of India in 1980s has introduced the concept of Joint Forest Management (JFM) so as to work closely with the local communities for protecting and managing forests.<br>In return for their services to the forest, the communities get benefit of various forest products (e.g., fruits, gum, rubber, medicine, etc.), and thus the forest can be conserved in a sustainable manner.<br>**-2 Marks** | | |

## BIOLOGY (THEORY) : MODEL QUESTION PAPER – 2

## BLUE PRINT FOR SUMMATIVE ASSESSMENT (UNIT WISE WEIGHTAGE)

**Time : 3 Hours and 15 minutes** **II PUC** **Maximum Marks : 70**

| SL. NO | UNIT | TEACHING HOURS | KNOWLEDGE | | | | UNDERSTANDING | | | | APPLICATION/ APPRECIATION | | | | EXPRESSION/ SKILL | | | | TOTAL QUESTIONS | | | | MARKS WEIGHTAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 120 | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | |
| VI | REPRODUCTION | 29 | 2 | 1 | 1 | 1 | | | 1 | | | 1 | 1 | | | | | 1 | 2 | 2 | 3 | 2 | 25 |
| VII | GENETICS AND EVOLUTION | 30 | | 3 | | | | 1 | 1 | 2 | 2 | 1 | | | | | | | 2 | 5 | 1 | 2 | 25 |
| VIII | BIOLOGY AND HUMAN WELFARE | 25 | 1 | | 1 | | | | | 1 | | | 1 | | | | | 2* | 1 | | 2 | 3 | 22 |
| IX | BIOTECHNOLOGY | 12 | | 1 | 1 | | | | | 1 | 1 | | | | | | | | 1 | 1 | 1 | 1 | 11 |
| X | ECOLOGY | 24 | 2 | | 1 | 2 | | | | 1 | 2 | | | | | | | | 4 | | 1 | 3 | 22 |
| | | 120 | 40 % 42 marks | | | | 30% 33 marks | | | | 15 % 15marks | | | | 15% 15 marks | | | | 10 | 8 | 8 | 11 | 105 |

NOTE:

1) The question paper must be prepared based on the individual blue print on the basis of weightage of marks fixed for each chapter.
2) A variation of 1% weightage per objective is allowed.
3) A variation of 1 mark per unit/chapter is allowed. However, the total marks should not exceed 105 marks.
4) At least one question each carrying 1 mark, 2 marks, 3 marks and 5 marks have to be derived from each unit.
5) When a question carrying 5 marks is divided into sub-questions (3+2/2+2+1), the sub-questions have to be derived from the same chapter.
6) When a question carrying 5 marks is divided into sub-questions, the sub-questions have to be derived from different topics of the same chapter.
7) *Split questions

# BIOLOGY (THEORY) : MODEL QUESTION PAPER – 2

## BLUE PRINT FOR SUMMATIVE ASSESSMENT (CHAPTER WISE WEIGHTAGE)

Time : 3 Hours and 15 minutes | II PUC | Maximum Marks : 70

| UNIT NO | HOURS | CHAPTER | HOURS | MARKS PER UNIT | KNOWLEDGE | | | | UNDERSTANDING | | | | APPLICATION/ APPRECIATION | | | | SKILL | | | | TOTAL | | | | TOTAL MARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | |
| **UNIT VI. REPRODUCTION** | | | | | | | | | | | | | | | | | | | | | | | | | |
| VI | 29 | 1.REPRODUCTION IN ORGANISMS | 5 | 25 | 2 | | | | | | 1 | | | | | | | | | | 2 | | 1 | | 5 |
| | | 2. SEXUAL REPRODUCTION IN FLOWERING PLANTS | 10 | | | | 1 | 1 | | | | | | | | | | | | | | | 1 | 1 | 8 |
| | | 3.HUMAN REPRODUCTION | 9 | | | | | | | | | | | 1 | | | | | | 1 | | 1 | | 1 | 7 |
| | | 4. REPRODUCTIVE HEALTH | 5 | | | 1 | | | | | | | | | 1 | | | | | | | 1 | 1 | | 5 |
| **UNIT VII. GENETICS AND EVOLUTION** | | | | | | | | | | | | | | | | | | | | | | | | | |
| VII | 30 | 5. PRINCIPLES OF INHERITANCE AND VARIATION | 12 | 26 | | 1 | | | | | | 1 | | 1 | | | | | | | | 2 | | 1 | 9 |
| | | 6. MOLECULAR BASIS OF INHERITANCE | 12 | | | 2 | | | | | | 1 | 2 | | | | | | | | 2 | 2 | | 1 | 11 |
| | | 7. EVOLUTION | 6 | | | | | | | 1 | 1 | | | | | | | | | | | 1 | 1 | | 5 |
| **UNIT VIII. BIOLOGY AND HUMAN WELFARE** | | | | | | | | | | | | | | | | | | | | | | | | | |
| VIII | 25 | 8. HUMAN HEALTH AND DISEASE | 10 | 21 | | | 1 | | | | | | | | | | | | | 1* | | | 1 | 1 | 8 |
| | | 9. STRATEGIES FOR ENHANCEMENT OF FOOD PRODUCTION | 9 | | | | | | | | | 1 | | | 1 | | | | | | | | 1 | 1 | 8 |
| | | 10. MICROBES IN HUMAN WELFARE | 6 | | 1 | | | | | | | | | | | | | | | 1* | 1 | | | 1 | 6 |
| **UNIT IX. BIOTECHNOLOGY** | | | | | | | | | | | | | | | | | | | | | | | | | |
| IX | 12 | 11.BIOTECHNOLOGY:PRICNIPLES AND PROCESSES | 7 | 11 | | | | | | | | 1 | 1 | | | | | | | | 1 | | | 1 | 6 |
| | | 12. BIOTECHNOLOGY AND ITS APPLICATIONS | 5 | | | 1 | 1 | | | | | | | | | | | | | | | 1 | 1 | | 5 |
| **UNIT X. ECOLOGY** | | | | | | | | | | | | | | | | | | | | | | | | | |
| X | 24 | 13. ORGANISMS AND POPULATION | 4 | 22 | 1 | | | 1 | | | | | | | | | | | | | 1 | | | 1 | 6 |
| | | 14 ECOSYSTEM | 6½ | | | | | | | | | 1 | 1 | | | | | | | | 1 | | | 1 | 6 |
| | | 15. BIODIVERSITY AND CONSERVATION | 3½ | | 1 | | 1 | | | | | | | | | | | | | | 1 | | 1 | | 4 |
| | | 16. ENVIRONMENTAL ISSUES | 7 | | | | | 1 | | | | | 1 | | | | | | | | 1 | | | 1 | 6 |
| | 120 | TOTAL | 120 | 105 | | | | | | | | | | | | | | | | | 10 | 8 | 8 | 11 | 105 |

## MODEL QUESTION PAPER – 2
## SUBJECT: BIOLOGY (36)

### II PUC

**Time: 3 Hours and 15 minutes** **Maximum Marks: 70**

**GENERAL INSTRUCTIONS:**

i) *The question paper consists of four parts **A**, **B**, **C** and **D** .Part D consists of two parts, **Section-I** and **Section-II**. Part A contains of **10** questions of **one** mark each, Part B is of **8** questions of **two** marks each, Part C is of **8** questions of **three** marks each, Part D – Section I is of **6** questions of **five** marks each and Part D – Section II is of **5** questions of **five** marks each.*

ii) *All the Parts are Compulsory.*

iii) *Draw diagrams wherever necessary. Unlabelled diagrams or illustrations do not attract any marks.*

### PART – A

**Answer the following questions in one word or one sentence each.** **10x1=10**

1. Define parthenogenesis.
2. What are meiocytes?
3. How does repressor protein prevent the transcription of structural genes?
4. Electrophoresis is an essential procedure that needs to be employed in genetic fingerprinting. Why?
5. What are biofertilisers ?
6. Restriction enzymes are considered as a type of endonucleases. Why?
7. State Gause's competitive exclusion principle.
8. Why is pyramid of energy always upright?
9. What are 'biodiversity hotspots'?
10. Ozone layer in the stratosphere becomes thinner due to the release of CFCs. Give a scientific reason for this.

### PART - B

**Answer any *FIVE* of the following questions in 3-5 sentences each, wherever applicable:** **5x2=10**

11. "Unless foetal ejection reflex is produced, normal parturition does not occur". Substantiate the statement.
12. What is infertility? Mention one Assisted Reproductive Technology (ART).
13. What are multiple alleles? Why the alleles $I^A$ and $I^B$ for blood group are considered codominant?
14. What is the karyotype in Turner's syndrome? Mention two symptoms of the syndrome.
15. Mention the function of RNA polymerase I and RNA polymerase II in eukaryotes.
16. Explain two salient features of genetic code.
17. Differentiate homologous and analogous organs.
18. Define gene therapy. Name a genetic disorder that is being treated using the technique of gene therapy.

## PART - C

**Answer any FIVE of the following Questions in 40-80 words each, wherever applicable.** **5x3=15**

19. Mention three differences between asexual and sexual reproduction.
20. Explain the structure of a mature female gametophyte in flowering plants.
21. How do intra-uterine devices prevent conception in humans?
22. State Hardy – Weinberg law. Write the role of any two factors that affect Hardy – Weinberg equilibrium.
23. What are carcinogens? Mention any two groups of carcinogens with an example for each.
24. Differentiate out-crossing, cross breeding and interspecific hybridisation.
25. Write a note on Bt toxin.
26. Explain any three major causes of biodiversity loss.

## PART – D

### *Section-I*

**Answer any FOUR of the following questions on 200-250 words each, wherever applicable.** **4x5=20**

27. What is autogamy? Explain the devices that the plants have developed to prevent this.
28. Explain the different steps involved in translation.
29. Write the schematic representation of the life cycle of HIV.
30. Explain briefly the steps involved in recombinant DNA technology.
31. Briefly describe the different stages involved in decomposition.
32. Explain five effects of water pollution.

### *Section-II*

**Answer any THREE of the following questions in 200-250 words each, wherever applicable.** **3x5=15**

33. Draw the diagram of the sectional view of the female reproductive system in humans.
34. Explain Mendel's experiment that describes the inheritance of one gene.
35. Draw a labelled diagram of a biogas plant.
36. (a) Explain the application of tissue culture in any three fields. (3)
    (b) Why continued inbreeding should be avoided in plants? (1)
    (c) What is germplasm collection? (1)
37. Explain predation.

# MODEL QUESTION PAPER (THEORY) – 2

## SUBJECT : BIOLOGY (36)

## II PUC

### Scheme of Evaluation

| Q. No. | ANSWER / VALUE POINTS | MARKS | PAGE NUMBER IN THE TB |
|---|---|---|---|
| | **PART – A** | | |
| | **Answer in one word or one sentence each:** | | **10 x 1 = 10** |
| 1 | • Development of the egg into an individual without fertilization | 1 | 14 |
| 2 | • Gamete mother cells / Cells which undergo meiosis to form gametes | 1 | 11 |
| 3 | • Repressor protein binds to the operator region of the operon and prevents RNA polymerase from transcribing the operon | 1 | 117 |
| 4 | • Required to separate DNA fragments obtained during restriction enzyme digestion | 1 | 122 |
| 5 | • Biofertilisers are organisms that enrich the nutrient quality of the soil. | 1 | 188 |
| 6 | • Restriction endonucleases make cuts at specific positions within the DNA. | 1 | 196 |
| 7 | • Two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eventually eliminated. | 1 | 235 |
| 8 | • When energy flows from a particular trophic level to the next trophic level, some energy is always lost as heat at each step. | 1 | 249 |
| 9 | • 'Biodiversity hotspots' are regions with very high levels of species richness and high degree of endemism. | 1 | 266 |
| 10 | • UV rays act on CFCs and release Cl atoms which act as catalysts, degrade ozone, and release molecular oxygen. | 1 | 282 |
| | **PART – B** | | |
| | **Answer any FIVE in 3 – 5 sentences each:** | | **5 x 2 = 10** |
| 11 | • Stimulation of pituitary to release oxytocin followed by stronger contractions of uterine muscles due to oxytocin<br>• Further secretion of oxytocin resulting in stronger and stronger contractions that causes the expulsion of the foetus from the uterus | 1<br>1 | 54 |
| 12 | **Infertility:**<br>• Inability to produce children (conceive) in spite of unprotected sex<br>**Assisted reproductive technology:**<br>• IVF-ET / ZIFT / GIFT / ICSI / Artificial insemination (AI)<br>**ANY ONE** | 1<br><br><br>1 | 63 & 64 |
| 13 | **Multiple alleles:**<br>• Alleles which occur in more than two alternate forms<br>• When $I^A$ and $I^B$ are present together in an individual, both A and B types of sugar polymers are produced / Both the alleles express when they are together | 1<br><br>1 | 77 |

| | | | |
|---|---|---|---|
| 14 | **Turner's syndrome:**<br>• Karyotype is 45 chromosomes with XO / 44A – XO<br>**Symptoms:**<br>• Lack of female secondary sexual characters<br>• Sterility due to rudimentary ovaries<br>• Short stature **ANY TWO → 2 x ½** | 1<br><br><br><br>1 | 91 |
| 15 | • **RNA polymerase I** – Catalyses the synthesis of rRNA (28S, 18S & 5.8S).<br>• **RNA polymerase II** – Catalyses the synthesis of heterogeneous nuclear RNA / hnRNA / precursor mRNA | 1<br><br>1 | 110 &111 |
| 16 | **Features of genetic code:**<br>• **Codons are triplet in nature.** A codon is a unit consisting of three nucleotides.<br>• **Genetic code is universal.** A particular codon in mRNA codes for the same amino acid in all organisms.<br>• **Degeneracy or redundancy of codons:** A single amino acid is coded by more than one triplet codon.<br>• **Codons are specific and unambiguous:** Triplet codons recognise specific amino acids during protein synthesis and therefore, they are sensible.<br>• **Codons are non - overlapping and commaless:** Codons are units of three nucleotides which are read continuously in 5' → 3' direction without any punctuation.<br>• **Genetic code has initiator codon.** AUG is the initiator codon which initiates protein synthesis. It codes for methionine.<br>• **Genetic code has stop codons.** Of the 64 codons, three do not code for any amino acids and are called stop codons (terminator codons or non - sense codons → UAA, UAG and UGA).<br>**MENTIONING TWO FEATURES: 2 x ½**<br>**EXPLANATION OF MENTIONED FEATURES: 2 x ½** | <br><br><br><br><br><br><br><br><br><br>1<br>1 | 112 |
| 17 | **Homologous organs:** Organs or structures that have the same origin and basic anatomical structure but perform different functions<br>**Analogous organs:** Structures that are different in their basic anatomical structure and origin but appear similar and perform similar functions | 1<br><br>1 | 130 & 131 |
| 18 | **Gene therapy:**<br>Gene therapy is the replacement of a defective mutant allele with a functional gene into an individual's cells and tissues to treat genetic / hereditary diseases.<br>**OR**<br>It is the insertion of normal functional genes into the individual or embryo with genetic defect to take over the function of and compensate for the non-functional gene.<br>**Genetic disorder:** ADA deficiency / Adenosine deaminase deficiency | <br><br><br><br><br><br>1<br>1 | 211 |
| | **PART – C**<br>**Answer any FIVE in 40 – 80 words each:** | | **5 x 3 = 15** |
| 19 | **Differences between asexual reproduction and sexual reproduction:** | | |

| | | | |
|---|---|---|---|
| | <table><tr><th>ASEXUAL REPRODUCTION</th><th>SEXUAL REPRODUCTION</th></tr><tr><td>• Only one parent is involved</td><td>• Two parents of opposite sex are involved</td></tr><tr><td>• Reproductive cells or gametes (egg and sperm) are not produced</td><td>• Involves the production and fusion of male and female gametes (sperm and egg)</td></tr><tr><td>• Offspring produced are identical and are exact copies of the parent</td><td>• Offspring produced are not identical and are also not exact copies of the parents</td></tr></table> **EACH DIFFERENCE: 1 Mark** | 3 | 05 |
| 20 | **Structure of female gametophyte in flowering plants:**<br>• Egg apparatus at the micropylar end, three antipodals at the chalazal end and a central cell<br>• Egg apparatus consists of one egg cell and two synergids which have cellular thickenings called **filiform apparatus** at the micropylar tip<br>• Central cell with two polar nuclei | 1<br>1<br>1 | 26 & 27 |
| 21 | **Role of IUDs in contraception:**<br>• Increase phagocytosis of sperms within the uterus<br>• Copper ions released by them decrease motility and fertilizing capacity of sperms<br>• Hormone releasing IUDs prevent implantation<br>• Hormone releasing IUDs also make the cervix hostile for sperms<br>**ANY THREE → 3 x 1** | 3 | 60 |
| 22 | **Hardy – Weinberg law:**<br>Allele frequencies in a population are stable and are constant from generation to generation.<br>**OR**<br>Allele frequency or gene frequency in a population (gene pool) remains constant from generation to generation unless there are factors to upset it<br>**Role of factors that affect Hardy – Weinberg equilibrium:**<br>**Gene flow:** It is the movement of genes or alleles from one population to another when there is a migration of a section of population to another place and population. This changes gene frequencies.<br>**Genetic drift:** It is the random change in the gene frequency by chance (in small populations). The change in gene frequency in the new population may be so different that the members become a different species (founder's effect).<br>**Mutation:** It is the sudden heritable change in genetic material which results in new genotypes and phenotypes, thus altering the gene frequency.<br>**Genetic recombination:** It occurs during gametogenesis (meiosis) and results in variations. This would result in change in gene frequency over a period of time.<br>**Natural selection:** Variations that occur as a result of mutations or recombinations or due to gene flow or genetic drift enhance reproductive success or fitness. Survivors would leave more progeny and over a period of time the gene frequency of the population changes.<br>**MENTIONING ANY TWO FACTORS: 2 X ½**<br>**EXPLANATION OF THE MENTIONED FACTORS: 2 X ½** | 1<br>1<br>1 | 136 & 137 |
| 23 | **Carcinogens:** | | |

| | | | |
|---|---|---|---|
| | Agents that cause cancer are called carcinogens.<br>**Groups of carcinogens:**<br>**Physical agents:** X-rays, gamma rays, UV rays<br>**Chemical agents:** Chemicals present in tobacco smoke<br>**Biological agents:** Oncogenic viruses<br>**MENTIONING ANY TWO GROUPS: 2 X ½**<br>**ONE EXAMPLE EACH FOR THE MENTIONED GROUPS: 2 X ½** | 1<br><br><br><br><br>1<br>1 | <br><br><br><br><br><br>157 |
| 24 | **Out-crossing:** It is the mating of the animals of the same breed but which have no common ancestors on either side of the pedigree up to 4 – 6 generations.<br>**Cross-breeding:** It is the mating of superior males of one breed with superior females of another breed (both with desirable characters).<br>**Inter-specific hybridization:** It is the mating of male and females of two different but related species. | <br><br>1<br><br>1<br><br>1 | <br><br><br><br><br><br>168 |
| 25 | **Bt toxin:**<br>• Bt toxin is an insecticidal protein formed in the form of crystals during a particular phase of the growth of *Bacillus thuringiensis*.<br>• It exists as inactive ***protoxin*** in bacteria and is converted into an active form of toxin in insect due to the alkaline pH of the gut.<br>• Active toxin binds to the surface of epithelial cells of the midgut and creates pores which cause cell swelling and lysis and eventually the death of the insect. | <br><br>1<br><br>1<br><br>1 | <br><br><br><br><br><br>208 & 209 |
| 26 | **Causes of biodiversity losses:**<br>**Habitat loss and fragmentation:**<br>• Many large habitats like forests have been destroyed by man either for cultivation or for conversion to grasslands and broken up into small fragments which leads to the decline in the population of living organisms.<br>**Over-exploitation:**<br>• Over-exploitation of natural resources for the purpose of food, shelter and other purposes and harvesting of many marine fish populations by humans leads to the elimination of many species.<br>**Alien species invasions:**<br>• Unintentional or deliberate introduction of alien species may cause the decline or extinction of indigenous species as they may turn invasive.<br>**Co-extinctions:**<br>• When a species becomes extinct, the plant and animal species associated with it in an obligatory way also becomes extinct.<br>**MENTIONING OF ANY THREE CAUSE: 3 x ½**<br>**XPLANATION OF THE MENTIONED CAUSE: 3 X ½** | <br><br><br><br><br><br><br><br><br><br><br><br><br><br>1½<br>1½ | <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>264 & 265 |
| | **PART – D**<br>***Section – I***<br>**Answer any FOUR in 200 – 250 words each:** | | **4 x 5 = 20** |
| 27 | **Autogamy:**<br>• Self pollination in which there is transfer of pollen grains from the anthers to the stigma of the same flower<br>**Devices in flowering plants to prevent autogamy:**<br>• Release of pollen grains before the stigma becomes receptive or stigma | <br><br>1 | |

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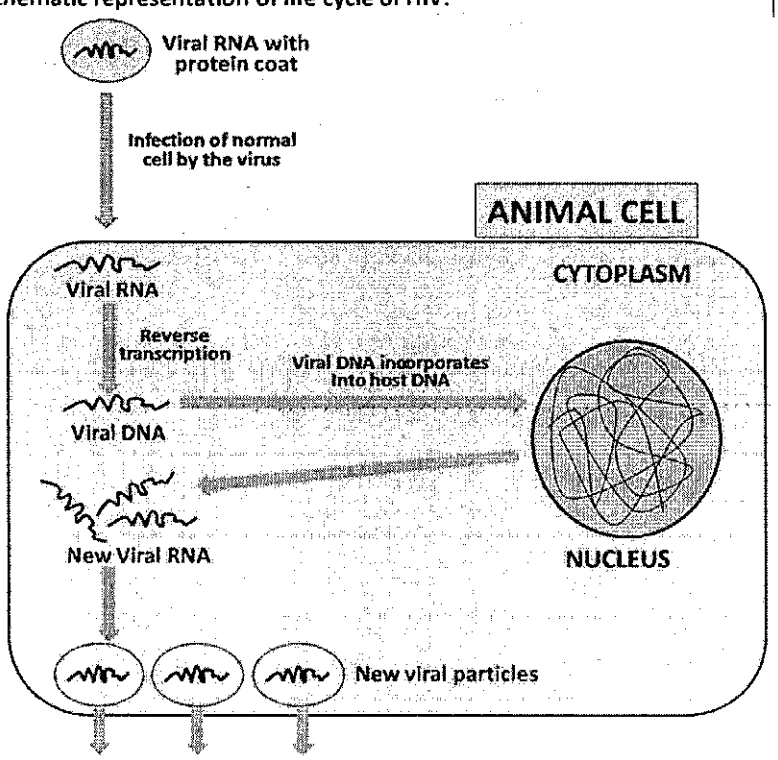
| | becoming receptive much before the release of pollen grain | 1 | |
| | • Placement of anthers and stigma at different positions so that pollen cannot come in contact with the stigma of the same flower | 1 | |
| | • Self incompatibility – Genetic mechanism which inhibits the germination of pollen grain or growth of the pollen tube inside the style, thus preventing the fertilization process | 1 | |
| | • Unisexuality – Production of unisexual flowers (male and female flowers on different plants or on the same plant) | 1 | **27 & 31** |
| **28** | **Translation in eukaryotes:** | | |
| | • **Charging of tRNA (aminoacylation of tRNA)** – Activation of amino acids in the presence of ATP and their linking to specific tRNA | 1 | |
| | • Binding of the ribosome (small sub-unit) to mRNA at the initiator codon (AUG) | 1 | |
| | • Binding of the initiator tRNA carrying the amino acid (methionine) to the initiator codon to **initiate protein synthesis** | 1 | |
| | • Movement of ribosome from codon to codon along the mRNA and adding of amino acids (linked to tRNA) one by one – **elongation of polypeptide chain.** | 1 | |
| | • Binding of the **release factor** to the stop codon located at the 3'-end of mRNA, **terminating translation** and **releasing the polypeptide** from ribosome. | 1 | **114 & 115** |
| **29** | **Schematic representation of life cycle of HIV:** | | |
| |   | | |
| | INFECTION OF CELL BY HIV | 1 | |
| | REVERSE TRANSCRIPTION AND PRODUCTION OF VIRAL DNA | 1 | |
| | INCORPORATION OF VIRAL DNA INTO HOST DNA | 1 | |
| | PRODUCTION OF NEW VIRAL RNA | 1 | |
| | FORMATION OF NEW VIRAL PARTICLES AND THEIR RELEASE | 1 | 155 |
| **30** | **Recombinant DNA technology:** | | |

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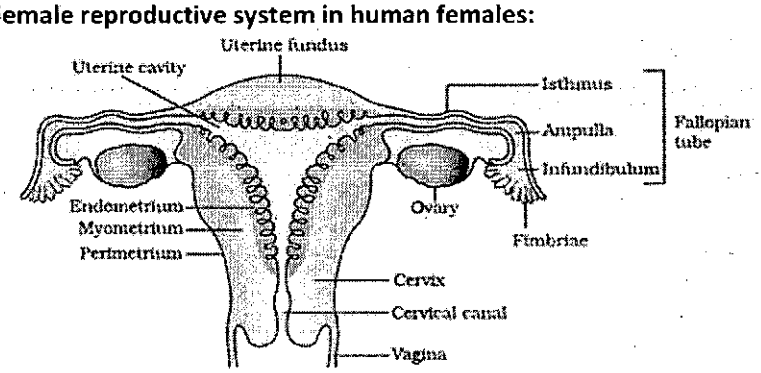
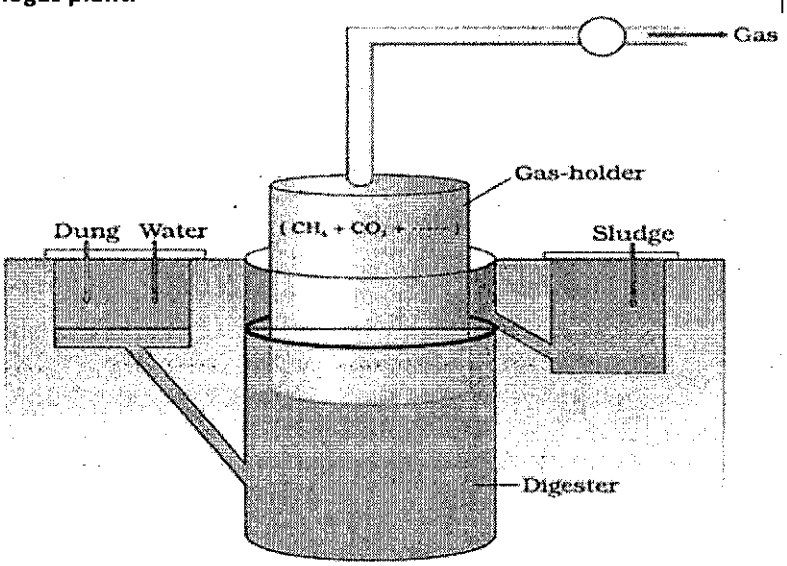
|---|---|---|---|
| | **Isolation of the genetic material (DNA):**<br>• Bacterial cells / plant or animal tissues are treated with enzymes such as lysozyme (bacteria), cellulase (plant cells), chitinase (fungus), etc. to digest the membrane and isolate DNA along with other macromolecules (RNA, proteins, polysaccharides and lipids). Other molecules are removed by appropriate treatments. Chilled ethanol is added to get purified DNA as precipitate.<br>**Cutting of DNA and isolation of desired DNA fragment:**<br>• Purified DNA molecules are incubated with the restriction enzyme, at the optimal conditions for restriction enzyme digestion. Desired DNA fragment is isolated by agarose gel electrophoresis.<br>**Ligation of the DNA fragment into a vector:**<br>• The cut out **'gene of interest'** from the source DNA and the cut vector with space are mixed and ligase is added to produce recombinant DNA.<br>**Insertion of recombinant DNA into the host cell /organism:**<br>• Recipient cells are made 'competent' to receive and take up DNA present in its surrounding and the recombinant DNA is introduced into it by microinjection or gene gun technique<br>**Culturing of host cells and obtaining the foreign gene product:**<br>• The cells having cloned genes of interest are grown on a small scale in the laboratory in a culture medium. To produce the products in large quantities, the cells can also be multiplied in continuous culture systems called **bioreactors**. | 1<br>1<br>1<br>1 | 201 to 204 |
| 31 | **Steps (stages) of decomposition:**<br>**Fragmentation:**<br>It is the break down detritus into smaller particles by **detritivores** (earthworm).<br>**Leaching:**<br>It is the process in which water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts.<br>**Catabolism:**<br>It is the process in which bacterial and fungal enzymes degrade detritus into simpler inorganic substances.<br>**Humification:**<br>It is the process which leads to the accumulation of a dark coloured amorphous substance called **humus** that is highly resistant to microbial action and undergoes very slow decomposition.<br>**Mineralisation:**<br>It is the degradation of humus by some microbes and the release of inorganic nutrients.<br>**MENTIONING OF EACH STEP: ½ MARK EACH**<br>**EXPLANATION OF THE MENTIONED STEP: ½ MARK EACH** | 2½<br>2½ | 243 & 244 |
| 32 | **Effects of water pollution:**<br>• Release of sewage decreases dissolved oxygen (used by microbes for degradation of organic matter) and causes mortality of fish and other aquatic organisms.<br>• Sewage contains many pathogenic microorganisms that spread serious diseases like dysentery, typhoid, jaundice, cholera, etc.<br>• Presence of large amounts of nutrients in water causes excessive | | |

| | | | |
|---|---|---|---|
| | growth of planktonic algae, i.e., **algal bloom** that changes the colour of water and deterioration of water quality and results in fish mortality.<br>• Release of nutrients such as nitrogen and phosphorus causes eutrophication which leads to the excessive growth of aquatic weeds like water hyacinth (*Eichhornia crassipes* – 'Terror of Bengal).<br>• Toxic substances such as mercury, cadmium, copper, lead, etc., undergo **biological magnification (Biomagnification)** in the aquatic food chain and cause harmful effects on animals of different trophic levels.<br>• Thermal waste water reduces the number of organisms sensitive to high temperature, and may enhance the growth of plants and fish in extremely cold areas but, only after causing damage to the indigenous flora and fauna.<br>**ANY FIVE EFFECTS → 1 MARK EACH – 5 x 1** | 5 | 275 to 277 |
| | ***Section – I*** | | |
| **Answer any FOUR in 200 – 250 words each:** | | | **4 x 5 = 20** |
| **33** | **Female reproductive system in human females:**<br>  <br><br>**NEAT AND CORRECT DIAGRAM →**<br>**EIGHT CORRECT LABELLINGS – ½ x 8 →** | 1<br>4 | 45 |
| **34** | **Mendel's experiment to show the inheritance of single gene:**<br>• Crossing of true breeding tall pea plant with a true breeding dwarf plant – All the offspring **(hybrid)** in the $F_1$ are tall.<br>• Appearance of tall character in the $F_1$ indicates that tallness is dominant over dwarf character.<br>• Selfing of $F_1$ tall plants – Production of both tall and dwarf plants in the ratio **3:1** in the $F_2$.<br>• The reappearance of dwarf character in the $F_2$ generation indicates that alleles for tallness and dwarf character have segregated during gamete formation. | ½<br>½<br>½<br>½ | |

| | | | |
|---|---|---|---|
| | **Phenotype:** Pure tall X Pure dwarf<br>**Genotype:** TT tt<br>**Gametes:** (T) (T) (t) (t)<br>**$F_1$ generation:** Tt (All tall)<br>**$F_1$ selfing:** $F_1$ tall X $F_1$ tall<br>**Genotype:** Tt Tt<br>**Gametes:** (T) (t) (T) (t)<br>**$F_2$ generation:**<br>**Phenotypic ratio – Tall : Dwarf → 3 : 1**<br>**Genotypic ratio – TT : Tt : tt → 1 : 2 : 1**<br>Based on the result of this monohybrid cross, Mendel put forward the **law of segregation**, i.e., factors or alleles for a pair of contrasting characters do not blend, but segregate or separate during gamete formation such that a gamete receives only one of the factors (purity of gametes). | 2<br><br>1 | 71 to 75 |

| | | | |
|---|---|---|---|
| | | (T) | (t) |
| | (T) | TT Tall | Tt Tall |
| | (t) | Tt Tall | tt Dwarf |

| | | | |
|---|---|---|---|
| 35 | **Biogas plant:**<br>  <br><br>**NEAT AND CORRECT DIAGRAM**<br>**SIX CORRECT LABELLINGS → 6 X ½** | 2<br>3 | 186 |
| 36 | **(a) Applications of tissue culture:**<br>• **Micropropagation:** It is used for the propagation / production of a large number of plants in short durations. Micropropagation produces somaclones (plants genetically identical to the original / parent plant).<br>• **Virus-free plants:** Meristems of plants are grown by tissue culture to get virus-free plants. By this method, healthy plants can be recovered from diseased plants.<br>• **Somatic hybridization:** Somatic hybrids obtained from somatic | | |

| | | | |
|---|---|---|---|
| | hybridization (fusion of naked protoplasts isolated from two different varieties of plants) can be further grown to form new plants by tissue culture.<br>**MENTIONING THE FIELD OF APPLICATION → 3 X ½**<br>**EXPLANATION OF THE APPLICATION → 3 x ½**<br>**(b)** Continued inbreeding results in inbreeding depression which decreases fertility and productivity of plants.<br>**(c) Germplasm collection:** It is the entire collection of plants or seeds having diverse alleles for all the genes in a given crop. | 1½<br>1½<br>1<br>1 | <br><br>177<br>167<br>171 |
| **37** | **Predation**:<br>• Predation is a type of interaction in which a larger organism called predator of higher trophic level feeds on another organism called prey of lower trophic level.<br>• In this type of interaction, one of the partner's (predator) is benefitted while the prey is harmed.<br>**Role played by predators:**<br>• They act as links for energy transfer across trophic levels.<br>• They keep prey populations under control.<br>**Defences developed by animal preys against predators:**<br>• Some show cryptic colouration to avoid being detected easily by the predator.<br>• Some are poisonous and some are highly distasteful and therefore are avoided by the predators.<br>**Defences developed by plant preys against predators:**<br>• Thorns (*Acacia*, *Cactus*) are morphological means of defence.<br>• Many plants produce and store chemicals like nicotine, caffeine, quinine, strychnine, opium, etc., that make the herbivore sick when they are eaten, inhibit feeding or digestion, disrupt its reproduction or even kill it. | 1<br>1<br>½<br>½<br>½<br>½<br>½<br>½ | <br><br><br><br><br><br><br><br>233 & 234 |

## Blue Print of the Question Paper 03

**Time: 3.15Hours** **II PUC BIOLOGY** **Max Marks: 70**

| Sl. No. | UNIT | Teaching Hours | Knowledge | | | | Understanding | | | | Application Appreciation | | | | Expression Skills | | | | Total | | | | Marks Weightage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | II PUC | 120 | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | 1M | 2M | 3M | 5M | |
| 1. | REPRODUCTION | 29 | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | | | | | 2 | 2 | 1 | 2 | 3 | 25 |
| 2. | GENETICS AND EVOLUTION | 30 | 1 | | 1 | 1 | | 1 | | 2 | 1 | 1 | | | | | | | 2 | 2 | 1 | 3 | 24 |
| 3. | BIOLOGY IN HUMANWELFARE | 25 | 2 | 1 | | | 1 | 1 | 2 | 2 | | | | | | | | | 3 | 2 | 2 | 2 | 23 |
| 4. | BIOTECHNOLOGY | 12 | | | 1 | 1 | | | | | 1 | 1 | | | | | | | 1 | 1 | 1 | 1 | 11 |
| 5. | ECOLOGY | 24 | | 1 | | 2 | 2 | | | | | 1 | 1 | | | | 1 | | 2 | 2 | 2 | 2 | 22 |
| **Total Number of Qns.** | | | 4 | 3 | 3 | 5 | 4 | 2 | 2 | 4 | 2 | 3 | 2 | - | - | - | 1 | 2 | 10 | 8 | 8 | 11 | 105 |
| **Grand Total of Marks and Percentage** | | | **44Marks (41%)** | | | | **34 Marks (30%)** | | | | **14 Marks (15%)** | | | | **13s Marks (14%)** | | | | | | | | |

Note: 1) The question paper must be prepared based on the individual blue print which is based on the weightage of marks fixed for each Unit /chapter.

# II PUC MODEL PAPER. 03
# SUBJECT: BIOLOGY (36)

**Time: 3.15Hours** **Max Marks: 70**

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**GENERAL INSTRUCTIONS:** i) This question paper consists of five parts A.B.C.D and E.
ii) All the Parts are Compulsory.
iii) Draw diagrams whenever necessary.
Unlabelled diagrams or illustrations do not attract any marks.

## PART-A

**Answer the following questions in *One Word* or *One Sentence* each:** **10x1=10**

1. Define parthenocary.
2. What is Polyembryony?
3. Why eukaryotic genes are called split genes?
4. Define Law of dominance.
5. Expand BOD.
6. Write the binomial name of the organism that causes filariasis.
7. Name the fungi which has symbiotic association with many plants.
8. Why a pathogen *Agrobacterium tumifaciens* is generally used as a vector in plants for cloning.
9. In which food chain dead organic matter occupies the base?
10. How is the scared groove important in conservation of Biodiversity?

## PART-B

**Answer any FIVE of the following questions in *3-5 sentences* each** **5x2=10**

**Wherever applicable:**

11. What is xenogamy? Mention its importance.
12. Who wrote "Origin of Life"? What is the focal point of big bang theory?
13. List the components of Operon concept.
14. What are causes of cancer?
15. With reference to tissue culture, what is i) Totipotency ii) Somatic hybrids.
16. What is biolistics? Where it is generally used?
17. What are factors that are responsible for fluctuations of population growth.
18. What is biomagnifications give an example for it.

## PART-C

**Answer any FIVE of the following Questions in *100-150 words* each: 5x3=15.**

19. What kind of reproduction is seen in following organisms?

    *Penicillium, Chlamydomonas and sponges.*

20. Define contraceptive. Mention any four important qualities of a good contraceptive.
21. Why Mendel's work was not recognized? Give any three reasons.
22. What is inborn immunity? Write note on any of them.
23. Brief note on i) inbreeding ii) out breeding iii) crossbreeding.
24. Expand the abbrivation GMO. Write any four uses of it.
25. Draw a schematic representation of carbon cycle.
26. Note on a case study of plastic waste.

## PART-D

### SECTION -I

**Answer any FOUR of the following questions on *200-250 words* each: 4x5=20**

27. With help of diagram of mature embryo sac, explain double fertilization.
28. Draw a neat diagrammatic view of male reproductive view.
29. A molecule that acts as genetic material must have some criteria. Mention those criteria and write note on it.
30. With help of diagram explain plasmid BR322.
31. Represent schematically replication of retrovirus.
32. Define and discuss the following terms, a) Mutualism b) Competition.

### SECTION -II

**Answer any THREE of the following questions in *200-250 words* each: 3x5=15**

33. Draw neat labeled diagram of sectional view of mammary gland.
34. Define aneuploidy. Name an allosomal hyperaneuploidy condition and mention its characters.
35. mention any five characters of genetic code write note on it.
36. Write note on a typical biogas plant. How microbes help in production of biogas.
37. What are abiotic factors? Discuss the importance of any four factors.

## II PUC

## SCHEME OF EVALUATION

### PART –A

1. In some species in which fruits develop without fertilization. 1 mark.
2. Occurrence of more than one embryo in a seed. 1 mark.
3. As they have introns and exons. 1 mark.
4. In hereogenous condition the gene which expresses itself is called dominate character. 1 mark.
5. Biochemical Oxygen Demand. 1 mark.
6. *Waucheria bancrofti. Or Waucheria malayi.* 1 mark.
7. *Mycorrhiza.* 1 mark.
8. It has Ti plasmid in which desired gene can incorporated. 1 mark.
9. Detritus food chain. 1 mark.
10. Trees and wildlife can be protected. 1 mark.

### PART –B

11. Transfer of pollen grains from anther to the stigma of a different plant. 1 mark.

    It brings great genetic variation. 1mark.

12. Oparin. 1 mark.

    Life evolved for the first time and for last time from nonliving, then on life evolved from preexisting life.. 1 mark.

13. Regulatory gene, Promoter gene, Operative gene & Structural gene. Each ½ mark.
14. The agents are called carcinogens. ½ mark. Agents could be physical, chemical & biological. Each ½ mark.
15. Any plant cell or explants can generate a complete plant is called totipotent. 1 mark.

    Isolate protoplasts from two different varieties of plants two having desirable character and is fused is called somatic hybrid. 1 mark.

16. Restriction endonuclease. ½ mark. It is also called molecular scissor. ½ mark. It recognizes a specific palindromic nucleotide sequences. ½ mark. REN are two types viz endonuclease and exonuclease. ½ mark.
17. Natality Mortality, Immigration and Emigration. Each ½ marks.
18. Biomagnification refers to increase in concentration of toxic substance at successive tropic level. 1 mark.

    Mercury or DDT. ( any one) 1 mark.

## PART – C

19. All by asexual method. ½ mark.

    Penicllium- conidium, Chlamydomonas- zoospore and sponges- Gemmules. Each ½ mark

20. Contraceptive is the method which prevents unwanted pregnancies. 1 mark.
    i) It is user friendly. Ii) Easily available iii) Effective & reversible with the sexual drive, desire and the sexual act of the user. Each 1 mark.
21. I) Communication was not easy in those days.
    II) His concept of "Factors" contolled theexpression of traits & of the pair of alleles which did not 'blend' with each other, was not accepted by his contemporaries.
    III) Mendel's approach of using mathematic to explain biological approach.
    IV) Microscope was not discovered at that time. (Any three point) Each 1 mark.
    V) Refer Biology prescribed text book for I PUC, Page no 103, fig 7.4 (a). Each label ½ marks.
22. Refer Biology prescribed text book for II PUC, Page no 150, Definition. 1 mark.
    Any one barrier with four points Each points ½ mark.
23. Refer Biology prescribed text book for II PUC, Page no 168, Defination of each term. Each 1 mark
24. Refer Biology prescribed text book for II PUC, Page no 208, GMO- Genetically Modified Organism. 1 mark . (Any four uses). Each uses ½ marks.
25. Refer Biology prescribed text book for II PUC, Page no 253.
26. Refer Biology prescribed text book for II PUC, Page no 279(16.3.1)

## PART –D

### SECTION –I

27. Refer Biology prescribed text book for II PUC, Page no 26. Fig no2.8 c
    any six labels ½ mark each. (3 marks). Double fertilization, 2 mark.
28. Refer Biology prescribed text book for II PUC, Page no 43. Fig no 3.1( a or b).
    Neat diagram 1 mark. Any eight labels ½ mark each.
29. Refer Biology prescribed text book for II PUC, Page no 103.
    DNA OR RNA is genetic material, as they have the following criteria. 1mark.
    Mentioning of each criterion ½ marks. Explain the same ½ mark.
30. Refer Biology prescribed text book for II PUC, Page no 199. Fig no 11.4
    any four labels ½ mark each. (2 marks). Note on pBR 322, 2 marks.
31. Refer Biology prescribed text book for II PUC, Page no 155. Fig no 8.6.
    Neat diagram 1 mark. Each step ½ marks.
32. Note on Mutualism 2½ mark, Competition 2½ mark.

SECTION –II

33. Refer Biology prescribed text book for II PUC, Page no 46. Fig no 3.4.
    Neat diagram 1 mark. Each label ½ marks.
34. Refer Biology prescribed text book for II PUC, Page no 90 for aneuploidy definition, and page no. 91 Klinefelter's syndrome. Defination 2 mark. Mentioning abnormality 1 mark. For its each character 1 mark (any 2 character.)
35. Mentioning of each character ½ marks, note on each ½ mark.
36. Refer Biology prescribed text book for II PUC, Page no 186. Fig no 10.8. Any four labels. Each label ½ mark. Explanation 3 marks.
37. Definition 1 mark. Any four factors with note on it. 1 marks each.

Refer Biology prescribed text book for II PUC, Page no 150, fig 7.4 (a). Each labels ½ marks.