3. BIOLOGY

Course Content

Section A (Botany)

Teaching hour: 75 **Full marks : 37.5**

Unit – 1: Anatomy and Physiology of Organisms **27 Teaching hour**

- **Plant anatomy:** Types of tissues, meristematic and permanent tissues; Internal structure of dicot and monocot root, stem and leaf; Secondary growth of dicot stem.
- **Plant physiology:**
  - (i) **Water relation:** Osmosis, diffusion, ascent of sap and transpiration.
  - (ii) **Photosynthesis:** Site of photosynthesis, mechanism and factors affecting photosynthesis.
  - (iii) **Respiration :** Types of respiration, mechanism and factors affecting respiration.
  - (iv) **Growth :** Plant growth hormones: Auxins, Gibberellin, Cytokinin.
  - (v) **Plant movement:** Concept of growth and turgor movement.

Unit – 2: Genetics **32 Teaching hour**

Elements of heredity and variation; Genetic material (DNA and RNA), Genetic code, Gene pool, Genetic expression and its regulation; Basis of Mendelian genetics, Mendel's laws of inheritance, Concept of incomplete dominance and co-dominance, Multiple gene, Linkages, Crossing over, Mutation and its types and polyploidy. Sex-linked inheritance (X-linked gene for eye colour of Drosophila and colour-blindness in man)

Unit - 3: Developmental Biology **10 Teaching hour**

Reproduction and development of angiosperms - Asexual reproduction, Pollination, Development of male and female gametophyte, Fertilization and development of embryo (dicot and monocot).

Unit – 4: Application of Biology **6 Teaching hour**

- Introduction to biotechnology, tissue culture, concept of breeding technique, Disease resistant plants, green manures.
- Genetic engineering and its application
- Fermentation technology: alcoholic and antibiotic fermentation.

Section B (Zoology)

Teaching hour: 75 **Full marks : 37.5**

Unit – 1: Animal tissues **8 Teaching hour**

Epithelial, connective, muscular and nervous tissues.

Unit - 2: Developmental Biology **6 Teaching hour**

- (i) **Development of frog:** Fertilization, cleavage, morulation, blastulation, gastrulation, formation of germinal layers, coelom and tissue formation.
- (ii) Gametogeneisis in animal.

Unit – 3: Human Biology and Health **50 Teaching hour**

- Nutrition; digestive organs and digestion of food.
- Respiratory organs and mechanism.
- Circulation: Blood, heart and its action, arterial and venous systems (Major arteries and veins), Blood groups, Rh-factor, Blood pressure and lymph (definition).
- Excretion: Excretory organs, mechanism of urine formation, osmoregulation and homeostatic mechanism (temperature regulation, kidney and liver control system).
- Nervous co-ordination: Types of nervous system, structure and function of brain, Transmission of nerve impulse.
- Endocrinology: Structures, functions and disorders of pituitary, thyroid, parathyroid, pancreas and adrenal glands.
- Sense organs: Structure and function of eye and ear.
- Reproduction: Reproductive organs.
- Human population: Growth, problem and control strategies.
- Human Diseases:
  - (a) Socially significant: Drug abuse, alcoholism and smoking
  - (b) Communicable: Typhoid, Tuberculosis, Ascariasis and AIDS.
  - (c) Non - communicable: Cancer.
  - (d) Concept of kalazar and hepatitis.

Unit – 4: Application of Biology **11 Teaching hour**

- Antibiotics Vaccines (Type and application)
- Tissue and organs transplantation
- Test-tube baby
- Amniocentesis
- Introduction to poultry farming and fish farming.

Model Question 2065

F.M: 75
Time : 3 hrs. **P.M: 27**

Section A (Zoology)

1. Answer any seven questions in very short. **[1x7=7]**

(a) In which kind of animal tissue you find the mast cells ? **[From Unit 1]**
(b) Name the two sex linked diseases in human. **[From Unit 3]**
(c) Define gametogenesis. **[From Unit 3]**
(d) Name any two enzymes which are responsible for protein digestion. **[From Unit 3]**
(e) Define the term 'deamination'. **[From Unit 3]**
(f) Which part of human brain is the centre of intelligence? **[From Unit 3]**
(g) Name the causative agent of typhoid fever. **[From Unit 3]**
(h) What does ISD cause ? **[From Unit 3]**
(i) What is the role of surrogate mother in test tube baby? **[From Unit 4]**
(j) Differentiate heterograft and autograft. **[From Unit 4]**

2. Answer any five questions in brief. **[3x5=15]**

(a) Describe the structure of aerolar fissure. **[From Unit 1]**
(b) If a red-eyed male Drosophila is mated with a white-eyed female, what will be the phenotype of male and female in F1 progeny? **[From Unit 3]**
(c) How is the notochord formed in the embryo of frog? **[From Unit 2]**
(d) What is vitamin? Mention functions of fat - soluble vitamins. **[From Unit 3]**
(e) Draw a labeled sketch of internal structure of human kidney. **[From Unit 3]**
(f) What will be the problems of over human population? Suggest some measures to control over population. **[From Unit 3]**
(g) Define amniocentesis. Mention its negative & positive effects? **[From Unit 3]**

3. Explain the structure and function of human brain. [8] **[From Unit 4]**
Or Explain the respiratory organs of human being. **[From Unit 3]**
4. What are communicable diseases? Discuss the causative agents, symptoms, effects and control measures of any one communicable disease you have studied. [7.5] **[[From Unit 3]**

Section B (Botany)

1. Answer any seven questions in very short. **[1x7=7]**

(a) Write the function of xylem? **[From Unit 1]**
(b) Name the components of a nucleotide? **[From Unit 2]**
(c) Give one example of polygenic inheritance. **[From Unit 2]**
(d) Define genetic code. **[From Unit 2]**
(e) What is polyploidy ? **[From Unit 2]**
(f) Mention two importance of vegetative propagation. **[From Unit 3]**
(g) Give two examples of entomophilus plants. **[From Unit 3]**
(h) Define genetic engineering. **[From Unit 4]**
(i) Define tissue culture. **[From Unit 4]**
(j) What is the main source of green manures? **[From Unit 4]**

2. Answer any five questions in brief. **[3x5=15]**

(a) Give the well-labelled diagram of monocot embryo (Description is not required). **[From Unit 3]**
(b) What are the differences between dicot stem and monocot stem? **[From Unit 1]**

(c) Explain the types of transpiration in plants. [From Unit 1]
(d) Differentiate between phenotype and genotype. [From Unit 2]
(e) What did you understand by Mendel's 9:3:3:1 ratio? [From Unit 2]
(f) Differentiate between self and cross fertilization. [From Unit 3]
(g) Show with the diagrams the development of dicot embryo (no description). [From Unit 3]
(h) Mention the applications of genetic engineering. [From Unit 4]

3. What is secondary growth ? Discuss the activity of cambium in secondary growth of dicot stem. [7.5] [From Unit 1]

OR Describe the light dependent steps of photosynthesis. [From Unit 1]

4. iDNA is the hereditary materiali, explain it with an experiment. [8] [From Unit 2]

Exam Questions

Section 'A' (Zoology)

Unit 1: Animal Tissues

Answer all in Very Short

(All questions are of equal value, 1 mark each.)

1. What is matrix? [Q.N.1(a), 2072'C']
2. Squamous epethelium is called pavement tissue, why? [Q.N.1(f), 2072'D']
3. Write down the role of mast cell. [Q.N.1(a), 2072'E']
4. Name the tissue whose cells divide throughout the life. [Q.N. 1(a), 2071]
5. Name the tissue that connect bones with bone and muscle. [Q.N.1(a), 2070 'Supp']
6. Name the tissue that connects muscles with the bone. [Q.N. 1(a), 2070]
7. Name the proteins present in cartilage and bone. [Q.N. 1(a), Supp. 2069]
8. What is periosteum? [Q.N. 1(a), 2069]
9. Mention the location and important feature of cardiac muscle. [Q.N. 1(a), 2067]
10. What is mast cell? [Group 'A' – Q.N.1(a), 2066]
11. Define a ligament. [Group 'A' – Q.N.1(a), 2065]
12. What is Osteocyte ? [Q.N. 1(l), 2063]
13. Which cell is the longest cell of the body ? [Q.N. 1(m), 2063]
14. Which is the hardest tissue in the body ? [Q.N. 1(a), 2060]
15. Mention the human body parts where you find unstriated muscles. [Q.N. 1(b), 2059]

Answer all in Brief

1. Describe Adipose tissue. [Q.N.2(a), 2072'C']
2. Types of neurons. [Q.N.2(b), 2072'E']
3. Mention the types and functions of connective tissues. [Q.N. 2(a), 2071]
4. Functions of connective tissue. [Q.N.2(a), 2070 'Supp']
5. Describe the structure of a neuron. [Q.N. 2(a), 2070]
6. The adipose tissue. [Q.N. 2(f), Supp. 2069]
7. Function of epithelial tissue. [Q.N. 2(e), 2069]
8. The structure of bone. [Q.N. 2(a), 2068]
9. Differentiate between simple and compound epithelium. [Q.N. 2(a), 2067]
10. Describe the adipose tissue. [Group 'A' – Q.N.2(a), 2066]
11. Internal structure of bone. [Group 'A' – Q.N.2(a), 2065]

Unit 2: Developmental Biology

Answer all in Very Short

(All questions are of equal value, 1 mark each.)

1. Define gastrulation. [Q.N.1(b), 2072'C']
2. Differentiate between animal pole and vegetal pole of Frog's egg. [Q.N. 1(b), 2071]
3. Define epiboly. [Q.N.1(b), 2070 'Supp']
4. What is cleavage? [Q.N. 1(b), 2070]
5. Define morulation. [Q.N. 1(b), Supp. 2069]
6. What is spermiogenesis ? [Q.N. 1(b), 2068]
7. About the coelom formation in frog. [Q.N. 2(b), 2068]
8. Define the term blastulation. [Group 'A' – Q.N.1(e), 2065]
9. What is cleavage ? [Q.N. 1(i), 2064]
10. What is holoblastic cleavage ? [Q.N. 1(d), 2063]
11. Define cleavage. [Q.N.1(m), 2061]
12. Give reason why micromere cells in frog's embryo are fast dividing. [Q.N. 1(e), 2059]
13. Cleavage in frog is:
    a) Holoblastic and unequal b) Holoblastic and equal
    c) Centrolecithal d) None of them [Q.N. 1(i), 2052]
14. List the process of segmentation of the egg of frog. [Q.N. 2(f), 2052]

Answer all in Brief

1. Discuss the formation of coelom in the embryo of frog. [Q.N.2(b), 2072'C']
2. The coelom formation in frog. [Q.N.2(f), 2072'D']
3. The neurulation process in frog's embryo. [Q.N.2(g), 2072'E']
4. Explain the process of neurulation. [Q.N. 2(b), 2071]
5. Morula and blastula stage of Frog. [Q.N.2(b), 2070 'Supp']
6. Give an account of the formation of coelom in the embryo of frog. [Q.N. 2(e), 2070]
7. Discuss the process of Gastrulation in Frog. [Q.N. 2(a), Supp. 2069]
8. Formation of nervecord. [Q.N. 2(a), 2069]
9. Discuss the fate of ectoderm. [Q.N. 2(b), 2067]
10. Describe the structure of frog's gastrula. [Q.N. 2(c), 2059]

Long Questions

1. Describe the formation of coelome during the development of frog. [Q.N.3, 2066]
2. Describe the changes taking place during gastrulation in frog. [Q.N.3, 2065]
3. What are germinal layers ? How they are formed in the embryo of frog ? [Q.N. 6, 2064]
4. Describe embryonic development of frog up to formation of blastula stage. [Q.N. 6, 2063]
5. How does fertilization takes place in fog. Describe its development up to the formation of gastrula. [Q.N. 6, 2062]
6. What is coelome ? Describe its formation in the development of frog. [Q.N.6, 2061]
7. Describe the development of frog upto the formation of 3 germinal layers. [Q.N.6, 2060]
8. What is coelom? How is it formed in the development of frog. [Q.N. 6, 2058]
9. What are germinal layers ? How they are formed in frog's embryo. [Q.N. 6, 2057]

Unit 3: Human Biology and Health

Answer all in Very Short

(All questions are of equal value, 1 mark each.)

1. What do you mean by dead space? [Q.N.1(c), 2072'C']
2. Write the full form of FSH and LH. [Q.N.1(d), 2072'C']
3. Mention the incubation period of Hepatitis 'B'. [Q.N.1(f), 2072'C']

4. How would you define drug? [Q.N.1(h), 2072'C']
5. Name a drug that gives boundless energy. [Q.N.1(i), 2072'C']
6. Why blind spot of retina can not from image? [Q.N.1(a), 2072'D']
7. Which drugs are obtained from hemp plant? [Q.N.1(b), 2072'D']
8. Write down the function of sorratostain. [Q.N.1(c), 2072'D']
9. Name sensory cranial nerves. [Q.N.1(d), 2072'D']
10. Name carcinogen present in tobacco. [Q.N.1(g), 2072'D']
11. Mention the role of acrosome during fertilization. [Q.N.1(i), 2072'D']
12. Name the minerals needed for proper growth of teeth and bone. [Q.N.1(b), 2072'E']
13. What are Haemopoitic organs? [Q.N.1(c), 2072'E']
14. What do you mean by deamination? [Q.N.1(d), 2072'E']
15. What is the role of eustachian tube? [Q.N.1(e), 2072'E']
16. What is metastasis? [Q.N.1(g), 2072'E']
17. What is gluconeogenesis? [Q.N.1(j), 2072'E']
18. Define the term peristalsis. [Q.N. 1(c), 2071]
19. What is chloride shift? [Q.N. 1(d), 2071]
20. Name the fluid in which the membranous labyrinth floats. [Q.N. 1(e), 2071]
21. Which pigment enables us to see in dark? [Q.N. 1(f), 2071]
22. Give the mode of transmission of hepatitis B. [Q.N.1(c), 2070 'Supp']
23. At what stage an embryo is implanted in the uterus to apply the test-tube baby technique. [Q.N.1(d), 2070 'Supp']
24. What is homeostasis ? [Q.N.1(e), 2070 'Supp']
25. efine synaptic vessicle. [Q.N.1(f), 2070 'Supp']
26. Which mineral is required for the growth of bone and teeth? [Q.N. 1(c), 2070]
27. Differentiate between hormones of enzymes. [Q.N. 1(e), 2070]
28. Define population. [Q.N. 1(d), 2070]
29. Define malignant tumour. [Q.N. 1(g), 2070]
30. What is the incubation period of heptatitis 'A'. [Q.N. 1(h), 2070]
31. What are narcotics? [Q.N. 1(i), 2070]
32. What do you mean by zero population growth? [Q.N. 1(c), Supp. 2069]
33. Where do you find Brunner's gland? [Q.N. 1(d), Supp. 2069]
34. Why do mountainous people usually have simple goitre? [Q.N. 1(e), Supp. 2069]
35. Give two examples of mixed cranial nerves. [Q.N. 1(f), Supp. 2069]
36. Why is Ascariasis prevalent in children? [Q.N. 1(i), Supp. 2069]
37. Name the main steps of nutrition. [Q.N. 1(b), 2069]
38. What do you mean by myogenic heart? [Q.N. 1(c), 2069]
39. Which part of the retina has only cones? [Q.N. 1(d), 2069]
40. What do you understand by the term census? [Q.N. 1(e), 2069]
41. Name the endocrine part of pancreas. [Q.N. 1(f), 2069]
42. Write the effects of increased secretion of sex corticoids in women. [Q.N. 1(g), 2069]
43. In what form is oxygen transported to tissues ? [Q.N. 1(a), 2068]
44. Define the carrying capacity of the environment. [Q.N. 1(c), 2068]
45. What is most toxic excretory product produced in the body ? [Q.N. 1(d), 2068]
46. Name the harmone secreted by corpus luteum. [Q.N. 1(e), 2068]
47. What are narcotics ? [Q.N. 1(f), 2068]
48. What do you understand by Rh-factor ? [Q.N. 1(g), 2068]
49. Name two diseases caused by deficiency of vitamin A. [Q.N. 1(h), 2068]
50. What is Hamburger's phenomenon ? [Q.N. 1(b), 2067]
51. Why blood group A person can not donate blood to Blood group B person ? [Q.N.1(c),2067]
52. Name the pigment needed for vision in dim light. [Q.N. 1(d), 2067]
53. Mention the functions of human ear. [Q.N. 1(e), 2067]
54. Why in Hepatitis dangerous than AIDS. [Q.N. 1(j), 2067]

55. Which pigment is responsible for night vision? [Q.N.1(b), 2066]
56. What do you understand by stroke volume? [Q.N.1(c), 2066]
57. Mention the role of haemoglobin. [Q.N.1(d), 2066]
58. What is chloride shift? [Q.N.1(e), 2066]
59. At what period amniocentasis is done? [Q.N.1(f), 2066]
60. What is the role of immunosuppresant is organ transplantation? {Q.N.1(g), 2066]
61. What are the vitamins produced in human colon with the help of bacteria ? [Q.N.1(b), 2065]
62. Mention the function of hypothalamus. [Q.N.1(c), 2065]
63. What is the function of acrosome found in sperm cell ? [Q.N.1(d), 2065]
64. What is the function of lung ? [Q.N. 1(h), 2064]
65. What is malnutrition ? [Q.N. 1(j), 2064]
66. Mention the role of molars. [Q.N. 1(k), 2064]
67. What do you mean by capillaries ? [Q.N. 1(l), 2064]
68. What is middle ear ? [Q.N. 1(m), 2064]
69. What is the full form of AIDS ? [Q.N. 1(n), 2064]
70. What is herbal therapy ? [Q.N. 1(o), 2064]
71. Mention the role of acrosome. [Q.N. 1(b), 2063]
72. Name the enzyme which curdles milk. [Q.N. 1(e), 2063]
73. What do you mean by Rh factor ? [Q.N. 1(g), 2063]
74. What are neurotransmitters ? [Q.N. 1(i), 2063]
75. What is the function of liver ? [Q.N. 1(h), 2062]
76. What is ventricle ? [Q.N. 1(i), 2062]
77. What is pulmonary respiration ? [Q.N. 1(j), 2062]
78. What are the causative agents of tuberculosis ? [Q.N. 1(l), 2062]
79. What is the role of veins ? [Q.N. 1(m), 2062]
80. What is the function of kidney ? [Q.N.1(h), 2061]
81. What is the role of arteries ? [Q.N.1(i), 2061]
82. What are the causative agents of typhoid ? [Q.N.1(l), 2061]
83. Mention the types of respiration. [Q.N.1(k), 2061]
84. Define permanent teeth. [Q.N.1(n), 2061]
85. Define the term 'deamination'. [Q.N. 1(c), 2060]
86. Which pigment gives colour to urine ? [Q.N. 1(d), 2060]
87. What do you mean by uterus ? [Q.N. 1(e), 2060]
88. Which pigment enable us to see in the dark ? [Q.N. 1(f), 2060]
89. What do you mean by natality rate ? [Q.N. 1(o), 2060]
90. Mention the function of sertoli cells. [Q.N. 1(f), 2059]
91. Name the thoracic muscles involving in inspiration process of man. [Q.N. 1(g), 2059]
92. Mention the hormone when abnormally secreted results simple goitre. [Q.N.1(h), 2059]
93. Write the dental formula of adult man. [Q.N. 1(i), 2059]
94. Define ultrafiltration. [Q.N. 1(j), 2059]
95. Name the photoreceptor cells in the human eye. [Q.N. 1(k), 2059]
96. Define 'atrial systole'. [Q.N. 1(b), 2058]
97. What are psychotropic drugs? [Q.N. 1(f), 2058]
98. What is grey matter? [Q.N. 1(g), 2058]
99. What is demography? [Q.N. 1(j), 2058]
100. Give the role of ACT hormone. [Q.N. 1(n), 2058]
101. Name two proteolytic enzymes present in the intestinal juice. [Q.N. 1(o), 2058]
102. Where do you find ìAdam's appleî? [Q.N. 1(b), 2057]
103. What is the structure of lens in human eye? [Q.N. 1(f), 2057]
104. Which artery supplies the blood to the shoulder? [Q.N. 1(h), 2057]
105. Mention the function of bile. [Q.N. 1(i), 2057]
106. Which hormone results the growth of human body? [Q.N. 1(k), 2057]
107. Which part of human brain is the centre of intelligence? [Q.N. 1(m), 2057]

Answer all in Brief

(All questions are of equal value, 3 marks each.)

1. Describe the structure and function of cochlea. [Q.N.2(d), 2072'C']
2. Mention the functions of fat soluble vitamins. [Q.N.2(e), 2072'C']
3. Draw a neatly labelled sketch of a nephron. (No description required) [Q.N.2(f),2072'C']
4. Mechanism of hearing. [Q.N.2(a), 2072'D']
5. Ill effects of alcohol on health. [Q.N.2(b), 2072'D']
6. The sources and functions of vitamin A. [Q.N.2(c), 2072'D']
7. The pancreases as Heterocrine gland. [Q.N.2(d), 2072'D']
8. Differentiate between sympatheic and parasympathetic nervous system. [Q.N.2(e), 2072'D']
9. Role of fats in body. [Q.N.2(a), 2072'E']
10. The short and long term effects of use of tobacco. [Q.N.2(c), 2072'E']
11. The pancreas as compound gland [Q.N.2(e), 2072'E']
12. The menstrual cycle. [Q.N.2(f), 2072'E']
13. Write the effects of hypothyroidism. [Q.N. 2(c), 2071]
14. Discuss different diseases caused by malnutrition. [Q.N. 2(d), 2071]
15. Describe kidney as a homeostatic organ. [Q.N. 2(e), 2071]
16. Give the symptoms and control methods of tuberculosis. [Q.N. 2(f), 2071]
17. An artificial respiration. [Q.N.2(c), 2070 'Supp']
18. Antagonistic effects of insulin and glucagon. [Q.N.2(d), 2070 'Supp']
19. The role of iris in image formation. [Q.N.2(e), 2070 'Supp']
20. About menopause. [Q.N.2(f), 2070 'Supp']
21. The various factors controlling population growth. [Q.N.2(g), 2070 'Supp']
22. Discuss the control measures of over population. [Q.N. 2(c), 2070]
23. Draw a neatly labelled sketch of human ear (No description is required) [Q.N. 2(d), 2070]
24. Mention the health hazards of tobacco smoke. [Q.N. 2(g), 2070]
25. Write short note on Kala–Azar. [Q.N. 2(b), Supp. 2069]
26. Why Blood Group 'A' person can not donate Blood to Blood group 'B' person? [Q.N. 2(c), Supp. 2069]
27. Write ill effects of alcohol on health. [Q.N. 2(g), Supp. 2069]
28. Importance of vitamins. [Q.N. 2(b), 2069]
29. The role of graafian follicle. [Q.N. 2(c), 2069]
30. Exchange of gases in the lung. [Q.N. 2(d), 2069]
31. The trends of human population growth. [Q.N. 2(g), 2069]
32. Action of different proteolytic enzymes. [Q.N. 2(c), 2068]
33. Give an account of adrenal cortex. [Q.N. 2(d), 2068]
34. Differentiate between sympathetic and parasympathetic nerves. [Q.N. 2(g), 2068]
35. Write short note on control measures of human population growth. [Q.N. 2(c), 2067]
36. Describe the function of liver. [Q.N. 2(d), 2067]
37. Describe the role of pituitary gland in Endocrinology. [Q.N. 2(g), 2067]
38. Write the consequences of overpopulation. [Group 'A' – Q.N.2(b), 2066]
39. List the hormones required for proper functioning of male and female reproductive organs. [Group 'A' – Q.N.2(c), 2066]
40. Draw a neatly labelled diagram of a nephron. (No description is required.) [Group 'A' – Q.N.2(d), 2066]
41. Write a note on smoking. [Group 'A' – Q.N.2(e), 2066]
42. Structure and function of cochlea. [Group 'A' – Q.N.2(b), 2065]
43. Symptoms and causes of anemia. [Group 'A' – Q.N.2(c), 2065]
44. Meaning of carrying capacity and causes of population growth. [Group 'A' – Q.N.2(e), 2065]
45. Describe briefly about the importance of microelements. [Q.N. 2(f), 2064]
46. Sketch the well labelled diagram of L.S. of human kidney. [Q.N. 2(g), 2064]

47. Differentiate between active absorption and passive absorption. [Q.N. 2(h), 2064
48. Differentiate between J-shaped and S-shaped curves. [Q.N. 2(i), 2064]
49. Elaborate about the control of smoking. [Q.N. 2(j), 2064]
50. What are vitamins ? Why they are essential ? [Q.N. 2(a), 2063]
51. Write a note on an artificial pacemaker. [Q.N. 2(b), 2063]
52. Differentiate between benign and malignant tumour. [Q.N. 2(c), 2063]
53. Describe structure and function of adrenal gland. [Q.N. 2(e), 2063]
54. Show the internal structure of human heart (diagrammatically). [Q.N. 2(f), 2062]
55. What are the disadvantages of over population ? [Q.N. 2(g), 2062]
56. Elaborate about the causes of typhoid. [Q.N. 2(j), 2062]
57. Draw a labelled V.S. of human eyes. [Q.N.2(i), 2061]
58. What is the function of endocrine glands ? [Q.N.2(j), 2061]
59. Discuss about the over population of human beings. [Q.N.2(g), 2061]
60. "Aids is very common among drug addicts." Discuss. [Q.N.2(c), 2060]
61. Draw a labelled L.S. of human kidney. [Q.N.2(e), 2060]
62. What are heart sounds ? How are they produced ? [Q.N.2(f), 2060]
63. How is oxygen transported in the blood and released in the tissue ? [Q.N.2(j), 2060]
64. Name of hormones produced by adrenal gland and state their functions. [Q.N. 2(h), 2059]
65. Discuss the histological structure of human pancreas. [Q.N. 2(f), 2059]
66. Draw a labelled sketch of internal ear of man. [Q.N. 2(g), 2059]
67. Explain the phenomenon of reflex action. [Q.N. 2(b), 2058]
68. List the functions of human kidney. [Q.N. 2(c), 2058]
69. Distinguish between antigen and antibody. [Q.N. 2(f), 2058]
70. Explain the major causes of cancer. [Q.N. 2(g), 2058]
71. How human heart beating starts? [Q.N. 2(f), 2057]
72. Discuss the consequences of over human population. [Q.N. 2(g), 2057]
73. What is the structure of adrenal gland ? Name the hormones it produces. [Q.N. 2(h), 2057]
74. Pituitary gland is referred to as "Master Gland". Why ? [Q.N. 3(a), 2055]
75. Discuss the following:

(All questions are of equal value, 4 marks each.)

a) Thyroxine hormone triggers the rate of metamorphosis. [Q.N. 3(f), 2056]
b) structure of the Thyroid gland [Q.N. 2(a), 2055]

76. Differentiate between following:

(All questions are of equal value, 3 marks each.)

a. Dwarfism and giantism [Q.N. 4(b), 2055]
b. Thyroid gland and Thymus gland [Q.N. 4(d), 2054]

77. Mention the function of pituitaries. [Q.N. 2(b), 2054]
78. Justify pancreas as exocrine and endocrine gland. [Q.N. 2(a), 2053]
79. Mention the function of male sex hormone. [Q.N. 3(b), 2053]
80. What is endocrine gland ? Give the list of major endocrine glands. [Q.N. 3(c), 2052]

Long Questions

1. Give a detailed account of male reproductive organs of man. 7.5[Q.N.3, 2072'C']
2. What are myogenic hearts? Explain origin and conduction of heart beat in human being. [Q.N.3(Or), 2072'C']
3. Discuss the causative agent, mode of transmission, symptoms, diagnosis and control measures of Tuberculosis. 8 [Q.N.4, 2072'C']
4. Describe the alimentary canal of Human with labelled diagram. 7.5[Q.N.3, 2072'D']
5. Describe Tuberculosis as world emergency with causative agent, mode of transmission, symptoms and control measures. [Q.N.3(Or), 2072'D']
6. Discus the transmission of nerve impulse with well lablled diagram. 8 [Q.N.4, 2072'D'
7. Describe the structure and functions of Human Heart with well labelled diagram. 7.5[Q.N.3, 2072'E']

8. Describe the physiology of digestion in human being. [Q.N.3(Or), 2072'E']
9. Describe the causative agent, epidemiology, symptoms and control of Tuberculosis. 8 [Q.N.4, 2072'E']
10. Give the structure and working mechanism of human heart. 8 [Q.N. 4, 2071]
11. Discuss about the human population growth, problems of over population and control strategies. 7.5 [Q.N. 3, 2071]
12. Describe female reproductive system of human being. [Q.N. 3(Or), 2071]
13. Give an account of digestive system of man. [Q.N.4, 2070 'Supp']
14. Describe the causes and symptoms of the following diseases : Typhoid, Tuberculosis, Cancer and AIDS. [Q.N.4(Or), 2070 'Supp']
15. Discuss about the structure and working of human heart. [Q.N.3, 2070 'Supp']
16. Describe the respiratory organs of man. 7.5 [Q.N. 3, 2070]
17. Give an account of Alimentary canal of man. [Q.N. 3(Or), 2070]
18. Discuss causative agent, incubation period, affected organs, mode of transmission, symptoms, prevention and control measures of AIDS. 8 [Q.N. 4, 2070]
19. Describe the structure and function of nephron with suitable diagram. 7.5[Q.N. 3,Supp. 2069]
20. Explain the transmission of nerve impulse with well labelled diagram. [Q.N. 3(Or), Supp. 2069]
21. Describe the causative agent, mode of transmission, symptoms and control measures of Tuberculosis. 8 [Q.N. 4, Supp. 2069]
22. Describe the structure and functions of human brain. [Q.N. 3, 2069]
23. Give an account of the process of Urine formation in human being. [Q.N. 4, 2069]
24. Write an essay on socially significant diseases. [Q.N. 4(Or), 2069]
25. Explain the course of blood circulation in the human heart with the help of neat and well labelled diagram. [Q.N. 3, 2068]
26. Give an account of the retina in human eye, and mention its working mechanism. [Q.N. 4, 2068]
27. What is cancer ? Discuss its types, causes, symptoms, control measure, diagnosis and treatment. [Q.N. 4(Or), 2068]
28. Describe the pulmonary respiration and mechanism of breathing in human being. [Q.N. 3, 2067]
29. Describe the causative agent, mode of transmission and control measures of typhoid. [Q.N. 3(or), 2067]
30. Give an account of structure and function of a nephron in human being. [Q.N. 4, 2067]
31. Give an account of the structure and function of human brain. [Q.N.4, 2066]
32. What is DOTS ? Discuss the causative agent, symptoms, effects and control measures of tuberculosis. [Q.N.4(Or)), 2066]
33. Describe the digestive organs of man with the help of well labelled diagram. 8 [Group 'A' – Q.N.4, 2065]
34. What is AIDS ? Mention its causative organism, mode of transmission, symptoms, diagnosis, treatment and preventive measures. [Q.N.4.(or), 2065]
35. Explain the course of blood circulation in the human heart with well labelled diagram. 10 [Q.N. 4, 2064]
36. What are communicable diseases ? Elaborate about the causative agents, symptoms, effects and controlling measures of tuberculosis. [Q.N. 4(or), 2064]
37. Discuss the processes of urine formation in a nephron. 10 [Q.N. 5, 2063]
38. Give an account of the structure and functions of human ear. [Q.N. 5(Or), 2063]
39. Describe the human alimentary canal and process of digestion with neat diagram. 10 [Q.N. 4, 2062]
40. What is cancer ? Discuss the causes and treatment of cancer and also mention one major cancer in man and woman each. [Q.N. 4(Or), 2062]
41. What is respiration ? Describe the respiratory system of human being. 10[Q.N.4, 2061]

42. Define AIDS, and elaborate about its origin, causative agents, mode of transmission and controlling measures. [Q.N.4(Or), 2061]
43. Write an account of the structure & working of human heart. 10 [Q.N.4, 2060]
44. Discuss the human population growth, problems of over population and control strategies. [Q.N.4(Or), 2060]
45. Discuss the internal structure of human lung and mention its working mechanism. 5+2 [Q.N. 4, 2059]
46. What is addiction? Discuss the symptoms, effects and control measures of alcohol addiction. 1+3+3+3 [Q.N. 4(Or), 2059]
47. Describe the fertilization process in human beings. 7[Q.N. 3, 2058]
48. Write the basic features of digestive system in mammals. Draw a well labeled diagram of alimentary canal of man. 5+2 [Q.N. 3(Or), 2058]
49. What is 'DOTS'? Describe causal organism, symptoms, transmission and preventive measures of tuberculosis. 1+1+2+2+4 [Q.N. 4(Or), 2058]
50. Draw a well-labeled sketch of structure of human heart. 7 [Q.N. 5, 2058]
51. Write an account of the structure of mammalian kidney. How it acts as homeostatic organ? 5+5 [Q.N. 4, 2057]
52. What are communicable diseases ? Discuss the causative agents, symptoms, effects and control measures of any one communicable disease you have studied. 2+1+2+2+3 [Q.N. 4(Or), 2057]

Unit 4: Application of Biology

Answer all in Very Short

1. What is antibiotics? [Q.N.1(e), 2072'C']
2. Why is amniocentesis banned? [Q.N.1(g), 2072'C']
3. Define significance of poultry farming. [Q.N.1(j), 2072'C']
4. Which analysis is carried out to find the sex of unborn baby? [Q.N.1(e), 2072'D']
5. What is xenograft? [Q.N.1(h), 2072'D']
6. Why is surrogacy banned in some countries. [Q.N.1(j), 2072'D']
7. Give full form of IUD. [Q.N.1(f), 2072'E']
8. How is test tube baby different from normal baby? [Q.N.1(h), 2072'E']
9. Name two indegenous fishes found in Nepal. [Q.N.1(i), 2072'E']
10. Who extracted penicillin for the first time? [Q.N. 1(g), 2071]
11. What do you mean by extensive fish farming? [Q.N. 1(i), 2071]
12. What are pullets? [Q.N. 1(j), 2071]
13. Define the term immunity. [Q.N. 1(h), 2071]
14. Who discovered the first antibiotic ? [Q.N.1(g), 2070 'Supp']
15. Define interferon. [Q.N.1(h), 2070 'Supp']
16. Define allograft with example. [Q.N.1(i), 2070 'Supp']
17. Name first test-tube baby with date. [Q.N.1(j), 2070 'Supp']
18. What is antigen? [Q.N. 1(f), 2070]
19. What do you mean by vaccination? [Q.N. 1(j), 2070]
20. Define extensive fish farming. [Q.N. 1(g), Supp. 2069]
21. What are antibiotics? [Q.N. 1(h), Supp. 2069]
22. Write down the meaning of cryopreservation. [Q.N. 1(j), Supp. 2069]
23. What is antibody? [Q.N. 1(h), 2069]
24. Define immunity. [Q.N. 1(i), 2069]
25. Define the term sexing. [Q.N. 1(j), 2069]
26. What is called brooding ? [Q.N.1(i),2068]
27. What do you mean by surrogate mother ? [Q.N.1(j),2068]
28. Who invented penicillin and when ? [Q.N. 1(f), 2067]

29. What is Toxoid ? Give example. [Q.N. 1(i), 2067]
30. What do you understand by poultry farming ? [Q.N. 1(g), 2067]
31. What is keratoplasty ? [Q.N. 1(h), 2067]
32. What is ELISA test ? [Group 'A' – Q.N.1(f), 2065]
33. Write the meaning of surrogate mother. [Group 'A' – Q.N.1(g), 2065]
34. What is antigen ? [Q.N. 1(k), 2062]
35. What are vaccines ? [Q.N.1(j), 2061]
36. Mention any two chief properties of antibiotics. [Q.N. 1(n), 2059]
37. Give the meaning of amniocentesis. [Q.N. 1(m), 2059]

Answer all in Brief

(All questions are of equal value, 3 marks each.)

1. Explain the role of surrogate mother. [Q.N.2(c), 2072'C']
2. Discuss the advantages of fish framing. [Q.N.2(g), 2072'C']
3. The advantages of pisciculture in Nepal. [Q.N.2(g), 2072'D']
4. Note on vaccine. [Q.N.2(d), 2072'E']
5. Discuss the advantages and drawbacks of test tube baby. [Q.N. 2(g), 2071]
6. Write a note on poultry farming. [Q.N. 2(b), 2070]
7. Discuss the benefit of organ transplantation. [Q.N. 2(f), 2070]
8. Discuss the benefit of ogran transplantation. [Q.N. 2(d), Supp. 2069]
9. Illustrate the consequences of over population. [Q.N. 2(e), Supp. 2069]
10. Advantage and disadvantage of amniocentesis. [Q.N. 2(f), 2069]
11. What are vaccines ? Describe their types. [Q.N. 2(e), 2068]
12. About the scope of fish farming in Nepal. [Q.N. 2(f), 2068]
13. Give brief account of antibiotics. [Q.N. 2(e), 2067]
14. Discuss the significance of Amniocentesis in brief. [Q.N. 2(f), 2067]
15. Amniocentesis [Group 'A' – Q.N.2(d), 2065]
16. Write a note on amniocentesis. [Q.N. 2(e), 2062]
17. What is the benefit of organ transplantation. [Q.N.2(h), 2061]
18. Write a note on organ transplantation. [Q.N. 2(i), 2057]

Section 'B' (Botany)

Unit 1: Anatomy and Physiology of Organisms

1.1 Plant Physiology

Answer all in Very Short

(All questions are of equal value, 1 mark each.)

1. Define phototropism. [Q.N.1(b), 2072'C']
2. What does it mean by deplasmolysis? [Q.N.1(c), 2072'C']
3. Define geotropism. [Q.N.1(b), 2072'D']
4. What does it mean by plasmolysis? [Q.N.1(c), 2072'D']
5. What is ascent of sap? [Q.N.1(b), 2072'E']
6. Define transpiration. [Q.N. 1(b), 2071]
7. What do you mean by hydrotropism? [Q.N. 1(c), 2071]
8. Define turgidity. [Q.N.1(b), 2070 'Supp']
9. Mention two plant hormones. [Q.N.1(c), 2070 'Supp']
10. Define osmotic pressure. [Q.N. 1(b), 2070]
11. What is hormone? [Q.N. 1(c), 2070]
12. What does it mean by Plasmolysis ? [Q.N. 1(c), 2069]
13. What is osmosis ? [Q.N.1(b), 2068]
14. What is the function of hydathode ? [Q.N.1(c), 2068]

15. Define the term diffusion ? [Q.N. 1(b), 2067]
16. What is phototropism ? [Q.N. 1(c), 2067]
17. Define phototropism. [Group 'B' – Q.N.1(b), 2066]
18. Write full form of NADP. [Group 'B' – Q.N.1(e), 2066]
19. What happens when a turgid cell is placed in hypertonic solution ? [Group 'B' – Q.N.1.(b), 2065]
20. What are different types of photosynthetic pigments ? [Group 'B' – Q.N. 1(c), 2065]
21. What is semipermeable membrane ? [Q.N. 1(b), 2064]
22. Write full form of ATP. [Q.N. 1(c), 2064]
23. What is parthenocarpic fruit ? [Q.N. 1(d), 2064]
24. What is the role of ethylene ? [Q.N. 1(b), 2062]
25. What is the role of guard cell ? [Q.N. 1(o), 2062]
26. What is the role of root nodules ? [Q.N.1(g), 2061]
27. What is photophosphorylation ? [Q.N. 1(i), 2060]
28. What is the role of hydathode ? [Q.N.1(o), 2061]
29. Where do auxins are synthesized ? [Q.N. 1(j), 2060]
30. What cell controls the opening & closing of stomata ? [Q.N. 1(l), 2060]
31. How does transpiration differ from guttation ? [Q.N.2(i), 2060]
32. Name the plant hormone affecting seed germination. [Q.N. 1(c), 2058]
33. Which plant hormone promotes leaf and fruit fall ? [Q.N. 1(c), 2057]
34. **Mark (√) the correct choice.** ***(All questions are equal value of 1 marks.)***
    a) Rooting hormones are-
    i. Auxins ii. Gibberllins iii. Kinetins iv. Ethylene. [Q.N. 1(c), 2056]
    b) Auxins and Gibberllins. [Q.N. 4(f), 2056]
    c) Falling of leaves from plants is due to:
    i) excess of auxins in the leaf ii) high concentration of ABA in the leaf
    iii) due to cytokinins iv) due to Gibberellin [Q.N. 1(b), 2055]
    d) Grow the inhibiting hormone in plant is: [Q.N. 1(a), 2054]
    ☐ Abscisic acid ☐ Auxin ☐ Cytokinin ☐ Ethane

Answer all in Brief

1. Structure and function of stomata. [Q.N.2(a), 2072'C']
2. Light reaction. [Q.N.2(b), 2072'C']
3. Anaerobic respiration. [Q.N.2(b), 2072'D']
4. Discuss the physiological significance of auxins. [Q.N.2(b), 2072'E']
5. Characteristics of C_4 plants with examples. [Q.N. 2(b), 2071]
6. Structure of stomata and its mechanism. [Q.N.2(a), 2070 'Supp']
7. Steps of dark reaction. [Q.N.2(b), 2070 'Supp']
8. Steps of light reaction. [Q.N. 2(b), 2070]
9. Explain the functioning of stomata with figure. [Q.N. 2(c), Supp. 2069]
10. External factors affecting the photosynthesis. [Q.N. 2(c), 2069]
11. Describe the anaerobic respiration. [Q.N.2(b), 2068]
12. Describe the uses of cytokinin. [Q.N. 2(b), 2067]
13. Highfight the importance of osmosis. [Group 'B' – Q.N.2(d), 2066]
14. Cyclic phosphorylation. [Group 'B' – Q.N.2.(b), 2065]
15. What are the differences between transpiration and guttation ? [Q.N. 2(b), 2064]
16. Discuss an experiment to demonstrate the root pressure. [Q.N. 2(f), 2063]
17. Elaborate about glycolysis. [Q.N. 2(c), 2062]
18. Differentiate between transpiration and guttation. [Q.N. 2(i), 2062]
19. How pyruvic acid is formed in glycolysis ? [Q.N.2(b), 2061]
20. Describe how auxins are related with bending of shoots towards light. [Q.N.2(g), 2060]
21. Mention the physiological effects of gibberellins in plant growth. [Q.N. 2(b), 2059]

22. Describe biological role of gibberallic acid in plants. [Q.N. 2(a), 2058]
23. Describe an experiment showing Oxygen is evolved during photosynthesis. [Q.N. 2(d), 2058]
24. Explain the significance of carboxylation in Calvin cycle. [Q.N. 2(i), 2058]
25. Discuss the role of light in photosynthesis. [Q.N. 2(a), 2057]
26. What are the physiological effects of cytokinins on plants? [Q.N. 2(b), 2057]
27. Attempt the following questions. *(All questions are equal value of 2 marks.)*
    a. What is plant growth inhibitor ? Why is it necessary in plants ? [Q.N. 3(c), 2053]
    b. Name any four growth hormones found in plant. [Q.N. 3(e), 2052]
28. Differentiate between the following pair of words. *(All questions are equal value of 2 marks.)*
    (a) Auxins and cytokinins [Q.N. 4(d), 2055]
29. Name any three plant hormones. [Q.N. 2(c), 2053]

Long Questions

1. Define respiration and explain the experiment to demonstrate the aerobic respiration with well labelled diagrams. [Q.N.3(c)(Or), 2072'C']
2. Define photosynthesis and describe the experiment to demonstrate that CO_2 is necessary for photosynthesis (Moll's apparatus). [Q.N.3(Or), 2072'D']
3. Describe in brief about the various factors that influences the photosynthesis in plants. [Q.N.3 (Or), 2072'E']
4. Define photosynthesis and describe any experiment regarding the photosynthesis studied by you. 7.5 [Q.N. 3, 2071]
5. Define respiration. Describe in detail the experiment to demonstrate the aerobic respiration with clean diagrams. [Q.N.3(Or), 2070 'Supp']
6. Define respiration. Describe in detail the experiment to demonstrate the anaerobic respiration with clean diagram. 8 [Q.N. 3(Or), 2070]
7. Describe the steps involved in Kreb's cycle. [Q.N. 3(Or), Supp. 2069]
8. Describe the experiment (Moll's apparatus) in detail showing the necessity of carbon dioxide during photosynthesis. [Q.N. 3(Or), 2069]
9. What is transpiration ? Describe an experiment to show the rate of transpiration by Ganong's potometer. [Q.N.3(Or), 2068]
10. What is transpiration ? Describe an experiment to show the unequal transpiration. [Q.N. 3(or), 2067]
11. Define aerobic respiration and highlight major steps of this process. [Group 'B' – Q.N. 3(Or, 2066]
12. Give an experiment to show that CO_2 is essential for photosynthesis. 8 [Group 'B' – Q.N.4. (or), 2065]
13. Describe briefly the various influencing factors of photosynthesis. [Q.N. 3(or), 2064]
14. Give an account of the structure of stomata and its working mechanism during transpiration. 7 [Q.N. 3, 2063]
15. What is respiration ? Discuss the mechanism of anaerobic respiration. [Q.N. 3 (Or), 2062]
16. What is transpiration ? Describe an experiment to show an unequal transpiration. [Q.N.3(Or), 2061]
17. Discuss cohesion-tension theory for the uptake of water. [Q.N.3(Or), 2060]
18. Describe the light dependent steps of photosynthesis. How are they linked to the dark reaction ? Discuss. [Q.N. 3(Or), 2059]
19. What are the types of transpiration ? Explain the factors affecting the rate of transpiration. *1.5+5.5* [Q.N. 3(Or), 2057]

1.2 Plant Anatomy

Answer all in Very Short

(All questions are of equal value, 1 mark each.)

1. What is apical meristem? [Q.N.1(a), 2072'C']
2. What is the role of sclerenchymatous tissue? [Q.N.1(a), 2072'D']
3. What is the functions of phloem? [Q.N.1(a), 2072'E']
4. Mention two elements of phloem. [Q.N. 1(a), 2071]
5. What does it mean by meristematic tissue ? [Q.N.1(a), 2070 'Supp']
6. What do you mean by chlorenchyma? [Q.N. 1(a), 2070]
7. What is apical meristem? [Q.N. 1(a), Supp. 2069]
8. Define epidermis. [Q.N. 1(b), Supp. 2069]
9. What do you mean by annual ring? [Q.N. 1(c), Supp. 2069]
10. Define permanent tissue. [Q.N. 1(a), 2069]
11. Mention the role of cuticle? [Q.N. 1(b), 2069]
12. Define sclerenchyma. [Q.N.1(a), 2068]
13. What is sclerenchyma ? [Q.N. 1(a), 2067]
14. What are annual rings ? [Group 'B' – Q.N.1(a), 2066]
15. Name thin walled cells with chloroplast. [Group 'B' – Q.N.1.(a), 2065]
16. Define cambium. [Group 'B' – Q.N.1.(d), 2065]
17. Name two elements of xylem bundle. [Q.N. 1(a), 2064]
18. Name two complex permanent tissues. [Q.N. 1(a), 2062]
19. What is the role of chlorenchyma ? [Q.N. 1(c), 2062]
20. Write full form of T.S. and L.S. [Q.N. 1(e), 2062]
21. Name two elements of phloem bundle. [Q.N.1(a), 2061]
22. What is apical dominance ? [Q.N.1(b), 2061]
23. What is the function of cortex ? [Q.N.1(c), 2061]
24. What do you mean by apical meristem ? [Q.N. 1(h), 2060]
25. Name any one plant with exarch xylem. [Q.N. 1(a), 2059]
26. Mention the function of lateral meristem. [Q.N. 1(h), 2058]
27. Give one example of stem with conjoint and collateral vascular bundle. [Q.N.1(a),2058]
28. Give one example with scattered vascular bundle in the stem. [Q.N. 1(a), 2057]

Answer all in Brief

1. Structure and function of conjoint vascular bundle. [Q.N.2(a), 2072'D']
2. Write short notes on sclerenchyma tissue. [Q.N.2(a), 2072'E']
3. Structure and function of collenchyma. [Q.N. 2(a), 2071]
4. Structure and function of parenchyma. [Q.N. 2(a), 2070]
5. Structure and function of different types of parenchymatous tissue. [Q.N. 2(b), Supp. 2069]
6. Structure and function of sclerenchymatous tissue. [Q.N. 2(b), 2069]
7. Structure and function of collenchymatous tissue. [Q.N.2(a), 2068]
8. Describe in detail about the types and functions of parenchymatous tissue. [Q.N. 2(a), 2067]
9. Differentiate between xylem and phloem tissues. [Group 'B' – Q.N.2.(a), 2065]
10. Differentiate between the collenchyma and sclerenchyma. [Q.N. 2(a), 2064]
11. How xylem differs from phloem ? Discuss. [Q.N. 2(h), 2063]
12. What are the roles of meristem ? [Q.N. 2(d), 2062]
13. What is simple permanent tissues of plants ? [Q.N.2(c), 2061]
14. Give the meaning of secondary growth with one example. [Q.N. 2(a), 2059]
15. Write about the permanent tissues of plant. [Q.N. 2(j), 2058]

Long Questions

1. Describe the T.S. of dicot stem with well labelled diagrams and compare it with monocot stem also. 7.5[Q.N.3(c), 2072'C']
2. What is secondary growth? Describe the process involved in dicot stem with necessary diagrams. 7.5[Q.N.3, 2072'D']
3. What is secondary growth? Describe the process of secondary growth in dicot stem. 7.5[Q.N.3, 2072'E']
4. Describe the T.S. of monocot and dicot leaf with necessary diagram. [Q.N.3(Or), 2071]
5. Describe the T.S. of monocot stem with well labelled diagram and point out its differences with that of dioct stem. 7.5 [Q.N.3, 2070 'Supp']
6. Describe the T.S. of monocot stem with well labelled diagram and point out its differences with that of dicot stem. 7.5 [Q.N. 3, 2070]
7. Describe the anatomical structure of dicot root with well labelled diagram and compare it with monocot root. 7.5 [Q.N. 3, Supp. 2069]
8. Define secondary growth and describe its processes involved in dicot stem with necessary figures. [Q.N. 3, 2069]
9. Draw a well labelled diagram of T.S. of dicot stem and point out its differences with monocot stem. 7.5 [Q.N.3, 2068]
10. Draw a well labelled diagram of T.S. of dicot root and point out its differences with that of monocot root. 7.5 [Q.N. 3, 2067]
11. Describe the internal structure of the monocot stem with the help of a well labelled diagram. 7.5 [Group 'B' – Q.N.3, 2066]
12. Draw a neat, well labelled diagram of T.S. dicot stem and point out its differences with that of monocot stem. 8 [Group 'B' – Q.N.4, 2065]
13. What is secondary growth ? Describe the process of secondary growth in dicot stem. [Q.N. 3, 2064]
14. What is secondary growth ? How the meristems are responsible for secondary growth ? Discuss. [Q.N. 3(Or), 2063]
15. Describe and compare the anatomical structures of dicot and monocot roots. 7 [Q.N. 3, 2062]
16. Discuss the anatomical structure of dicot stem. 7 [Q.N.3, 2061]
17. Discuss the anatomical structure of dicot root. Point out the nature of its vascular bundle. 7 [Q.N.3, 2060]
18. Discuss anatomical features of a typical dicot stem and point out any four important differences with the monocot type. 5+2 [Q.N. 3, 2059]
19. What do you mean by permanent plant tissues ? Discuss the structure and functions of simple permanent tissues. 1+3+3 [Q.N. 3, 2057]

Unit 2: Genetics

Answer all in Very Short

(All questions are of equal value, 1 marks each.)

1. What is genetic material? [Q.N.1(d), 2072'C']
2. What is homozygous? [Q.N.1(d), 2072'D']
3. Define recessiveness. [Q.N.1(e), 2072'D']
4. Differentiate dominance and epistasis. [Q.N.1(c), 2072'E']
5. Define gene mutation. [Q.N.1(d), 2072'E']
6. State law of independent assortment. [Q.N.1(j), 2072'E']
7. What does it mean by trait? [Q.N. 1(d), 2071]
8. Illustrate about RNA. [Q.N. 1(e), 2071]
9. What is genetic material ? [Q.N.1(d), 2070 'Supp']

10. What do you mean by dominance ? [Q.N.1(e), 2070 'Supp']
11. What does it mean by homozyous? [Q.N. 1(d), 2070]
12. Mention about monohybrid cross. [Q.N. 1(d), Supp. 2069]
13. What does it mean by genotype? [Q.N. 1(e), Supp. 2069]
14. Define polyploidy. [Q.N. 1(d), 2069]
15. What do you mean by test cross? [Q.N. 1(e), 2069]
16. Define inheritance. [Q.N.1(d), 2068]
17. What is variation ? [Q.N.1(e), 2068]
18. What is heredity ? [Q.N. 1(d), 2067]
19. What is homozygous ? [Q.N. 1(e), 2067]
20. What is a heterozygous organism ? [Group 'B' – Q.N.1(c), 2066]
21. What is a backcross ? [Group 'B' – Q.N.1.(e), 2065]
22. Write chemical differences between DNA and RNA. [Group 'B' – Q.N.1.(f), 2065]
23. Define polyploidy. [Group 'B' – Q.N.1.(g), 2065]
24. What do you understand by the term allele ? [Q.N. 1(n), 2063]
25. Define gene-pool. [Q.N. 1(o), 2063]
26. What does it mean by monohybrid cross ? [Q.N. 1(d), 2062]
27. What does it mean by genotype ? [Q.N.1(d), 2061]
28. Write full form of t RNA and m RNA. [Q.N.1(e), 2061]
29. What is polyploidy ? [Q.N. 1(g), 2060]
30. What is a regulator gene ? [Q.N. 1(m), 2060]
31. Give one example of co-dominance. [Q.N. 1(c), 2059]
32. Mention the nitrogen bases present in pyrimidine. [Q.N. 1(d), 2059]
33. Write two examples of polyploidy. [Q.N. 1(d), 2058]
34. What is punnett square? [Q.N. 1(e), 2058]
35. Define linkage. [Q.N. 1(i), 2058]
36. Define genetic engineering. [Q.N. 1(l), 2058]
37. Give the significance of polygenic trait. [Q.N. 1(m), 2058]
38. Define allele. [Q.N. 1(e), 2057]
39. Give one example of polygenic inheritance. [Q.N. 1(g), 2057]
40. Define genetic code. [Q.N. 1(n), 2057]
41. Differentiate between the Autogamy and Allogamy. [Q.N. 4(e), 2053]
42. Mark (√) the correct choice.

a. The probability of appearance of tall characters on pea plants in F_2generation of a Mendeian Experiment is-
i. 100% ii. 50% iii. 75% iv. 25% [Q.N. 1(d), 2056]

b. Agents that cause mutations are called:
i) mutagens ii) mutants
iii) chromosomes iv) genes [Q.N. 1(d), 2055]

c. Genetic make up of an individual is called ..... [Q.N. 1(a), 2053]
☐ Phenotype ☐ Genotype ☐ Recessive ☐ None

d. The mutation theory was proposed by ..... [Q.N. 1(e), 2053]
☐ Devries ☐ Charles Darwin ☐ Lamark ☐ A. R. Wallace

e. An organism having similar genes is called: [Q.N. 1(ii), 2052]
a) Genotype b) Dihybrid c) Homozygous d) Linkage

f. The theory of mutation was given by: [Q.N. 1(iii), 2052]
a) Darwin b) Cuvier c) Devries d) Lamarck

Answer all in Brief

(All questions are of equal value, 3 marks each.)

1. Process of crossing over. [Q.N.2(c), 2072'C']
2. Reason of pea plant selection for Mendel's experiments. [Q.N.2(d), 2072'C']
3. Law of dominance. [Q.N.2(e), 2072'C']
4. Law of segregation. [Q.N.2(c), 2072'D']
5. Importance of polyploidy. [Q.N.2(d), 2072'D']
6. Chromosomal aberration. [Q.N.2(e), 2072'D']
7. Differentiate genotypes and phenotypes. [Q.N.2(c), 2072'E']
8. Describe about the process of crossing over. [Q.N.2(d), 2072'E']
9. Explain sex-linked inheritance of colour blindness in man. [Q.N.2(e), 2072'E']
10. Law of independent assortment. [Q.N. 2(c), 2071]
11. Significance of polyploidy with examples. [Q.N. 2(d), 2071]
12. Difference between incomplete and codominace.. [Q.N. 2(e), 2071]
13. Types of DNA and its function. [Q.N.2(c), 2070 'Supp']
14. Law of dominance with examples. [Q.N.2(d), 2070 'Supp']
15. Semiconservative method of DNA replication. [Q.N.2(e), 2070 'Supp']
16. Structure and functions of RNA. [Q.N. 2(c), 2070]
17. Law of segregation. [Q.N. 2(d), 2070]
18. Semi-conservative method of DNA replication. [Q.N. 2(e), 2070]
19. What are the causes for selecting the fruit fly in genetic study? [Q.N. 2(d), Supp. 2069]
20. Explain the characteristics of genetic code. [Q.N. 2(e), Supp. 2069]
21. Elaborate about the law of dominance. [Q.N. 2(f), Supp. 2069]
22. Characteristics of genetic code. [Q.N. 2(d), 2069]
23. Process of crossing over. [Q.N. 2(e), 2069]
24. Mendel's dihybrid cross. [Q.N. 2(f), 2069]
25. Describe the structure of DNA. [Q.N. 2(c), 2068]
26. Discuss the incomplete dominance with examples. [Q.N. 2(d), 2068]
27. Describe the types of mutations. [Q.N. 2(e), 2068]
28. Describe the structure of DNA. [Q.N. 2(c), 2067]
29. Describe in detail about the incomplete dominance with examples. [Q.N. 2(d), 2067]
30. Describe the types of mutation. [Q.N. 2(e), 2067]
31. Explain the Mendel's law of segregation. [Group 'B' – Q.N.2(a), 2066]
32. Describe the significance of polyploidy. [Group 'B' – Q.N.2(b), 2066]
33. incomplete linkage in maize. [Group 'B' – Q.N.2.(c), 2065]
34. Show the dihybrid cross on Punnett Square method. [Q.N. 2(c), 2064]
35. Discuss the relationship between variation and heredity. [Q.N. 2(i), 2063]
36. What are the causes and roles of mutation ? [Q.N. 2(j), 2063]
37. Elaborate about the incomplete dominance. [Q.N. 2(a), 2062]
38. Describe semi-conservative mode of replication of DNA. [Q.N.2(a), 2061]
39. Discuss about sex-linked inheritance in Drosophila. [Q.N.2(e), 2061]
40. Elaborate about the dominance. [Q.N.2(f), 2061]
41. How is the wheat variety developed ? [Q.N.2(h), 2060]
42. Differentiate between genotype and phenotype. [Q.N. 2(d), 2059]
43. Write a short account of crossing over. [Q.N. 2(e), 2059]
44. Why is a man unable to pass on a sex-linked gene to his son? [Q.N. 2(e), 2058]
45. Write the semi-conservative mode replication of DNA. [Q.N. 2(h), 2058]
46. What did you understand by Mendel's 9:3:3:1 ratio? [Q.N. 2(c), 2057]
47. Define mutation. What is the result of mutation? [Q.N. 2(d), 2057]

48. Differentiate between the following terms.

(All questions are of equal value, 3 marks each.)

a. Phenotype and genotype. [Q.N. 4(d), 2056]
b. Dominant and recessive characters [Q.N. 4(c), 2055]
c. Dominance and Recessive [Q.N. 4(b), 2053]
d. Euploidy and Anenploidy [Q.N. 4(a), 2053]
e. Phenotype and genotype [Q.N. 4(b), 2052]
f. Heterozygous and Homozygous [Q.N. 4(a), 2052]

49. Prove 9:3:3:1 phenotypic ratio of dihybrid cross. [Q.N. 3(a), 2054]
50. Define mutation theory. [Q.N. 3(e), 2054]
51. Why is the phenotypic ratio 3: 6: 3: 1: 2 : 1 obtained ? [Q.N. 3(e), 2053]
52. What is dihybrid cross ? [Q.N. 2(f), 2053]
53. What is the basis of mendelian genetics ? Explain the law of segregation of characters. [Q.N. 2(b), 2052]
54. List the characters of identification of genetic disorder. [Q.N. 2(d), 2052]

Long Questions

1. Define sex-linked inheritance and discuss it with special reference to eye colour of Drosophila melanogaster (fruit fly). 8[Q.N.4, 2072'C']
2. Define DNA and describe the process involved in the semi-conservative mode of replication of DNA with necessary neat and clean diagrams. 8[Q.N.4, 2072'D']
3. What are genetics materials? Discuss the double helical structure of Watson and Crick's model of DNA with necessary diagrams. 8[Q.N.4, 2072'E']
4. Define crossing over and describe its mechanism with necessary diagrams along with its significance. 8 [Q.N. 4, 2071]
5. What is Mutation ? Describe its various types and its significance. 8 [Q.N.4, 2070 'Supp']
6. Describe the sex linked inheritance with special examples to the eye colour of Drosophila melanogaster (fruit fly). 8 [Q.N. 4, 2070]
7. Describe in detail about the semi-conservative method of replication of DNA. 8 [Q.N. 4, Supp. 2069]
8. What is mutation? Describe its various types and its significance. 8 [Q.N. 4, 2069]
9. What is criss-cross inheritance ? Discuss about the sex-linked inheritance with special reference to the eye colour of Drosophila. 8 [Q.N. 4, 2068]
10. Describe the sex linked inheritance with the reference of Drosophila (fruit fly) 8 [Q.N. 4, 2067]
11. What do you mean by linkage ? Describe its types with examples. 8 [Group 'B' – Q.N.4, 2066]
12. Explain the mechanism of DNA replication and mention its significance. 7.5 [Group 'B' – Q.N.3, 2065]
13. Describe in detail about the process of semi-conservative method of DNA replication. 7 [Q.N. 5, 2064]
14. Discuss the mechanism of DNA replication and state its functions. 7 [Q.N. 4, 2063]
15. What is criss-cross inheritance ? Discuss about the sex–linked inheritance with special reference to the eye colour of Drosophila. 7 [Q.N. 5, 2062]
16. Describe the double helical structure of Watson and Crick's model of DNA. 7 [Q.N.5, 2061]
17. What is Mutation ? Explain gene mutation in brief. 7 [Q.N.5, 2060]
18. What are genetic materials? Describe the structure and function of DNA. 1+4+2 [Q.N. 5, 2059]

19.	Describe the Mendel's Law of inheritance.	10 [Q.N. 4, 2058]
20.	Discuss the mechanism of DNA Replication.	7 [Q.N. 5, 2057]
21.	Discuss the Law of Independent Assortment.	[Q.N. 6, 2056]

Unit 3: Developmental Biology

Answer all in Very Short

1.	Define offspring.	[Q.N.1(e), 2072'C']
2.	Mention about gootee.	[Q.N.1(f), 2072'C']
3.	What is pollen tube?	[Q.N.1(g), 2072'C']
4.	Illustrate about entomophily.	[Q.N.1(h), 2072'C']
5.	Write about cutting.	[Q.N.1(f), 2072'D']
6.	What is entine?	[Q.N.1(g), 2072'D']
7.	Illustrate about megagametogenesis.	[Q.N.1(h), 2072'D']
8.	Define embryo sac.	[Q.N.1(e), 2072'E']
9.	Write any two advantages of vegetative propagation.	[Q.N.1(f), 2072'E']
10.	What is the difference between stock and scion?	[Q.N.1(g), 2072'E']
11.	Define vegetative propagation.	[Q.N. 1(f), 2071]
12.	What is fertilization?	[Q.N. 1(h), 2071]
13.	Elaborate the benefit of vegetative propagation.	[Q.N.1(f), 2070 'Supp']
14.	Define the benefit of pollination.	[Q.N.1(h), 2070 'Supp']
15.	Elaborate the offspring.	[Q.N. 1(e), 2070]
16.	Define asexual reproduction.	[Q.N. 1(f), 2070]
17.	Mention about male gametophyte.	[Q.N. 1(g), 2070]
18.	Point out fertilization.	[Q.N. 1(h), 2070]
19.	Define grafting.	[Q.N. 1(f), Supp. 2069]
20.	What is the role of pollen tube?	[Q.N. 1(g), Supp. 2069]
21.	How do you define double fertilization?	[Q.N. 1(h), Supp. 2069]
22.	What do you understand by the asexual reproduction.	[Q.N. 1(f), 2069]
23.	What is exine?	[Q.N. 1(g), 2069]
24.	Write the meaning of anemobhily.	[Q.N. 1(h), 2069]
25.	What does it mean by vegetative reproduction ?	[Q.N. 1(f), 2068]
26.	Define megasporogenesis.	[Q.N. 1(g), 2068]
27.	What is entomophilly ?	[Q.N. 1(h), 2068]
28.	What is vegetative reproduction ?	[Q.N. 1(f), 2067]
29.	Define microsporogenesis ?	[Q.N. 1(g), 2067]
30.	What is self pollination ?	[Q.N. 1(h), 2067]
31.	What do you understand by egg apparatus ?	[Group 'B' – Q.N.1(d), 2066]
32.	Where are the microspore mother cells found in an angiospermic plant ?	[Group 'B' – Q.N.1(f), 2066]
33.	What is vegetative reproduction ?	[Q.N. 1(f), 2064]
34.	Define vegetative reproduction.	[Q.N. 1(a), 2063]
35.	What do you mean by the term anemophily ?	[Q.N. 1(c), 2063]
36.	What is grafting ?	[Q.N. 1(j), 2063]
37.	What do you mean by fertilization ?	[Q.N. 1(f), 2062]
38.	What is the role of fragrance in pollination ?	[Q.N.1(f), 2061]
39.	Give two examples of entomophilus plants.	[Q.N. 1(d), 2057]
40.	What is double fertilization ? Give example.	[Q.N. 2(e), 2054]
41.	How does endosperm in Angiosperms become triploid ?	[Q.N. 3(a), 2052]

Answer all in Brief

(All questions are of equal value, 3 marks each.)

1. Process of microsporogenesis. [Q.N.2(f), 2072'C']
2. Development of male gametophyte. [Q.N.2(f), 2072'D']
3. What is anemophily? Describe the features of anemophilous flower. [Q.N.2(f), 2072'E']
4. Development of monocot embryo. [Q.N. 2(f), 2071]
5. Process of fertilization. [Q.N.2(f), 2070 'Supp']
6. Development of male gametophyte. [Q.N. 2(f), 2070]
7. Differentiate between asexual and sexual reproduction. [Q.N. 2(a), Supp. 2069]
8. Advantages of vegetative propagation. [Q.N. 2(a), 2069]
9. Elaborate the double fertilization. [Q.N. 2(f), 2068]
10. Discuss the process of double fertilization with necessary figures. [Q.N. 2(f), 2067]
11. Write the advantages of vegetative reproduction. [Group 'B' – Q.N.2(c), 2066]
3. Draw a L.S. of well labelled diagram of typical ovule. (No description) [Q.N. 2(d), 2064]
12. Explain the process of grafting with its importance. [Q.N. 2(h), 2062]
13. Differentiate between self and cross fertilization. [Q.N. 2(e), 2057]

Long Questions

1. Define pollination and discuss different agencies of plant pollination. [Q.N. 6, 2059]

Unit 4: Application of Biology

Answer all in Very Short

(All questions are of equal value, 2 marks each.)

1. Define tissue culture. [Q.N.1(i), 2072'C']
2. Elaborate about bio-fertilizer. [Q.N.1(j), 2072'C']
3. Define biotechnology. [Q.N.1(i), 2072'D']
4. Elaborate about farmyard manure. [Q.N.1(j), 2072'D']
5. Define fermentation? [Q.N.1(h), 2072'E']
6. What do you mean by biofertilizer? [Q.N.1(i), 2072'E']
7. What do you mean by callus culture? [Q.N. 1(i), 2071]
8. Mention about bio-fertilizer. [Q.N. 1(j), 2071]
9. Point out the concept of disease resistant plants. [Q.N.1(i), 2070 'Supp']
10. What does it mean by genetic engineering ? [Q.N.1(j), 2070 'Supp']
11. Elaborate the concept of disease resistant plant. [Q.N. 1(i), 2070]
12. What do you mean by genetic engineering? [Q.N. 1(j), 2070]
13. Where can be applied the biotechnology? [Q.N. 1(i), Supp. 2069]
14. What is fermentation? [Q.N. 1(j), Supp. 2069]
15. Mention the fields of biotechnology. [Q.N. 1(i), 2069]
16. State the meaning of tissue culture. [Q.N. 1(j), 2069]
17. Define biotechnology. [Q.N. 1(i), 2068]
18. What is vaccine ? [Q.N. 1(j), 2068]
19. Define tissue culture ? [Q.N. 1(i), 2067]
20. What is antibiotics ? [Q.N. 1(j), 2067]
21. Define a callus. [Q.N.1(g), 2066]
22. What is hybridization ? [Q.N. 1(e), 2064]
23. What is biofertilizer ? [Q.N. 1(g), 2064]
24. What is callus ? [Q.N. 1(f), 2063]
25. Define inbreeding. [Q.N. 1(h), 2063]
26. Define fermentation. [Q.N. 1(k), 2063]

27. What is farmyard manure ? [Q.N. 1(g), 2062]
28. How alcohol is formed ? [Q.N. 1(n), 2062]
29. Which is callus ? [Q.N. 1(k), 2060]
30. Define fermentation. [Q.N. 1(n), 2060]
31. Name any two plants which are of manure value. [Q.N. 1(j), 2059]
32. Give two applications of genetic engineering. [Q.N. 1(o), 2059]
33. Name two types of fermentation processes. [Q.N. 1(k), 2058]
34. Give any two plant names which are used as green manures. [Q.N. 1(j), 2057]
35. Mention any two chief uses of antibiotics. [Q.N. 1(l), 2057]
36. Which organisms cause fermentation for alcohol? [Q.N. 1(o), 2057]
37. Inbreeding and outbreeding [Q.N. 4(f), 2055]
38. What is green manuring ? Give example. [Q.N. 3(b), 2054]

Answer all in Brief

(All questions are of equal value, 4 marks each.)

1. Possible dangers of genetic engineering. [Q.N.2(g), 2072'C']
2. Application of biotechnology in agricultural sciences. [Q.N.2(g), 2072'D']
3. Discuss the importance of biotechnology. [Q.N.2(g), 2072'E']
4. Application of genetics engineering in medicine. [Q.N. 2(g), 2071]
5. Benefit of fermentation technology. [Q.N.2(g), 2070 'Supp']
6. Tissue culture and its application. [Q.N. 2(g), 2070]
7. Mention about the benefit of genetic engineering. [Q.N. 2(g), Supp. 2069]
8. Genetic engineering and its application. [Q.N. 2(g), 2069]
9. Discuss the green manure and its application. [Q.N. 2(g), 2068]
10. Discuss green manure and its application in agriculture. [Q.N. 2(g), 2067]
11. Discuss the industrial application of fermentation technology. [Group 'B' – Q.N.2(e), 2066]
12. Application of micropropagation in agriculture. [Group 'B' – Q.N.2.(d), 2065]
13. Advantage of green manure over chemical fertilizers. [Group 'B' – Q.N.2.(e), 2065]
14. Mention briefly about the importance of plant tissue culture in agriculture. [Q.N. 2(e), 2064]
15. Write down the applications of biotechnology. [Q.N. 2(d), 2063]
16. Write about the prospects of genetic engineering. [Q.N. 2(g), 2063]
17. Explain about the green manure with examples. [Q.N. 2(b), 2062]
18. Discuss the significance of biotechnology. [Q.N.2(d), 2061]
19. What are the objectives of plants breeding ? Explain. [Q.N.2(a), 2060]
20. What is the importance of manures in agriculture ? [Q.N.2(b), 2060]
21. Discuss in brief the methods of plant tissue culture. [Q.N.2(d), 2060]
22. State the advantages and disadvantages of outbreeding. [Q.N. 2(i), 2059]
23. Explain the principles of fermentation technology. [Q.N. 2(j), 2059]
24. What are the advantages of green manures over chemical fertilizers? [Q.N. 2(j), 2057]
25. Write short notes on Genetic engineering. [Q.N. 2(f), 2056]
26. Discuss the following:
    a. Monoclonal antibody. [Q.N. 2(b), 2056]
    b. the advantages of out-breeding [Q.N. 2(b), 2055]

Long Questions

1. Discuss the basic concept of genetic engineering. Explain its practical applications. 5+5=10 [Q.N. 6, 2055]
2. Discuss briefly about the alcoholic fermentation. 10 [Q.N. 7(Or), 2052]

4. MATHEMATICS–II

Course Content

Group 'A'

Unit 1: Permutation and Combination. **10 hrs**

Basic principle of counting, Permutation of (a) set of objects all different (b) set of objects not all different (c) circular arrangement (d) repeated use of the same object. Combination of things all different, Properties of combination.

Unit 2: Binomial Theorem **10 hrs**

Binomial theorem for a positive integral index, general term. Binomial coefficients, Binomial theorem for any index (Without proof), Application to approximation, Euler's number. Expansion of ex, ax and log (1 + x) (without proof).

Unit 3: Elementary Group Theory **8 hrs.**

Binary operation, Binary operation on sets of integers and their properties, Definition of a Group, Groups whose element are not numbers, Finite and infinite groups, Uniqueness of identity, Uniqueness of inverse, Cancellation law, Abelian Group.

Unit 4: Conic Sections **12 hrs**

Standard equation of parabola, Ellipse and Hyperbola, Equations of tangent and normal to a parabola at a given point.

Unit 5: Co-ordinates in Space **12 hrs**

Co-ordinate axes, Co-ordinate planes, The octants,, Distance between two points, External and internal point of division, Direction cosines and ratios , fundamental relation between direction cosines, Projections, Angle between two lines. General equation of a plane, Equation of a plane in intercept and normal form, Plane through three given points, Plane through the intersection of two given planes, Parallel and perpendicular planes, angle between two planes distance of a point from a plane.

Unit 6: Vectors and its Applications **14 hrs**

Cartesian representation of vectors, Collinear and non-collinear vectors, Coplanar and non-Coplanar vectors, Linear combination of vectors. Scalar product of two vectors, Angle between two vectors, Geometric interpretation of scalar product, Properties of Scalar Product, Condition of perpendicularity. Vector product of two vectors, Geometric interpretation of vector product, Properties of Vector Product, Application of product of vectors in plane trigonometry.

Unit 7: Derivative and its Application **14 hrs**

Derivative of inverse trigonometric, exponential and logarithmic functions by definition, Relationship between continuity and differentiability, Rules for differentiating hyperbolic function and inverse hyperbolic function, Composite function and function of the type $f(x)g(x)$. L'Hospital's rule (for 0/0, %), Differentials, Tangent and Normal, Geometric interpretation and application of Rolle's theorem and Mean value theorem.

Unit 8: Antiderivatives **7 hrs**

Antiderivatives, Standard integrals, Integrals reducible to standard forms, Integrals of rational functions.

Unit 9:Differential Equations and their Applications **7 hrs**

Differential equation and its order and degree, Differential equations of first order and first degree: Differential equations with separable variables, homogeneous and exact differential equations.

Unit 10: Dispersion, Correlation and Regression **12 hrs**

Dispersion, Measures of dispersion (Range, Semi interpqrtile range, Mean deviation, Standard deviation) variance, Coefficient of variation, Skewness, Karl Pearson's and Bowley's Coefficient of Skewness, Bivariate distribution, Correlation, Nature of correlation, Correlation coefficient by Karl Pearson's method. Interpretation of correlation coefficient, Properties of correlation coefficient (Without proof) Regression equation, Regression line of y on x and x on y.

Unit 11: Probability **8 hrs**

Random experiment, sample space, Event, Equally likely cases, Mutually exclusive events, Exhaustive cases, Favourable cases, Independent and dependent cases, Mathematical and empirical definition of probability, Two basic laws of probability, Conditional probability (without proof), Binomial distribution, Mean and Standard deviation of binomial distribution (without proof).

3. BIOLOGY

Exam Questions

Section 'A' (Zoology)

Unit 1: Animal Tissues

Answer all in Very Short *(All questions are of equal value, 1 mark each.)*

1. Which protein is present in white fiber ? [Q.N.1(a), 2073 'C']
2. Write the functions of heparin and histamine. [Q.N.1(a), 2073 'D']
3. Why are bones brittle in old age? [Q.N.1(a), Supp. 2072]

Answer all in Brief

1. Differentiate between cartilage and bone. [Q.N.2(a), 2073 'C']
2. Describe Haversian Canal System. [Q.N.2(a), 2073 'D']
3. Draw a neatly labelled diagram of a neuron. [Q.N.2(c), 2073 'D']
4. Describe Haversian Canal System. [Q.N.2(a), Supp. 2072]

Unit 2: Developmental Biology

Answer all in Very Short *(All questions are of equal value, 1 mark each.)*

1. Mention the role of acrosome. [Q.N.1(b), 2073 'C']
2. Define gametogenesis. [Q.N.1(b), 2073 'D']
3. Define cleavage. [Q.N.1(b), Supp. 2072]

Answer all in Brief

1. Discuss Gastrulation in Frog. [Q.N.2(b), 2073 'C']
2. Explain briefly about the coelom formation in frog. [Q.N.2(b), 2073 'D']
3. Describe the formation of notochord in the embryo of frog. [Q.N.2(g), Supp. 2072]

Long Questions

No Questions has been asked in this year.

Unit 3: Human Biology and Health

Answer all in Very Short *(All questions are of equal value, 1 mark each.)*

1. What do you understand by yellow spot ? [Q.N.1(c), 2073 'C']
2. State Ionic Theory. [Q.N.1(d), 2073 'C']
3. Write the meaning of arteriosclerosis. [Q.N.1(e), 2073 'C']
4. Which hormone is called emergency hormone and why ? [Q.N.1(f), 2073 'C']
5. What is carcinogen ? Give two examples. [Q.N.1(g), 2073 'C']
6. Name two enzymes responsible for protein digestion. [Q.N.1(c), 2073 'D']
7. What is deamination ? [Q.N.1(d), 2073 'D']
8. How would you define psychotropic drugs ? [Q.N.1(e), 2073 'D']
9. What are the essential enzymes to digest oil ? [Q.N.1(f), 2073 'D']
10. Where lies the organ of corti ? [Q.N.1(g), 2073 'D']
11. Give the causative agent of Typhoid fever. [Q.N.1(c), Supp. 2072]
12. When does menopause occur? [Q.N.1(d), Supp. 2072]
13. What is safe period? [Q.N.1(e), Supp. 2072]
14. What are psychedelic drugs? [Q.N.1(f), Supp. 2072]
15. Name the endocrine part of pancreas. [Q.N.1(h), Supp. 2072]

Answer all in Brief *(All questions are of equal value, 3 marks each.)*

1. Write short note on Natural Pacemaker. [Q.N.2(c), 2073 'C']

3. Write on control and prevention of smoking. [Q.N.2(e), 2073 'C']
4. Discuss methods of control of over population. [Q.N.2(f), 2073 'C']
5. Differentiate between Hyperthyroidism and Hypothyroidism. [Q.N.2(d), 2073 'D']
6. Write a note on hepatitis. [Q.N.2(f), 2073 'D']
7. Discuss the action of proteolytic enzymes. [Q.N.2(b), Supp. 2072]
8. Write down the causes of population growth. [Q.N.2(d), Supp. 2072]
9. Draw a neat and labelled diagram of section of eye (No. description is required) [Q.N.2(e),Supp.2072]
10. Give a brief account of 'Kala-Azar'. [Q.N.2(f), Supp. 2072]

Long Questions

1. What is aerobic respiration ? Describe pulmonary respiration in human with suitable diagram. 7.5 [Q.N.3, 2073 'C']
2. Discuss the causative agent, mode of transmission, symptoms, control and prevention of Ascariasis in the context of Nepal. [Q.N.3(Or), 2073 'C']
3. Describe the structure and function of human brain with well labelled diagram. 8[Q.N.4, 2073 'C']
4. Describe the structure of human eye. 7.5 [Q.N.3, 2073 'D']
5. Describe female reproductive system in man. [Q.N.3(Or), 2073 'D']
6. Discuss causative agent, symptoms, method of diagnosis, mode of infection and preventive and control measures of Tuberculosis. 8[Q.N.4, 2073 'D']
7. Explain the structure of human ear. 7.5[Q.N.3, Supp. 2072]
8. Describe the structure and function of human heart. [Q.N.3(Or), Supp. 2072]
9. What is cancer? Discuss its causes, types, symptoms, control measures, diagonosis and treatment. 8[Q.N.4, Supp. 2072]

Unit 4: Application of Biology

Answer all in Very Short

(All questions are of equal value, 1 mark each.)

1. What is vaccine ? [Q.N.1(h), 2073 'C']
2. What is xenograft ? Mention its use. [Q.N.1(i), 2073 'C']
3. What do you mean by poultry farming ? [Q.N.1(j), 2073 'C']
4. What do you mean by IVF Technology ? [Q.N.1(h), 2073 'D']
5. What is pathogen ? [Q.N.1(i), 2073 'D']
6. What are two popular varieties of fishes in Nepal ? [Q.N.1(j), 2073 'D']
7. Define immunosuppressant. [Q.N.1(g), Supp. 2072]
8. What is test tube baby? [Q.N.1(i), Supp. 2072]
9. Define about the significance of poultry farming. [Q.N.1(j), Supp. 2072]

Answer all in Brief

(All questions are of equal value, 3 marks each.)

1. Explain advantages of fish farming in Nepal. [Q.N.2(g), 2073 'C']
2. Give a short note on poultry farming in Nepal. [Q.N.2(e), 2073 'D']
3. Discuss the merits and demeris of amniocentesis. [Q.N.2(g), 2073 'D']
4. Mention the scope of fish farming. [Q.N.2(c), Supp. 2072]

Section 'B' (Botany)

Unit 1: Anatomy and Physiology of Organisms

1.1 Plant Physiology

Answer all in Very Short

(All questions are of equal value, 1 mark each.)

1. Define transpiration. [Q.N.1(b), 2073 'C']
2. What is the role of hormone ? [Q.N.1(c), 2073 'C']
3. What is turgidity ? [Q.N.1(b), 2073 'D']
4. Give two names of plant hormone. [Q.N.1(c), 2073 'D']

6. What do you mean by chemotropism? [Q.N.1(c), Supp. 2072]

Answer all in Brief

1. Significance of photosynthesis. [Q.N.2(b), 2073 'C']
2. Structure and function of stomata. [Q.N.2(a), 2073 'D']
3. External factors of transpiration. [Q.N.2(b), 2073 'D']

Long Questions

1. What is respiration ? Describe the various steps involved in Kreb's cycle. [Q.N.3(Or), 2073 'C']
2. What is ascent of sap ? Discuss the various theories involved in this phenomenon. [Q.N.3(Or), 2073 'D']
3. What is transpiration? Describe an experiment to show the unequal transpiration with clear diagram. 7.5[Q.N.3, Supp. 2072]

1.2 Plant Anatomy

Answer all in Very Short *(All questions are of equal value, 1 mark each.)*

1. What is permanent tissue ? [Q.N.1(a), 2073 'C']
2. Define meristematic tissue. [Q.N.1(a), 2073 'D']
3. Mention two elements of xylem. [Q.N.1(a), Supp. 2072]

Answer all in Brief

1. Structure and function of conjoint vascular bundle. [Q.N.2(a), 2073 'C']
2. Structure and function of aerenchyma. [Q.N.2(a), Supp. 2072]
3. Differentiate between osmosis and diffusion. [Q.N.2(b), Supp. 2072]

Long Questions

1. Describe and compare the anatomical structure of dicot and monocot stem with neat and clean diagrams. 7.5 [Q.N.3, 2073 'C']
2. Describe and compare anatomical structure of dicot and monocot root with neat and clean diagram. 7.5 [Q.N.3, 2073 'D']
3. Describe T.S. of monocot and dicot leaf with necessary diagrams. [Q.N.3(Or), Supp. 2072]

Unit 2: Genetics

Answer all in Very Short *(All questions are of equal value, 1 marks each.)*

1. What does it mean by monohybrid cross ? [Q.N.1(d), 2073 'C']
2. Write the full form of t RNA and m RNA. [Q.N.1(e), 2073 'C']
3. What does it mean by gene ? [Q.N.1(d), 2073 'D']
4. Elaborate test cross. [Q.N.1(e), 2073 'D']
5. What does it mean by heterogygous? [Q.N.1(d), Supp. 2072]
6. Illustrate about F_1 generation. [Q.N.1(e), Supp. 2072]

Answer all in Brief *(All questions are of equal value, 3 marks each.)*

1. mechanism of crossing over. [Q.N.2(c), 2073 'C']
2. Codominance [Q.N.2(d), 2073 'C']
3. Characteristic of genetic code. [Q.N.2(e), 2073 'C']
4. Law of segregation. [Q.N.2(c), 2073 'D']
5. Characteristics of genetic code. [Q.N.2(d), 2073 'D']
6. Incomplete dominance with examples. [Q.N.2(e), 2073 'D']
7. Law of segregation. [Q.N.2(c), Supp. 2072]
8. Significance of polyploidy with examples. [Q.N.2(d), Supp. 2072]
9. Criss-cross inheritance with its importance. [Q.N.2(e), Supp. 2072]

Long Questions

1. What is genetic material ? Describe the structure and function of DNA. 8 [Q.N.4, 2073 'C']
2. Define genetic material and describe the process of semi-conservative mode of replication of DNA with neat and clean diagrams. 8 [Q.N.4, 2073 'D']
3. Define crossing over and describe its mechanism with necessary diagrams along with significance. 8[Q.N.4, Supp. 2072]

Unit 3: Developmental Biology

Answer all in Very Short

1. Define the role of rhizome. [Q.N.1(f), 2073 'C']
2. State about microgametogenesis. [Q.N.1(g), 2073 'C']
3. What is pollen tube ? [Q.N.1(h), 2073 'C']
4. Define vegetative propagation. [Q.N.1(f), 2073 'D']
5. Mention about anther. [Q.N.1(g), 2073 'D']
6. State about double fertilization. [Q.N.1(h), 2073 'D']
7. Define gootee. [Q.N.1(f), Supp. 2072]
8. Elaborate gametogenesis. [Q.N.1(g), Supp. 2072]
9. What is double fertilization? [Q.N.1(h), Supp. 2072]

Answer all in Brief

(All questions are of equal value, 3 marks each.)

1. Process of fertilization. [Q.N.2(f), 2073 'C']
2. Monocot embryo. [Q.N.2(f), 2073 'D']
3. Anemophilous pollination and its concerned plant's characteristics. [Q.N.2(f), Supp. 2072]

Long Questions

No Questions has been asked in this year.

Unit 4: Application of Biology

Answer all in Very Short

(All questions are of equal value, 2 marks each.)

1. What do you mean by biotechnology ? [Q.N.1(i), 2073 'C']
2. mention about biofertilizer. [Q.N.1(j), 2073 'C']
3. What is callus culture ? [Q.N.1(i), 2073 'D']
4. What do you mean by fermentation ? [Q.N.1(j), 2073 'D']
5. What do you mean by embryo culture? [Q.N.1(i), Supp. 2072]
6. Mention about farmyard manure. [Q.N.1(j), Supp. 2072]

Answer all in Brief

(All questions are of equal value, 4 marks each.)

1. Advantages of polyploidy. [Q.N.2(g), 2073 'C']
2. Application of genetic engineering in agriculture. [Q.N.2(g), 2073 'D']
3. Genetic engineering and its possible danger. [Q.N.2(g), Supp. 2072]

Long Questions

No Questions has been asked in this year.