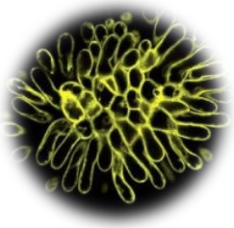
DEPARTMENT OF PRE-UNIVERSITY EDUCATION

ಕರ್ನಾಟಕ ಸರ್ಕಾರ
ಪದವಿ ಪೂರ್ವ ಶಿಕ್ಷಣ ಇಲಾಖೆ
Department of Pre University Education, Karnataka

QUESTION BANK



CLASS: II YEAR PUC

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Chapter 1
REPRODUCTION IN ORGANISMS

ONE MARK QUESTIONS:

1. Define reproduction. (K)
2. What is the significance of reproduction? (K)
3. What is life span? (K)
4. What is asexual reproduction? (K)
5. What is sexual reproduction? (K)
6. Offspring obtained from asexual reproduction are called clones. Why? (A)
7. Name the organism in which cell division itself is a mode of reproduction. (K)
8. Name the asexual reproductive structures in *Penicillium*. (K)
9. Name the asexual reproductive structures in *Chlamydomonas*. (K)
10. Name the asexual reproductive structures in *Hydra*. (K)
11. Name the mode of asexual reproduction in yeast. (K)
12. Name the asexual reproductive structures in sponges. (K)
13. Name the mode of asexual reproduction in *Amoeba*. (K)
14. Name the asexual reproductive spores produced by *Amoeba*. (K)
15. Name a fungus that undergoes asexual reproduction by means of conidia. (K)
16. Name a fungus that undergoes asexual reproduction by means of budding. (K)
17. Name an animal that undergoes asexual reproduction by means of budding. (K)
18. Name an organism that undergoes asexual reproduction by means of zoospores. (K)
19. Name organisms that undergo asexual reproduction by means of gemmules. (K)
20. Name the organism which undergoes asexual reproduction by means of encystation and sporulation. (K)
21. What is encystation? (K)
22. What are gemmules? (K)
23. What are vegetative propagules? (K)
24. Name the vegetative propagule in potato. (K)
25. Name the vegetative propagule in ginger. (K)
26. Name the vegetative propagule in water hyacinth. (K)
27. Name the vegetative propagule in *Agave*. (K)
28. Name the vegetative propagule in onion. (K)
29. Name the vegetative propagule in *Bryophyllum*. (K)
30. Mention an example for a plant which produces tuber as vegetative propagules. (K)
31. Mention an example for a plant which produces rhizome as vegetative propagules. (K)
32. Mention an example for a plant which produces bulb as vegetative propagules. (K)
33. Mention an example for a plant which produces offset as vegetative propagules. (K)
34. Mention an example for a plant which produces bulbil as vegetative propagules. (K)
35. Mention an example for a plant which produces adventitious leaf buds. (K)
36. What is juvenile phase of life span? (K)
37. What is reproductive phase of life span? (K)
38. What is senescent phase of life span? (K)
39. Give the scientific name of the plant which produces flowers once in 12 years. (K)

40. Name the plant that flowers only once in its life time. (K)
41. Name the reproductive cycle that occurs in females which are seasonal breeders. (K)
42. Name the reproductive cycle that occurs in females which are continuous breeders. (K)
43. Name the type of reproductive cycle that occurs in non-primate mammals. (K)
44. What are seasonal breeders? (K)
45. What are continuous breeders? (K)
46. Define gametogenesis. (K)
47. What are homogametes or isogametes? (K)
48. What are heterogametes? (K)
49. What are homothallic organisms? (K)
50. What are heterothallic organisms? (K)
51. What is a monoecious plant? (K)
52. What is a dioecious plant? (K)
53. Why *Cucurbita* plant is called a monoecious plant? (A)
54. Why papaya plant is called a dioecious plant? (A)
55. Why coconut palm is called a monoecious plant? (A)
56. Why date palm is called a dioecious plant? (A)
57. Mention an example for a monoecious plant. (K)
58. Mention an example for a dioecious plant. (K)
59. What is a staminate flower? (K)
60. What is pistillate flower? (K)
61. What are hermaphrodites? (K)
62. Mention an example for a hermaphrodite. (K)
63. Why tapeworm is considered as a hermaphrodite? (A)
64. Why leech is considered as a hermaphrodite? (A)
65. Why earthworm is considered as a hermaphrodite? (A)
66. Why sponges are considered as hermaphrodites? (A)
67. What are pre-fertilisation events? (K)
68. What are post-fertilisation events? (K)
69. What are meiocytes? (K)
70. If 2n = 40 in an organism, what would be the number of chromosomes in its meiocytes? (A)
71. Why the number of male gametes produced in majority of the organisms is several thousand times the number of female gametes produced? (A)
72. Define fertilization or syngamy. (K)
73. Define parthenogenesis. (K)
74. What is internal fertilization? (K)
75. What is external fertilization? (K)
76. Give an example for an animal where fertilization is external. (K)
77. Give an example for an animal group where fertilisation is internal. (K)
78. Give an example for a plant group where fertilisation is internal. (K)
79. Why external fertilization is disadvantageous to animals when compared to internal fertilization? (A)
80. Why internal fertilization is advantageous to the animal when compared to external fertilization? (A)
81. What type of cell division occurs in zygote of organisms with haplobiontic life cycle? (K)

82. What type of cell division occurs in the zygote of organisms with diplontic or haplo-diplontic cycle? (K)
83. Define embryogenesis. (K)
84. What are oviparous animals? (K)
85. What are viviparous animals? K
86. Why the chances of survival of young ones are more in viviparous animals than in oviparous animals? (A)
87. Name the protective wall of fruit. (K)
88. What is pericarp? (K)

TWO MARK QUESTIONS:

1. Mention any two differences between asexual reproduction and sexual reproduction. (K)
2. Water hyacinth is known as "terror of Bengal". Justify the statement. (A)
3. What are vegetative propagules? Mention two examples. (K)
4. Mention any two vegetative propagules of angiosperms. (K)
5. Mention the vegetative propagules of *Agave* and ginger (K)
6. Name the asexual reproductive structures in *Penicilliium* and *Hydra*. (K)
7. Name the asexual reproductive structures in *Chlamydomonas* and sponges. (K)
8. Name the asexual reproductive structures in *Amoeba* and yeast. (K)
9. Name the vegetative propagules in potato and ginger. (K)
10. Name the vegetative propagules in onion and ginger. (K)
11. Name the vegetative propagules in onion and potato. (K)
12. Name the vegetative propagules in *Eichhornia* and potato. (K)
13. Name the vegetative propagules in *Eichhornia* and ginger. (K)
14. Name the vegetative propagules in *Eichhornia* and onion. (K)
15. Name the vegetative propagules in *Bryophyllum* and potato. (K)
16. Name the vegetative propagules in *Bryophyllum* and onion. (K)
17. Name the vegetative propagules in *Bryophyllum* and ginger. (K)
18. Name the vegetative propagules in *Bryophyllum* and *Agave*. (K)
19. Name the vegetative propagules in *Bryophyllum* and *Eichhornia*. (K)
20. Name the vegetative propagules in *Eichhornia* and *Agave*. (K)
21. Name the vegetative propagules in onion and *Agave*. (K)
22. Name the vegetative propagules in potato and *Agave*. (K)
23. Name the vegetative propagules in ginger and *Agave*. (K)
24. Name the asexual spores produced by *Amoeba* and *Chlamydomonas*. (K)
25. Name the asexual spores produced by *Amoeba* and *Penicillium*. (K)
26. Name the asexual spores produced by *Penicillium* and *Chlamydomonas*. (K)
27. Give two examples for plants which exhibit unusual flowering phenomenon. (K)
28. Differentiate between menstrual cycle and estrous cycle. (U)
29. Differentiate seasonal breeders from continuous breeders. (U)
30. Name the reproductive cycle that occurs in females which are seasonal breeders. Give an example for a seasonal breeder. (K)
31. Name the reproductive cycle that occurs in females which are continuous breeders. Give an example for a continuous breeder. (K)
32. Distinguish between homogametes and heterogametes. (U)

33. What are heterogametes? Mention an organism which produces heterogametes. (K)
34. What are homogametes? Mention an organism which produces homogametes. (K)
35. Distinguish between monoecious plants and dioecious plants. (U)
36. Distinguish between homothallic plants and heterothallic plants. (U)
37. What are homothallic organisms? Mention an example. (K)
38. What are heterothallic organisms? Mention an example. (K)
39. Distinguish between pistillate and staminate flowers. (U)
40. What are hermaphrodites? Mention one example. (K)
41. What is fertilization? Mention the types. (K)
42. What is external fertilization? Why is it disadvantageous compared to internal fertilization? (U)
43. What is internal fertilization? Why is it advantageous compared to external fertilization? (U)
44. Differentiate internal fertilization and external fertilization. (U)
45. What is parthenogenesis? Name two organisms which exhibit this. (K)
46. Differentiate between gametogenesis and embryogenesis. (U)
47. What is embryogenis? Mention two important events that occur during embryogenesis. (K)
48. Differentiate oviparous animals from viviparous animals. (U)
49. What are oviparous animals? Why ovipary is disadvantageous? (U)
50. What are viviparous animals? Why vivipay is advantageous? (U)

THREE MARK QUESTIONS:

1. Differentiate asexual reproduction from sexual reproduction. (U)
2. What is asexual reproduction? Explain encystation and sporulation in *Amoeba*. (U)
3. What are vegetative propagules? Name the vegetative propagules in potato and ginger. (K)
4. What are vegetative propagules? Name the vegetative propagules in onion and ginger. (K)
5. What are vegetative propagules? Name the vegetative propagules in onion and potato.(K)
6. What are vegetative propagules? Name the vegetative propagules in *Eichhornia* and potato. (K)
7. What are vegetative propagules? Name the vegetative propagules in *Eichhornia* and ginger. (K)
8. What are vegetative propagules? Name the vegetative propagules in *Eichhornia* and onion. (K)
9. What are vegetative propagules? Name the vegetative propagules in *Bryophyllum* and potato. (K)
10. What are vegetative propagules? Name the vegetative propagules in *Bryophyllum* and onion. (K)
11. What are vegetative propagules? Name the vegetative propagules in *Bryophyllum* and ginger. (K)
12. What are vegetative propagules? Name the vegetative propagules in *Bryophyllum* and *Agave*. (K)
13. What are vegetative propagules? Name the vegetative propagules in *Bryophyllum* and *Eichhornia*. (K)
14. What are vegetative propagules? Name the vegetative propagules in *Eichhornia* and *Agave*. (K)
15. What are vegetative propagules? Name the vegetative propagules in onion and *Agave*. (K)
16. What are vegetative propagules? Name the vegetative propagules in potato and *Agave*. (K)
17. What are vegetative propagules? Name the vegetative propagules in ginger and *Agave*. (K)
18. Name the vegetative propagules in onion, potato and ginger. (K)
19. Name the vegetative propagules in onion, potato and Agave. (K)
20. Name the vegetative propagules in onion, potato and *Bryophyllum*. (K)
21. Name the vegetative propagules in onion, potato and *Eichhornia*. (K)
22. Name the vegetative propagules in onion, ginger and *Eichhornia*. (K)
23. Name the vegetative propagules in onion, ginger and *Agave*. (K)

24. Name the vegetative propagules in onion, ginger and *Brophyllum*. (K)
25. Name the vegetative propagules in onion, *Agave* and *Bryophyllum*. (K)
26. Name the vegetative propagules in onion, *Agave* and *Eichhornia*. (K)
27. Name the vegetative propagules in onion, *Bryophyllum* and *Eichhornia*. (K)
28. Name the vegetative propagules in potato, ginger and *Agave*. (K)
29. Name the vegetative propagules in potato, ginger and *Bryophyllum*. (K)
30. Name the vegetative propagules in potato, ginger and *Eichhornia*. (K)
31. Name the vegetative propagules in potato, *Agave* and *Bryophyllum*. (K)
32. Name the vegetative propagules in potato, *Agave* and *Eichhornia*. (K)
33. Name the vegetative propagules in potato, *Bryophyllum* and *Eichhornia*. (K)
34. Name the vegetative propagules in ginger, *Agave* and *Bryophyllum*. (K)
35. Name the vegetative propagules in ginger, *Bryophyllum* and *Eichhornia*. (K)
36. Name the vegetative propagules in *Agave*, *Bryophyllum* and *Eichhornia*. (K)
37. Explain the distinct phases of life span in organisms. (U)
38. Distinguish between homogametes and heterogametes. Give an example each of organisms producing these. (U)
39. Distinguish between homothallic and heterothallic organisms. Give an example for each. (U)
40. Distinguish between monoecious plants and dioecious plants with an example for each. (U)
41. Define fertilization. Differentiate external fertilization and internal fertilization. (U)

FIVE MARK QUESTIONS:

1. Describe any five modes of asexual reproduction. (U)
2. Describe sexuality in organisms. (U)
3. Write a detailed account of fertilization as an event during sexual reproduction in organisms. (U)

Chapter 2

SEXUAL REPRODUCTION IN FLOWERING PLANTS

ONE MARK QUESTIONS:

1. Name the male reproductive structure of the flower. (K)
2. Name the female reproductive structure of the flower. (K)
3. How many thecae are present in a typical mature anther of angiosperms? (A)
4. What is a dithecous anther? (K)
5. How many microsporangia are present in a typical anther of angiosperms? (K)
6. How many microsporangia are present in each lobe of an anther? (K)
7. How many wall layers are present in a microsporangium? (K)
8. Name the innermost wall layer of microsporangium? (K)
9. What is the function of tapetum? (K)
10. What is a sporogenous tissue? (K)
11. Define microsporogenesis (K)
12. Name the tissue in the microsporangium which produces microspores. (K)
13. Which type of cell division occurs in pollen mother cell during microsporogenesis? (K)
14. If a microsporangium has 450 pollen mother cells, how many microspores are produced? (A)
15. What is the ploidy of functional microspore in flowering plants? (K)
16. What does pollen grain represent? (K)
17. Name the outer layer of pollen grain. (K)
18. Name the layer of pollen grain which is generally made of sporopollenin. (K)
19. Name the organic chemical present in exine of pollen grain. (K)
20. What is the biological significance of sporopollenin? (K)
21. What are germ pores? (K)
22. Name the region on the exine of pollen grains where sporopollenin is absent. (K)
23. Name the organic chemical present in intine of pollen grains. (K)
24. Name the large cell of a mature pollen grain. (K)
25. Name the small cell of a mature pollen grain. (K)
26. Why pollen grains are very well preserved as fossils? (K)
27. How many cells do a mature male gametophyte has in majority of angiosperms just before it germinates on the stigma? (K)
28. Name the cell in the male gametophyte of angiosperms which produces the male gametes (K)
29. Name the cell in the male gametophyte of angiosperms which produces the pollen tube. (K)
30. Name the solution used to promote pollen germination and formation of pollen tube. (K)
31. Arrange the following terms in the correct developmental sequence: (U)
32. Pollen grain, Sporogenous tissue, Microspore tetrad, Pollen mother cell, Male gametes
33. Give an example for a plant that causes pollen allergy. (K)
34. How are pollen grains preserved? (K)
35. What is a monocarpellary pistil? (K)
36. What is a multicarpellary pistil? (K)
37. What is a syncarpous pistil? (K)
38. What is an apocarpous pistil? (K)
39. What is megasporogenesis? (K)

40. Name the type of cell division that the megaspore mother cell undergoes? (K)
41. What is monosporic development of embryo sac? (K)
42. What is the ploidy of functional megaspore in flowering plants. (K)
43. What is chalaza? (K)
44. Name the basal part of an angiosperm ovule. (K)
45. Name the region of the ovule present opposite to the micropylar end. (K)
46. What is micropyle? (K)
47. Name the opening of the angiosperm ovule where the integument is absent. (K)
48. Name the opening of the ovule through which pollen tube enters. (K)
49. Name the stalk of the angiosperm ovule. (K)
50. What is funicle? (K)
51. Name the region on the body of the ovule to which the funicle is attached. (K)
52. What is hilum? (K)
53. What are the protective envelopes of the ovule called? (K)
54. What are integuments? (K)
55. What is nucellus? (K)
56. Name the nutritive tissue with reserve food present in an angiosperm ovule. (K)
57. Name the mass of cells enclosed within the integuments in an ovule. (K)
58. What is free-nuclear division of functional megaspore? (K)
59. Name the cells present at the micropylar end in the embryo sac. (K)
60. What is 'filiform apparatus'? (K)
61. Name the special cellular thickenings of the synergids. (K)
62. What is the function of filiform apparatus? (K)
63. Mention the number of nuclei found in a typical mature angiosperm embryo sac. (K)
64. Mention the number of cells found in a typical mature angiosperm embryo sac. (K)
65. Name the structure found inside the megasporangium which is 7-celled and 8-nucleated. (K)
66. Define pollination? (K)
67. The distribution of bryophytes and pteridophytes is limited with respect to sexual reproduction. Why? (A)
68. Define autogamy. (K)
69. What are chasmoganous flowers? (K)
70. Give one example for a chasmogamous flower. (K)
71. What are cleistogamous flowers? (K)
72. Give one example for a cleistogamous flower. (K)
73. Why cleistogamous flowers are invariably autogamous? (A)
74. Cleistogamy is advantageous to the plant. Why? (A)
75. Define geitonogamy. (K)
76. Even though geitonogamy is functionally cross pollination involving pollinating agents, it is genetically similar to autogamy. Why? (A)
77. Define xenogamy. (K)
78. Papaya plants exhibit xenogamy only. Why? (A)
79. Name the type of pollination that brings genetically different types of pollen to the stigma. (K)
80. Mention one abiotic agent used by plants to achieve pollination. (K)
81. Mention one biotic agent used by plants to achieve pollination. (K)
82. Give one example for wind pollinated plant. (K)

83. Give one example for water pollinated plant. (K)
84. How are pollen grains protected from wetting in water pollinated species? (U)
85. Which are the dominant pollinating agents among insects? (K)
86. Mention one important feature of insect pollinated flower. (K)
87. Mention one floral reward provided by the flower to a pollinating animal. (K)
88. Give an example for a plant that gives floral reward by providing safe place to lay insect eggs. (K)
89. Why wind and water pollinated flowers produce enormous amount of pollen when compared to the number of ovules available for pollination? (A)
90. What is the floral reward that the flower of *Amorphophallus* provides to pollinating agent? (K)
91. Name the plant which has the tallest flower. (K)
92. Some insects are called 'pollen robbers' or 'nectar robbers'. Why? (A)
93. Why many flowering plants have developed devices to discourage self pollination and encourage cross pollination? (A)
94. Mention one strategy evolved to prevent self-pollination in flowers. (K)
95. What is self incompatibility? (K)
96. What is pollen-pistil interaction? (K)
97. What is artificial hybridization? (K)
98. What is emasculation? (K)
99. Why bisexual flowers of a plant are emasculated in artificial hybridization? (A)
100. Why emasculated flowers are covered with bags of butter paper? (A)
101. What is bagging with reference to artificial hybridisation? (K)
102. What is triple fusion? (K)
103. What is double fertilization? (K)
104. What does the primary endosperm cell develop into? (K)
105. What is the ploidy of the primary endosperm cell? (K)
106. Expand PEN. (K)
107. What is embryogeny? (K)
108. Why do you think that the zygote is dormant for sometime immediately after fertilization in an ovule? (A)
109. What is epicotyl? (K)
110. What is hypocotyl? (K)
111. What is scutellum? (K)
112. What is coleorrhiza? (K)
113. What is coleoptile? (K)
114. What is seed? (K)
115. What are non-albuminous seeds? (K)
116. What are albuminous seeds? (K)
117. Give an example for a plant which produces albuminous seeds. (K)
118. Give an example for a plant which produces non–albuminous seeds. (K)
119. Seeds of pea, groundnut and beans are considered as non-albuminous seeds. Why? (A)
120. Seeds of wheat, maize, barley, castor, coconut and sunflower are considered as albuminous seeds. Why? (A)
121. Give one example for a seed in which the endosperm is completely consumed during the development of embryo. (K)
122. Give one example for a seed in which the endosperm may persist in a mature seed. (K)

123. What is perisperm? (K)
124. What is the residual persistent nucellus of a seed called? (K)
125. Give an example for a plant which produces seeds that has perisperm. (K)
126. What is pericarp? (K)
127. Name the protective wall of fruit. (K)
128. What is a false fruit? (K)
129. Why apple is called a false fruit? (A)
130. What is a true fruit? (K)
131. Give one example for a fleshy fruit. (K)
132. Give one example for a dry fruit. (K)
133. What are parthenocarpic fruits? (K)
134. Give an example for a plant which naturally produces parthenocarpic fruit. (K)
135. How can parthenocarpy be induced? (U)
136. What is apomixis? (K)
137. What is polyembryony? (K)

TWO MARK QUESTIONS:

1. Name the parts of an angiosperm flower in which development of male and female gametophytes takes place. (K)
2. Mention two differences between microsporogenesis and megasporogenesis. (U)
3. Name the male gametophyte of flowering plants. What is the ploidy of functional microspore in flowering plants? (K)
4. Mention four wall layers of microsporangium. (K)
5. What are the functions of tapetum of microsporangium and filiform apparatus of synergids? (K)
6. What is filiform apparatus? What is its significance? (K)
7. Differentiate syncarpous and apocarpous pistils. (U)
8. What are the functions of integument and nucellus of megasporangium. (K)
9. Define pollination. Mention three types of pollination. (K)
10. Differentiate autogamy and geitonogamy. (U)
11. Differentiate autogamy and xenogamy. (U)
12. Differentiate xenogamy and geitonogamy (U)
13. What is xenogamy? Mention its importance. (K)
14. Differentiate between chasmogamous and cleistogamous flowers. (A)
15. Mention two advantages of cleistogamy (K)
16. Mention one advantage and one disadvantage each of cleistogamy. (K)
17. Mention any two characteristic features of flowers that exhibit anemophily (K)
18. Mention any two characteristic features of flowers that are pollinated by animals (K)
19. Yucca plant and a species of moth cannot complete their life cycle without each other. Why? (U)
20. Mention any two outbreeding devices in angiosperms to prevent self pollination (K)
21. What is self incompatibility? Why self-pollination does not lead to seed formation in self incompatible species? (K)
22. What is artificial hybridisation ? Name the techniques that are employed to achieve this? (K)
23. What is meant by emasculation ? When does a plant breeder employ this technique? (U)
24. What is bagging technique? How is it useful in artificial hybridisation? (U)

25. With regard to artificial hybridization, what do you understand by emasculation and bagging techniques? (U)
26. What do you understand by double fertilization and triple fusion? (U)
27. Mention the four stages of embryogeny in a dicotyledonous embryo (K)
28. Distinguish between albuminous and non – albuminous seeds (U)
29. Differentiate hypocotyl and epicotyl. (U)
30. Differentiate coleoptile and coleorrhiza. (U)
31. Differentiate integument and testa. (U)
32. Differentiate perisperm and pericarp. (U)
33. What is perisperm? Give an example for a plant that produces seeds with perisperm. (K)
34. Mention two favourable conditions which promote the germination of seeds (K)
35. Mention two advantages that the seeds offer to angiosperms (K)
36. What are true fruits? Give an example for a plant that produces false fruit. (K)
37. What are false fruits? Give an example (K)
38. Why apple is called a false fruit? Which part of the flower also forms a part of the fruit in apple plant? (U)
39. Distinguish between true fruits and false fruits.. (U)
40. What are parthenocarpic fruits? Give an example for a plant that produces false fruit. (K)
41. Name the phenomenon of formation of seed without fertilization in angiosperms. Give an example for a plant which exhibits this phenomenon. (K)
42. What is parthenocarpic fruit? Mention a plant which naturally produces parthenocarpic fruit. (K)
43. What is apomixis and what is its importance? (K)
44. Define polyembryony. Mention an angiosperm which exhibits polyembryony (K)

THREE MARK QUESTIONS:

1. Draw a diagrammatic representation of the L.S. of a flower. (S)
2. Mention three differences between microsporogenesis and megasporogenesis. (K)
3. Draw a labeled diagram of transverse section of a young anther. (S)
4. Draw a labeled diagram of an angiosperm ovule. (S)
5. Explain the structure of a mature female gametophyte in flowering plants (K)
6. Differentiate autogamy, geitonogmy and xenogamy. (U)
7. Differentiate chasmogamous and cleistogamous flowers. How is cliestogamy advantageous ? (K)
8. Mention any three characteristic features of flowers that are pollinated by animals. (K)
9. List three characters of insect pollinated flowers. (K)
10. List three characters of wind pollinated flowers. (K)
11. Explain briefly pollination in *Vallisneria*. (U)
12. Explain briefly pollination in *Zostera*. (U)
13. Briefly describe three outbreeding devices in flowering plants. (K)
14. What is meant by emasculation? When does a plant breeder employ this technique and why? (K)
15. Write a short note on pollen-pistil interacton (K)
16. What is triple fusion? Where does it take place in the megasporangium? Name the nuclei involved in triple fusion. (K)
17. Draw a labeled diagram of a typical dicot embryo. (S)
18. Draw a labeled diagram of the L.S. of an embryo of grass. (S)
19. Explain the structure of a typical dicot embryo (U)

20. Explain the structure of a typical monocot embryo. (U)
21. Differentiate albuminous and non – albuminous seeds with an example for each. (U)
22. Mention three advantages offered by the seeds to angiosperms. (K)
23. Draw a diagram of the section of fruit in apple. (S)

FIVE MARK QUESTIONS:

1. Explain the T.S. of a microsporangium with a labeled diagram. (U)
2. Describe the structure of a mature male gametophyte (U)
3. Describe the structure of an anatropous ovule with a labeled diagram. (U)
4. Explain the structure of a typical dicot embryo with a labeled diagram. (U)
5. Explain the structure of a typical monocot embryo with a labeled diagram. (U)
6. Mention five differences between microsporogenesis and megasporogenesis. (K)
7. Explain the development of female gametophyte in angiosperms. (U)
8. Explain how some plants are adapted for achieving pollination through wind. (U)
9. How *Vallisneria* and *Zostera* achieve pollination? (U)
10. What is autogamy ? Explain the devices that the plants have developed to prevent this (K) + (U)
11. With a neat diagram, explain the structure of a mature female gametophyte of angiosperms. (U)
12. Why plants have developed devices to discourage self pollination? Explain the the devices that flowering plants have developed to encourage cross pollination. (U)
13. Give the definitions of the following: (K)
    (a) Perisperm (b) Pericarp (c) Parthenocarpic fruits (d) Apomixis (e) Polyembryony

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Chapter 3
HUMAN REPRODUCTION

ONE MARK QUESTIONS:

1. What is scrotum? (K)
2. Scrotum in human males is situated outside the abdomen. What is the significance of this? (U)
3. What are seminiferous tubules? (K)
4. Name the functional units of testis where spermatogenesis occurs. (K)
5. Write the function of Leydig cells. (K)
6. Name the cells of testis that synthesise and secrete androgens. (K)
7. Mention the type of cells which provide nutrition to spermatogonia. (K)
8. Mention one function of sertoli cells. (K)
9. Sertoli cells are very much essential during spermatogenesis. Why? (A)
10. Name an accessory duct of the male reproductive system in humans. (K)
11. Name an accessory gland of the male reproductive system in humans. (K)
12. What is urethral meatus? (K)
13. What is glans penis? (K)
14. What is foreskin? (K)
15. What is seminal plasma? (K)
16. Name an accessory duct of the female reproductive system in humans. (K)
17. Name the funnel shaped part of the fallopian tube which lies close to the ovary. (K)
18. Name the finger-like projections present at the edges of the infundibulum of oviduct. (K)
19. Name the middle part of the oviduct or fallopian tube. (K)
20. Name the last part of the oviduct or fallopian tube. (K)
21. What is birth canal? (K)
22. Name the inner glandular layer of the uterus. (K)
23. Name the layer of uterus which undergoes cyclical changes during menstrual cycle. (K)
24. Name the layer of the uterus which exhibits strong contractions during parturition. (K)
25. What is hymen? (K)
26. Define gametogenesis. (K)
27. Define spermatogenesis. (K)
28. What is the ploidy of primary spermatocytes? (K)
29. What is the ploidy of secondary spermatocytes? (K)
30. What is the ploidy of spermatids? (K)
31. What would be the number of chromosome in the spermatids? (K)
32. Define spermiogenesis. (K)
33. Define spermiation. (K)
34. Expand GnRH. (K)
35. Mention the role of LH during spermatogenesis. (K)
36. In the absence of LH, spermatogenesis does not occur. Why? (A)
37. Mention the role of FSH in spermiogenesis. (K)
38. In the absence of FSH, spermiation does not occur. Why? (A)
39. Name the cap-like structure that covers the nucleus of the sperm anteriorly. (K)
40. Mention the role of acrosome. (K)

41. What is semen? (K)
42. Define oogenesis. (K)
43. Name the stage of meiosis in which the primary oocytes exist. (K)
44. What are primary ovarian follicles? (K)
45. What are secondary ovarian follicles? (K)
46. What are tertiary ovarian follicles? (K)
47. Name the cavity of graafian follicles. (K)
48. Name the cavity present in the tertiary ovarian follicles of human females. (K)
49. Define ovulation. (K)
50. Define menstrual cycle. (K)
51. What is menarche? (K)
52. What is menopause? (K)
53. During which phase of the menstrual cycle the endometrial lining of uterus and its blood vessels breakdown resulting in bleeding? K
54. Mention a gonadotropin which promotes follicular development during menstrual cycle. (K)
55. Name the hormone which induces the rupturing of Graafian follicle. (K)
56. Name a hormone which induces ovulation. (K)
57. Ovulation takes place on the 14^{th} day of menstrual cycle. Why? (K)
58. During which phase of the menstrual cycle the mature Graafian follicle ruptures to release the ovum? (K)
59. During which phase of the menstrual cycle corpus luteum is formed? (K)
60. Name the hormone secreted by corpus luteum. (K)
61. Mention the function of progesterone. (K)
62. What is coitus? (K)
63. What is insemination? (K)
64. Define fertilisation. (K)
65. In which part of the fallopian tube of the female reproductive system fertilization occurs? (K)
66. Why all copulations do not lead to fertilization and pregnancy in healthy couple? (A)
67. When does the secondary oocyte complete second meiotic division? (U)
68. Define cleavage. (K)
69. What is trophoblast ? (K)
70. Why the cells of the inner cell mass of blastocyst are called stem cells? (A)
71. What are stem cells? (K)
72. Define implantation. (K)
73. Name the finger like projections that appear on the trophoblast after the implantation. (K)
74. Define is placenta? (K)
75. Expand hCG. (K)
76. Expand hPL. (K)
77. Mention any one hormone secreted by the placenta. (K)
78. Mention one function of placenta. (K)
79. Name any one hormone in human females which is produced only during pregnancy. (K)
80. Mention the hormone produced only during pregnancy by the ovary in human females. (K)
81. Which part of the female reproductive system produces relaxin? (K)
82. In which month of pregnancy, embryo's heart is formed? (K)
83. In which month of human pregnancy, foetus develops limbs and digits? (K)

84. At which month of pregnancy first foetal movement and appearance of hair on head can be noticed? (K)
85. What is gestation period? (K)
86. Define parturition. (K)
87. What is foetal ejection reflex? (K)
88. Name a hormone which induces parturition. (K)
89. Why oxytocin is necessary for parturition? (A)
90. Name the hormone released by the pituitary gland in response to foetal ejection reflex in human female. (K)
91. Define lactation. K
92. What is colostrum? (K)
93. "Colostrum is considered as essential for newborn baby". Give reason. (A)

TWO MARKS QUESTIONS:

1. Mention two functions of sertoli cells. (K)
2. What are the functions of sertoli cells and interstitial cells of the testis? (K)
3. Name the hormones secreted by Leydig's cells and corpus leuteum. (K)
4. Name any two accessory ducts of the male reproductive system in humans. (K)
5. Name any two accessory glands of the male reproductive system in humans. (K)
6. Name any two accessory ducts of the female reproductive system in humans. (K)
7. Mention any four parts of the external genitalia in human females. (K)
8. Mention any two hormones secreted by ovary. (K)
9. Differentiate spermiogenesis from spermiation. (U)
10. Define spermiation. What is the role of FSH in spermiation? (K)
11. Mention the roles of LH and FSH during spermatogenesis. (K)
12. "Acrosome and middle piece of the sperm are very essential parts of the sperm without which fertilization does not occur". Justify the statement. (A)
13. How is primary ovarian follicle different from secondary ovarian follicle? (U)
14. How is secondary ovarian follicle different from tertiary ovarian follicle? (U)
15. Mention one function each of FSH and LH. (K)
16. Mention one function each of LH and oxytocin. (K)
17. Mention one function each of FSH and oxytocin. (K)
18. Mention one function each of FSH and progesterone. (K)
19. Mention one function each of progesterone and LH. (K)
20. What is menstrual cycle? Name the hormones which regulate menstrual cycle. (K)
21. Name the gonadotropins whose concentration gradually increases during the follicular phase of menstrual cycle. (K)
22. Mention two events that occur during the follicular phase of menstrual cycle. (K)
23. Define ovulation. Mention the hormone that induces ovulation. (K)
24. Mention two events that occur during the leuteal phase of menstrual cycle. (K)
25. Differentiate menarche and menopause. (U)
26. Define fertilization. In which part of the fallopian tube of the female reproductive system fertilization occurs? (K)
27. Define the terms cleavage and implantation. (K)
28. Define the terms fertilization and implantation. (K)

29. Define the terms fertilization and cleavage. (K)
30. Mention the functions of placenta. (K)
31. What is placenta? Mention any two hormones secreted by placenta. (K)
32. List any four hormones secreted by placenta. (K)
33. Name any four hormones which increase several folds in maternal blood during pregnancy. K
34. Name any two hormones in human females which are produced only during pregnancy. (K)
35. Define parturition. Name the hormone released by the pituitary which induces parturition. (K)
36. Mention one function each of progesterone and oxytocin. (U)
37. "Unless foetal ejection reflex is produced, normal parturition does not occur". Substantiate the statement. (K)
38. What is colostrum? Mention its benefits. K

THREE MARK QUESTIONS:

1. Draw a neat labeled diagram of sectional view of seminiferous tubules. (S)
2. Write the schematic representation of spermatogenesis. (S)
3. Briefly explain the role of three hormones during spermatogenesis. (U)
4. Write the schematic representation of oogenesis. (S)
5. Mention the events that occur during the folloicular phase of menstrual cycle. (K)
6. Mention the events that occur during the leuteal phase of menstrual cycle. (K)
7. Briefly explain the process of fertilization in humans. (U)
8. Define placenta. Mention the functions of placenta. (K)
9. In humans, sex of the baby is determined by the father and not the mother. Justify. (A)
10. Define gestation. Name any two hormones in human females which are produced only during pregnancy. (K)
11. Explain the neuroendocrine mechanism which induces parturition. (U)

FIVE MARK QUESTIONS:

1. Describe the male reproductive system in humans. (U)
2. Draw a labelled diagram of human male reproductive system. (S)
3. Describe the internal structure of testis. (U)
4. Describe the female reproductive system in humans. (U)
5. Draw a labelled diagram of the sectional view of female reproductive system. (S)
6. Describe the structure of mammary gland. (U)
7. Draw a neat labeled diagram of the sectional view of mammary gland. (S)
8. Explain spermatogenesis with the help of a schematic representation. (U)
9. Explain oogenesis with the help of a schematic representation. (U)
10. Draw a neat labelled diagram of human sperm. (S)
11. Describe the various events that occur during menstrual cycle. (U)
12. Briefly explain the embryonic development in humans. (U)

Chapter 4
RERPODUCTIVE HEALTH

ONE MARK QUESTIONS:

1. Expand the abbreviation WHO. (K)
2. Define reproductive health according to WHO. (K)
3. In which year was family planning programme initiated in India? (K)
4. What does RCH stand for? (K)
5. Name the current national programme in operation which is related to reproductive health. (K)
6. Define amniocentesis(K)
7. Name the foetal sex determination test. (K)
8. Why statutory ban on amniocentesis is needed? (A)
9. Mention one negative application of amniocentesis. (A)
10. Expand the abbreviation Central Drug Research Institute (CDRI), Lucknow. (K)
11. What is the statutory marriageable age of males in India? (K)
12. What is the statutory marriageable age of females in India? (K)
13. What is family planning? (K)
14. What are contraceptives? (K)
15. The use of contraceptives has become very essential. Give reason. (A)
16. Name a natural method of contraception. (K)
17. Mention the principle involved in natural method of contraception. (U)
18. What is the advantage of natural method of contraception?(K)
19. What is periodic abstinence. (K)
20. Define withdrawl method of contraception. (K)
21. Define coitus interruptus? (K)
22. "Use of condoms not only prevents conception, but also has additional benefits". Justify with one reason. (A)
23. Avoiding coitus from 10th day to 17th day of menstrual cycle prevents conception. Why? (A)
24. What is lactational amenorrhea? (K)
25. How does lactational amenorrhea become a birth control method?(A)
26. During the period of intense lactation following parturition, chances of conception are nil even after sexual intercourse. Why? (A)
27. How contraceptive barriers prevent conception? (A)
28. What are condoms? (K)
29. Name a popular brand of condom for the male. (K)
30. How do condoms act as effective contraceptive devices? (A)
31. What is the additional benefit of condom apart from being a contraceptive device? (U)
32. What are diaphragms? (K)
33. What are vaults? (K)
34. How do diaphragms, cervical caps and vaults act as contraceptive devices? (A)
35. What is the benefit of using spermicidal creams, jellies and foams along with some of the contraceptive barriers? (U)
36. How can the efficiency of contraceptive barriers be increased? (A)
37. What are Intra Uterine Devices? (K)

38. Expand the abbreviation IUDs. (K)
39. Where are IUDs inserted in the body of woman? (K)
40. Give an example for non-medicated IUDs. (K)
41. Give an example for copper releasing IUDs. (K)
42. Give an example for hormone releasing IUDs. (K)
43. How do copper releasing IUDs prevent conception? (A)
44. Identify a contraceptive device that releases ions to suppress sperm motility and the fertilizing capacity of sperms. (A)
45. Name an IUD that would be recommended to promote the cervix hostility to the sperms. (A)
46. How do hormone releasing IUDs prevent conception? (A)
47. How does LNG-20 act as contraceptive? (A)
48. What are oral contraceptives? (K)
49. What is the hormonal composition of oral contraceptive used by females? (K)
50. Name a non-steroidal oral contraceptive pill. (K)
51. Name 'once-a-week' oral contraceptive pill. (K)
52. What is the hormonal composition of an implant which used as a contraceptive? (K)
53. What is sterilization method of contraception? (K)
54. How do surgical methods prevent conception? (A)
55. Define vasectomy? (K)
56. Name the terminal method of contraception in male. (K)
57. How does vasectomy prevent conception? (A)
58. Define tubectomy? (K)
59. Name the terminal method of contraception in female. (K)
60. How does tubectomy prevent conception? (A)
61. What is the disadvantage of surgical method of contraception? (K)
62. Expand the abbreviation MTP. (K)
63. What is medical termination of pregnancy ? (K)
64. What is induced abortion? (K)
65. When did Government of India legalize MTP? (K)
66. Government of India legalized MTP in 1971 with strict conditions for MTP in our country. Justify giving a reason. (A)
67. Which period of pregnancy is considered as relatively safe for MTPs? (K)
68. What are sexually transmitted diseases? (K)
69. What are venereal diseases? (K)
70. Expand the abbreviation STD. (K)
71. Expand the abbreviation VD. (K)
72. Expand the abbreviation PID. (K)
73. What are reproductive tract infections? (K)
74. Sharing of injection needles by two individuals is not recommended. Why? (A)
75. Define is infertility? (K)
76. Expand the abbreviation IVF-ET. (K)
77. Expand the abbreviation ZIFT. (K)
78. Expand the abbreviation GIFT. (K)
79. Expand the abbreviation IUT. (K)
80. Expand the abbreviation ICSI. (K)

81. Expand the abbreviation IUI. (K)
82. What is In-vitro fertilization? (K)
83. Define in-vivo fertilization. (K)
84. What is Gamete Intra Fallopian Transfer? (K)
85. What is Zygote Intra Fallopian Transfer? (K)
86. What is Intra Cytoplasmic Sperm Injection? (K)
87. Define Intra-uterine insemination. (K)
88. What is artificial insemination? (K)
89. Name the method of obtaining an embryo in the laboratory by direct injection of a sperm into ovum. (K)
90. Which is the correct assisted reproductive technique technique when male partner fails to inseminate or produces semen with low sperm count in the ejaculates? (U)
91. Semen from the husband or a healthy donor is artificially introduced into the uterus of the female. What is this technique called? (U)
92. Suggest an assisted reproductive technique that can help the couple to have a child where the problem is with the male partner. (A)
93. Suggest an assisted reproductive technique that help the couple to have a child where the problem is with the female partner who cannot conceive. (A)
94. Name a contraceptive device that inhibits ovulation and implantation. (K)
95. Mention one Assisted Reproductive Technology. (K)

TWO MARK QUESTIONS:

1. Mention two objectives of action plans and programmes for reproductive health. (K)
2. Mention two means to create awareness among the people about problems regarding reproductive health. (K)
3. Mention two strategies to promote reproductive health. (K)
4. What are the benefits of introducing sex education in schools? (K)
5. List any two indicators that indicate a reproductively healthy society. (K)
6. Mention any two reasons for population explosion in India. (K)
7. What are contraceptives ? Mention two qualities of an ideal contraceptive. (K)
8. Mention any four characteristics of ideal contraceptives. (K)
9. Mention any two natural methods of contraception. (K)
10. A proper understanding of menstrual cycle can help immensely in family planning. If you agree with the statement, give reasons for your answer. (A)
11. Which days of menstrual cycle are identified as “fertile period” and why? (K)
12. Mention any four devices used as barriers by males and females to prevent conception. (K)
13. Mention two benefits of condoms which are used as contraceptive devices. (U)
14. What are IUDs ? Give any two examples. (K)
15. Mention any two types of IUDs with an example for each. (K)
16. IUDs are ideal contraceptives for females who want to delay pregnancy. Justify with two reasons. (A)
17. Briefly describe the principle of working of IUDs. (U)
18. List any two types of IUDs that are available for human females and state their mode of action.(U)
19. CuT can act as an effective contraceptive. Justify. (A)

20. Explain the contraceptive actions of Multiiload 375. (U)
21. Progestasert can act as an effective contraceptive. Justify. (A)
22. Write the mode of action of oral contraceptives. (U)
23. Why do women use 'Saheli', the oral contraceptive pill as a well accepted method? (A)
24. What are emergency contraceptives? Write their hormonal combination. (K)
25. List one contraceptive method each in males and females with poor reversibility. (K)
26. Differentiate vasectomy from tubectomy. (U)
27. List the possible ill-effects of various contraceptive methods. (K)
28. What is Medical Termination of Pregnancy? Mention the safe period for Medical Termination of Pregnancy. (K)
29. When does medical termination of pregnancy become essential? (U)
30. List any four reproductive tract infections. (K)
31. List any four sexually transmitted diseases. (K)
32. Mention four early symptoms of STD that occur in the genital region. (K)
33. List the complications a person suffers from untreated sexually transmitted diseases. (K)
34. List any two preventive measures of STD. (K)
35. List the modes of transmission of HIV. (K)
36. List the modes of transmission of hepatitis-B infection. (K)
37. Mention the reasons for infertility. (U)
38. List the types of assisted reproductive technologies (ARTs). (K)
39. Suggest any two ARTs that can help the couple to have a child where the problem is with the female partner. (A)
40. Explain the procedure involved in conceiving the baby by test tube baby programme. (U)
41. After successful *in-vitro* fertilization, the fertilized egg begins to divide. Where is this egg transferred before it reaches the 8-celled stage and what is this technique called? (U)
42. Differentiate ZIFT from IUT. (U)
43. Differentiate ZIFT from GIFT. (U)
44. Explain the procedures involved in GIFT and Intra Cytoplasmic Sperm Injection. (U)
45. Name the two regions of female's reproductive system into which the zygote or embryos are transferred in Embryo Transfer technique. (K)
46. Explain Artificial Insemination. (U)
47. Explain the technique that can help a healthy married woman who is unable to produce viable ova but can provide a suitable environment for fertilization and further development and wants to bear a child. (U)
48. Differentiate in-vitro fertilization from in-vivo fertilization. (U)
49. How is ICSI different from ZIFT ? (U)
50. How is ICSI different from GIFT? (U)
51. How is IUI different from ICSI ? (U)
52. How is IUI different from GIFT ? (U)
53. How is IUI different from ZIFT? (U)

THREE MARK QUESTIONS:

1. Mention any three objectives of action plans and programmes for reproductive health. (K)
2. Mention three strategies to promote reproductive health. (K)
3. Mention any three reasons for population explosion in India. (K)

4. List the measures to check the population growth rate. (K)
5. Explain natural methods of contraception. (U)
6. Explain barrier methods of contraception. (U)
7. How does barrier method helps in contraception ? Mention any four devices which are used as barriers by males and females to prevent conception.
8. List the types of intra uterine devices with one example for each. (K)
9. Categorise the following into different kinds of IUDs such as non-medicated, copper releasing or hormone releasing ones. (K)
   (a) Progestasert (b) Lippes loop (c) CuT (d) LNG-20 (e) Cu7 (f) Multiload 375
10. Intra uterine devices are ideal contraceptives for females who want to delay pregnancy. Justify with three reasons. (A)
11. What is the chemical composition of oral contraceptives? How do they prevent conception? (U)
12. Name a terminal method to prevent pregnancy in humans. Explain the procedure of the terminal method employed in human male and female. (U)
13. What is Medical Termination of Pregnancy? Mention two reasons for a woman to undergo medical terrmination of pregnancy. (K)
14. List any six reproductive tract infections. (K)
15. List three principles through which one could be free of STDs. (K)
16. Define venereal disease. Mention any two modes of transmission of HIV or Hepatitis B virus. (K)
17. What are sexually transmitted diseases? Mention four early symptoms of STD that occur in the genital region. (K)
18. Suggest any three ARTs that can help the couple to have a child where the problem is with the male partner. (A)
19. Write a note on the steps involved in the creation of “test tube baby”. (U)
20. Explain any three methods employed to assist infertile couples to have children. (A)
21. What are Assisted Reproductive technologies (A RTs)? Explain the role of ZIFT and GIFT as two important ARTs. (U)
22. What do you understand by GIFT, ICSI and AI as Assisted Reproductive Technologies. (K)
23. What do you understand by GIFT, ICSI and IUI as Assisted Reproductive Technologies. (K)
24. What do you understand by GIFT, IUI and AI as Assisted Reproductive Technologies. (K)
25. How ZIFT and GIFT are useful as assisted reproductive technologies to overcome infertility? (A)
26. A healthy couple came to know that both of them are unable to produce functional gametes and should look for an ART (Assisted Reproductive Technique). Name the ART that can be suggested to help them bear a child and explain the procedure involved in it. (A)

FIVE MARK QUESTIONS:

1. Explain five measures that can be taken to build up a socially responsible and reproductively healthy society? (U)
2. Explain any five birth control methods.(U)
3. Explain natural method and sterilization method of contraception. (U)
4. What are IUDs? Mention any two types with an example for each. How do IUDs help in preventing conception? (U)
5. List the types of Intra Uterine Devices with one example each. Explain their mode of action. (U)
6. Explain how oral contraceptives and sterilization help in contraception. (U)
7. With the help of labeled diagrams, explain the surgical methods of contraception in human. (S)

8. What are sexually transmitted diseases ? Mention four early symptoms of STD that occur in the genital region. Mention any four complications of STDs if they are not detected early and treated properly. (K)
9. What are assisted reproductive technologies? How infertility is treated by assisted reproductive technologies? (U)
10. What is infertility? How is infertility treated by assisted reproductive technologies like IVF-ET and ZIFT? (U)
11. What is infertility? How is infertility treated by assisted reproductive technologies like GIFT, ZIFT, AI and ICSI? (U)
12. What is infertility? How is infertility treated by GIFT, ICSI, IUI and AI? (U)
13. Explain the steps involved in *In vitro* fertilization popularly known as 'test tube baby' programme and mention the importance of this IVF programme. (U)
14. What are Assisted Reproductive Technologies? How is infertility treated by IVF – ET and ZIFT? (U)
15. What are Assisted Reproductive Technologies (ARTs)? How is infertility treated by ZIFT, GIFT, ICSI and AI? (U)
16. What are Assisted Reproductive Technologies? How is infertility treated by GIFT, ICSI, IUI and AI? (U)
17. Define the following: (a) Amniocentesis (b) Artificial Insemination (c) Infertility (d) Venereal diseases (e) Assisted Reproductive Technologies (K)

Chapter 5
PRINCIPLES OF INHERITANCE

ONE MARK QUESTIONS:

1. Define Genetics. (K)
2. Define inheritance. (K)
3. Define heredity. (K)
4. Define variation. (K)
5. Define genes. (K)
6. Define alleles. (K)
7. What is a dominant allele? (K)
8. What is a recessive allele? (K)
9. What is genotype? (K)
10. What is phenotype? (K)
11. What are homozygous individuals? (K)
12. What are heterozygous individuals? (K)
13. What is a true breeding plant? (U)
14. What is monohybrid cross? (K)
15. What is a monohybrid? (K)
16. What is Punnette square? (K)
17. Mention the phenotypic ratio of monohybrid cross. (K)
18. Mention the genotypic ratio of monohybrid cross. (K)
19. State the law of segregation. (U)
20. What is dihybrid cross? (K)
21. Mention the phenotypic ratio of dihybrid cross. (K)
22. State the law of independent assortment. (U)
23. What is test cross? (K)
24. Mention monohybrid test cross ratio. (K)
25. Mention dihybrid test cross ratio. (K)
26. Mention the significance of test cross. (K)
27. Define incomplete dominance. (K)
28. Mention the phenotypic ratio with respect to incomplete dominance in Snapdragon. (K)
29. Mention the genotypic ratio with respect to incomplete dominance in Snapdragon. (K)
30. Define codominance. (K)
31. What are multiple alleles? (K)
32. Mention an example for multiple allelism. (K)
33. How many genotypes are possible for the four blood groups in ABO blood group system? (K)
34. I^A and I^B alleles which determine blood group in man are considered as codominant. Why? (A)
35. What is polygenic inheritance? (K)
36. Mention an example for polygenic inheritance. (K)
37. What is pleiotropy? (K)
38. Mention an example for pleiotropy. (K)
39. What is phenylketonuria? (K)
40. Mention one reason why Mendel's work remained unrecognized for a long time. (U)

41. Define linkage. (U)
42. Define recombination. (U)
43. Even when genes are grouped on the same chromosome, some genes show very low recombination. Give reason. (A)
44. Mention the type of sex determination mechanism in *Drosophila melanogaster*. (K)
45. Mention the type of sex determination mechanism in humans. (K)
46. Mention the type of sex determination mechanism in insects like grasshopper. (K)
47. Mention the type of sex determination mechanism in birds. (K)
48. What is haplo-diploid sex determination mechanism? (K)
49. Define male heterogamety. (K)
50. Define female heterogamety. (K)
51. Define mutation. (K)
52. What is deletion mutation? (K)
53. What is insertion mutation? (K)
54. What is point mutation? (K)
55. Mention an example for point mutation. (K)
56. What is frame shift mutation? (K)
57. What are mutagens? (K)
58. What is pedigree analysis? (K)
59. What is thalassemia? (K)
60. What are Mendelian disorders? (K)
61. Mention an example for a mendelian disorder. (K)
62. What are chromosomal disorders? (K)
63. Mention an example for chromosomal disorder. (K)
64. Give an example for sex linked recessive disease in humans. (K)
65. Name an autosomal recessive Mendelian disorder in humans. (K)
66. Mention an example for an inborn error of metabolism caused due to a recessive allele on the autosome. (K)
67. Name the enzyme that is not produced due to gene mutation which causes phenylketonuria. (K)
68. Phenyl pyruvic acid and its derivatives are excreted through urine in phenylketonuria. Why? (A)
69. Why persons with phenylketonuria normally suffer from mental retardation. (A)
70. What is haemophilia? (K)
71. Why the possibility of a female becoming a haemophilic is extremely rare? (A)
72. In a haemophilic patient, why even a simple cut results in non-stop bleeding ? (A)
73. What is colourblindness? (K)
74. What is sickle cell anaemia? (K)
75. RBCs become sickle-shaped in persons suffering from sickle cell anaemia. Why? (U)
76. Name the amino acid which substitutes glutamic acid in the beta globin chain of haemoglobin in sickle cell anaemia. (K)
77. Name the amino acid in the beta globin chain of haemoglobin which is substituted by valine in sickle cell anaemia. (K)
78. Mention the sixth codon of beta globin chain in normal haemoglobin. (K)
79. Write the sixth codon of beta globin chain in haemoglobin of sickle celled anaemic patients. (K)
80. Which genetic disease is characterized by the reduced synthesis of haemoglobin ? (K)
81. Define polyploidy. (K)

82. What is the cause for polyploidy? (U)
83. Define aneuploidy. (K)
84. What is trisomy ? (K)
85. What is monosomy ? (K)
86. What is the cause for aneuploidy? (U)
87. Give an example for trisomy of sex chromosomes. (K)
88. Mention the karyotype of Down's syndrome. (K)
89. Mention the karyotype of Klinefelter's syndrome. (K)
90. Mention the karyotype of Turner's syndrome. (K)
91. Mention an example for aneuploidy of autosomes. (K)
92. Give an example for allosomal monosomy. (K)
93. Give an example for autosomal trisomy. (K)
94. Mention an example for allosomal trisomy. (K)
95. Why does a person with Klinefelter's syndrome exhibit feminine characters? (A)
96. What is gynaecomastia ? (K)
97. Why does a person with Turner's syndrome lack certain female secondary sexual characters and has rudimentary ovaries? (A)
98. Write the symbol used to represent 'affected individuals' in pedigree chart. (K)
99. Write the symbol used to represent 'consanguineous mating' in pedigree chart. (K)
100. Write the symbol used to represent 'male' in pedigree chart. (K)
101. Write the symbol used to represent 'female' in pedigree chart. (K)
102. Write the symbol used to represent 'individual of unspecified sex' in pedigree chart. (K)

TWO MARK QUESTIONS:

1. Differentiate homozygous and heterozygous conditions. (U)
2. Differentiate dominant and recessive alleles. (U)
3. Distinguish between monohybrid and dihybrid crosses. (U)
4. What is test cross? Write its significance. (K)
5. State the law of segregation and law of independent assortment. (U)
6. What is incomplete dominance? Mention an example. (K)
7. What is codominance? Mention an example. (K)
8. What are multiple alleles? Give an example of human trait regulated by multiple alleles. (K)
9. What are multiple alleles? Why alleles I^A and I^B for blood group are considered codominant ? (U)
10. A child has blood group 'O'. If the father has blood group 'A' and mother blood group 'B', work out the genotypes of the parents and the possible genotypes of the other offspring. (A)
11. Differentiate between incomplete dominance and codominance. (U)
12. Differentiate polygenic inheritance and pleiotropy. (U)
13. What is polygenic inheritance? Give an example. (K)
14. What is polygenic inheritance? Explain it taking the inheritance of skin colour in man. (U)
15. Define pleiotropy. Mention an example. (K)
16. Mention two similarities in the behaviours of chromosomes and genes. (K)
17. Differentiate linkage and recombination. (U)
18. List two features of *Drosophila melanogaster* which make it suitable for genetic experiments. (K)
19. What are the conclusions drawn by T H Morgan from the crossing experiment in *Drosophila* with respect to linkage? (U)

20. Mention two features in Drosophila which made T H Morgan to select it for his genetical experiments. (K)
21. Mention the sex determination mechanisms in grasshopper and humans. (K)
22. Mention the sex determination mechanisms in grasshopper and *Drosophila melanogaster*. (K)
23. Mention the sex determination mechanisms in grasshopper and birds. (K)
24. Mention the sex determination mechanisms in humans and birds. (K)
25. Mention the sex determination mechanisms in *Drosophila melanogaster* and birds. (K)
26. What is male heterogamety ? Give an example. (K)
27. What is female heterogamety ? Give an example. (K)
28. Differentiate male haterogamety from female heterogamety. (U)
29. What is haplo-diploid sex determination mechanism? Mention an animal which exhibits this. (K)
30. Define mutation. What are mutation causing agents called? (K)
31. What is pedigree analysis? Mention its importance. (K)
32. Write the representative pedigree analysis (pedigree chart) of myotonic dystrophy as an example for autosomal dominant trait. (S)
33. Write the representative pedigree analysis (pedigree chart) of sickle cell anaemia as an example for autosomal recessive trait. (S)
34. What are Mendelian disorders? Mention two examples. (K)
35. What are chromosomal disorders? Mention two examples. (K)
36. What are Mendelian disorders? Give an example for sex linked recessive Mendelian disorder in humans. (U)
37. What are Mendelian disorders? Name an autosomal recessive Mendelian disorder in man. (K)
38. What are Mendelian disorders? Mention an example for an inborn error of metabolism caused due to an autosomal recessive allele. (K)
39. What is phenylketonuria? Write two symptoms. (K)
40. Mention the causes and effects of phenylketonuria. (K)
41. What is phenylketonuria? Why phenyl pyruvic acid and its derivatives are excreted through urine in phenylketonuria. (U)
42. What is phenylketonuria? Why persons with phenylketonuria normally suffer from mental retardation. (U)
43. What is haemophilia? Why the possibility of female becoming haemophilic is extremely rare? (U)
44. What is haemophilia? In a person suffering from haemophilia, why even a simple cut results in non-stop bleeding? (U)
45. What is sickle cell anaemia? Why RBCs become sickle-shaped in persons suffering from sickle cell anaemia? (U)
46. Mention the sixth codons of the beta globin chain in normal haemoglobin and the haemoglobin of person with sickle celled anaemia. (K)
47. What is thalassemia? Mention the types. (K)
48. Write a note on α – thalassemia. (U)
49. Write a note on β – thalassemia. (U)
50. What are chromosomal disorders? Mention any two symptoms of Turner's syndrome. (K)
51. What are chromosomal disorders? Mention any two symptoms of Klinefelter’s syndrome. (K)
52. What are chromosomal disorders? Mention any two symptoms of Down’s syndrome. (K)
53. Define aneuploidy. How is it caused? (U)
54. Distinguish between aneuploidy and polyploidy. (U)

55. Define aneuploidy. Mention an example for a syndrome caused by aneuploidy in humans. (K)
56. Define monosomy. How is it caused? (K)
57. Define trisomy. How is it caused? (K)
58. Define monosomy . Mention an example for it in humans. (K)
59. Define trisomy. Mention an example for it in humans. (K)
60. What is the karyotype in Turner's syndrome? Mention two symptoms of the syndrome. (K)
61. What is the karyotype in Klinefelter's syndrome? Mention two symptoms of the syndrome. (K)
62. What is the karyotype in Down's syndrome? Mention any two symptoms of the syndrome. (K)
63. Mention four symptoms of Down's syndrome. (K)
64. Give an example for trisomy in humans and mention three of its symptoms. (K)
65. Give an example for monosomy in humans and mention three of its symptoms (K).

THREE MARK QUESTIONS:

1. Write the flow chart that depicts Mendelian monohybrid cross for the inheritance of height in pea plant. (S)
2. Write the flow chart that depicts Mendelian dihybrid cross for the inheritance of colour and shape of seed in pea plant. (S)
3. Write the flow chart that depicts incomplete dominance in *Antirrhinum*. (S)
4. Define pleiotropy. Explain it with respect to phenylketonuria. (U)
5. "Mendel's work was not recognized during his time."? Give any three reasons. (A)
6. Mention the similarities between the behaviours of chromosomes and genes according to chromosomal theory of inheritance. (U)
7. Mention three features of *Drosophila melanogaster* which makes it suitable for genetic experiments. (K)
8. Explain sex determination in humans. (U)
9. Explain sex determination in *Drosophila melanogaster*. (U)
10. Explain sex determination in birds. (U)
11. Explain sex determination mechanism in grasshopper. (U)
12. Explain sex determination mechanism in honey bees. (U)
13. What is pedigree analysis? Write the representative pedigree analysis (pedigree chart) of myotonic dystrophy as an example for autosomal dominant trait. (S)
14. What is pedigree analysis? Write the representative pedigree analysis (pedigree chart) of sickle cell anaemia as an example for autosomal recessive trait. (S)
15. What are Mendelian disorders? Mention a Mendelian disease and its types where there is reduced synthesis of haemoglobin. (K)
16. Write a note on phenylketonuria as an example for Mendelian disorder. (U)
17. Mention the cause, symptoms and inheritance of haemophilia. (K)
18. What are chromosomal disorders? Mention any four symptoms of Down's syndrome. (K)
19. Mention the causes of Down's syndrome and mention four of its symptoms. (K)
20. Mention the karyotype of Down's syndrome and mention four of its symptoms. (K)
21. Write the karyotype of Klinefelter's syndrome, Turner's syndrome and Down's syndrome. (K)

FIVE MARK QUESTIONS:

1. State law of segregation. Explain it with reference to the inheritance of height of the plant in pea garden pea. (U)

2. Explain the concept of dominance. (U)
3. State the law of Independent assortment. Explain it with reference to the inheritance of colour and shape of the seed in pea plant. (U)
4. What is incomplete dominance? Explain it with respect to flower colour in snapdragon. (U)
5. What is pedigree analysis? Mention its significance. Write the representative pedigree analysis (pedigree chart) of myotonic dystrophy as an example for autosomal dominant trait. (U)
6. What is pedigree analysis? Mention its significance. Write the representative pedigree analysis (pedigree chart) of sickle cell anaemia as an example for autosomal recessive trait that you have studied. (U)
7. Explain the cause, symptoms and inheritance pattern of sickle cell anemia. (U)
8. Explain thalassemia as an example for Mendelian disorder. (U)
9. Define aneuploidy. What is the cause for aneuploidy? Mention the karyotype of Down's syndrome and four of its symptoms. (U)
10. What is trisomy? What is its cause? Mention the karyotype of Down's syndrome and four of its symptoms. (U)
11. Explain Morgan's experiment on Drosophila to show the relation between linkage and recombination.(U)

Chapter 6
MOLECULAR BASIS OF INHERITANCE

ONE MARK QUESTIONS:

1. Name the pentose sugar present in DNA. (K)
2. Name the pentose sugar present in RNA. (K)
3. Mention an example for purine. (K)
4. Mention an example for pyrimidine. (K)
5. Name the bond present between pentose sugar and nitrobase in a nucleoside. (K)
6. Name the bond present between a nucleoside and the phosphate group. (K)
7. Name the bonds present between the two strands of a DNA molecule. (K)
8. Name the bond formed between sugar and phosphate back bone of single stranded DNA. (K)
9. What is the alternative chemical name of thymine? (K)
10. Name the nitrogenous base present in DNA but not in RNA. (K)
11. Name the nitrogenous base present in RNA but not in DNA. (K)
12. Name the nucleoside present only in DNA. (K)
13. Name the nucleoside present only in RNA. (K)
14. What was the observation of Erwin Chargaff for a double stranded DNA? (U)
15. The two strands in a DNA molecule are said to be antiparallel. Why? (A)
16. Which nitrogenous base provides additional stability to DNA? (K)
17. State the central dogma of molecular biology. (U)
18. What is reverse dogma of molecular biology? (U)
19. What is nucleosome? (K)
20. Name the proteins which form the core of nucleosomes. (K)
21. Mention any one basic amino acid present in large quantities in the histone proteins of nucleosomes. (K)
22. How many base pairs (bp) of a DNA helix are found in a typical nucleosome? (K)
23. What is chromatin? (K)
24. What is euchromatin? (K).
25. Define heterochromatin. (K)
26. What is the loosely coiled and lightly stained region of chromatin called? (K)
27. What is the densely packed and darkly stained region of chromatin called? (K)
28. Replication in the region of euchromatin would be faster. Justify. (A)
29. Replication in the region of heterochromatin would be slow. Justify. (A)
30. Heterochromatin is transcriptionally inactive when compared to euchromatin. Give reason. (A)
31. Name the scientific name of bacteria used by Griffith in his experiment. (K)
32. Why the mouse dies when the mixture of heat killed 'S' strain and live 'R' strain of *Streptococcus pneumoniae* is injected? (A)
33. DNA is a better genetic material than RNA. Justify with one reason. (A)
34. Define replication. (K)
35. Why replication in DNA is referred to as semi-conservative replication? (A)
36. Name the enzyme involved in the polymerization of nucleotides during DNA replication. (K)
37. What is the function of DNA polymerase during replication? (K)
38. Mention the template polarity on which replication occurs continuously. (U)

39. Mention the template polarity on which replication occurs discontinuously. (U)
40. Name the enzyme which joins discontinuously synthesized fragments of DNA during DNA replication. (K)
41. What is the function of DNA ligase during replication? (K)
42. What is origin of replication? (K)
43. In which phase of the cell cycle DNA replication occurs? (K)
44. Define transcription. (K)
45. "Both the strands of DNA do not act as templates during transcription". Justify with a reason. (A)
46. Name the enzyme involved in polymerization of nucleotides during transcription. (K)
47. What is a 'coding strand' with respect to transcription? (K)
48. What is 'template strand' with respect to transcription? (K)
49. What is the significance of promoter site on a transcription unit? (U)
50. What is a cistron? (K)
51. What do you mean by monocistronic transcriptional unit? (U)
52. What is polycistronic transcriptional unit? (U)
53. What are exons? (K)
54. What are introns? (K)
55. What are split genes? (U)
56. Why eukaryotic genes are called split genes? (A)
57. Mention the function of mRNA. (K)
58. Mention the function of tRNA. (K)
59. Mention the function of rRNA. (K)
60. Why tRNA is called an adaptor molecule? (A)
61. Mention the factors that temporarily associate with RNA polymerase during initiation of transcription in prokaryotes. (K)
62. Mention the factors that temporarily associate with RNA polymerase during termination of transcription in prokaryotes. (K)
63. Mention the enzyme that transcribes mRNA in prokaryotes. (K)
64. In bacteria, translation can begin much before mRNA is fully transcribed. Give one reason. (A)
65. Mention the enzyme that transcribes hnRNA in eukaryotes. (K)
66. Which enzyme is involved in transcription of tRNA in eukaryotes? (K)
67. Which enzyme is involved in transcription of 28SrRNA in eukaryotes? (K)
68. Mention the function of RNA polymerase I.
69. Mention the function of RNA polymerase II.
70. Mention the function of RNA polymerase III.
71. What is hnRNA ?
72. What is 'capping' with reference to post-transcriptional stage in eukaryotes ?
73. What is 'tailing' with reference to post-transcriptional stage in eukaryotes ?
74. Define 'splicing' with respect to post-transcriptional stage in eukaryotes.
75. Define genetic code. (K)
76. What is triplet code? (K)
77. Name the Severo Ochoa enzyme. (K)
78. What is the special property of Severo Ochoa enzyme (polynucleotide phosphorylase)? (U)
79. Name the enzyme which is helpful in polymerizing RNA with defined sequences in a template independent manner. (A)

80. Name the initiator codon. (K)
81. Why AUG is considered as initiator codon? (A)
82. What other function the initiator codon performs in addition to initiating translation? (U)
83. Name the amino acid coded by initiator codon. (U)
84. Mention terminator codon. (K)
85. Why UAA is considered as terminator or stop codon? (A)
86. Why UAG is considered as terminator or stop codon? (A)
87. Why UGA is considered as terminator or stop codon? (A)
88. Why genetic code is referred to as degenerate? (A)
89. Why genetic code is said to be universal? (A)
90. Why genetic code is said to be unambiguous or specific? (A)
91. What is point mutation? (K)
92. What is frame shift insertion mutation? (K)
93. What is frame shift deletion mutation?
94. Mention an example for a genetic disorder which is a result of point mutation. (K)
95. Define translation. (K)
96. Name the cellular factory responsible for synthesizing proteins. (K)
97. What do you mean by charging of tRNA with respect to translation? (U)
98. What do you mean by aminoacylation of tRNA with respect to translation? (U)
99. Mention the enzyme involved in peptide bond formation during protein synthesis. (K)
100. What is the function of ribosome during chain elongation of translation? (K)
101. Which type of rRNA acts as ribozyme for the formation of peptide bonds during translation in bacteria? (K)
102. Mention the type of RNA that has anticodon? (K)
103. Expand UTR with reference to mRNA. (K)
104. What is an operon? (K)
105. What is lac operon? (K)
106. Name the protein produced by lac 'i' gene. (K)
107. What is the function of regulatory gene of Lac-operon? (K)
108. Why transcription in *E.coli* does not occur in the absence of lactose in the medium? (A)
109. How does repressor protein prevent the transcription of structural genes? (U)
110. What is the function of repressor in an operon? (K)
111. Name the enzyme encoded by the lac 'z' gene. (K)
112. Name the enzyme encoded by the lac 'y' gene. (K)
113. Name the enzyme encoded by the lac 'a' gene. (K)
114. What is the function of β – galactosidase in *E.coli*? (K)
115. Mention the function of permease in *E.coli*. (K)
116. What is the importance of operator in Lac-operon? (K)
117. Mention the inducer that inactivates Lac repressor protein. (K)
118. Why lactose is termed as inducer with reference to Lac-operon? (A)
119. What is negative regulation? (K)
120. What are expressed sequence tags? (K)
121. Define sequence annotation. (K)
122. Mention a common vector used for the amplification of DNA fragments during the sequencing of human genome. (K)

123. Which is the largest known human gene? (K)
124. Which chromosome in humans has the largest number of genes? (K)
125. Which chromosome in humans has the least number of genes? (K)
126. With reference to Human Genome Project, what do SNPs refer to? (K)
127. What is single nucleotide polymorphism? (K)
128. What is repetitive DNA? (K)
129. What is satellite DNA? (K)
130. Define DNA polymorphism. (K)
131. Expand VNTR. (K)
132. What is a VNTR probe or DNA probe? (U)
133. 'Restriction endonucleases are important tools in DNA finger printing technique'. Justify. (A)
134. Why gel electrophoresis is an important step in DNA fingerprinting? (A)
135. Mention one application of DNA fingerprinting. (K)

TWO MARK QUESTIONS:

1. Mention the four nitrobases present in DNA. (K)
2. Mention the four nitrobases present in RNA. (K)
3. List the nucleosides of DNA. (K)
4. Mention the nucleosides of RNA. (K)
5. If a double stranded DNA has 20% of cytosine, calculate the percent of adenine in the DNA. (A)
6. Explain the central dogma of molecular biology with a schematic representation. (U)
7. Draw a labeled diagram of nucleosome. (S)
8. Mention two differences between euchromatin and heterochromatin. (U)
9. How many base pairs of DNA are present in a typical nucleosome? Mention the types of proteins present in a nucleosome. (K)
10. Write the conclusion that can be drawn from Griffith's experiment. (K)
11. Mention any two criteria that a molecule must fulfill to act as genetic material. (K)
12. DNA is a better genetic material than RNA. Justify with two reasons. (A)
13. Mention the functions of DNA polymerase and DNA ligase during replication. (K)
14. Draw a labeled diagram of replication fork. (S)
15. "Both the strands of DNA molecule do not act as templates during transcription". Justify with two reasons. (A)
16. Write the schematic structure of a transcriptional unit. (S)
17. Write any two differences between prokaryotic and eukaryotic transcription unit. (U)
18. Differentiate monocistronic transcriptional unit from polycistronic transcriptional. (U)
19. Differentiate introns and exons. (U)
20. Differentiate template strand from a coding strand in DNA. (U)
21. Write the coding strand and the sequence of base on mRNA synthesized by DNA template with the sequence 3'-ATGCATAGCAT-5'. (A)
22. Write a note on the role of sigma factor and the rho factor in transcription in prokaruotes. (K)
23. What is heterogeneous nuclear RNA (hnRNA)? How is it converted into functional mRNA? (K)
24. Mention the functions of mRNA and rRNA. (K)
25. Mention the functions of mRNA and tRNA. (K)
26. Mention the functions of rRNA and tRNA. (K)

27. In bacteria, translation can begin much before the mRNA is fully transcribed. Justify with two reasons. (A)
28. Mention the functions of RNA polymerase I and RNA polymerase II in eukaryotes. (K)
29. Mention the functions of RNA polymerase I and RNA polymerase III in eukaryotes. (K)
30. Mention the functions of RNA polymerase II and RNA polymerase III in eukaryotes. (K)
31. With reference to transcription, define splicing and capping. (K)
32. Mention any two differences with reference to transcription in prokaryotes and eukaryotes. (U)
33. Define the terms transcription and translation. (U)
34. Name Severo Ochoa enzyme. Mention its function. (K)
35. Explain any two properties of genetic code. (U)
36. Mention the initiator and terminator codons. (K)
37. Name the initiator codon and the amino acid coded by it. (K)
38. "Codon AUG has dual function". Justify the statement. (A)
39. List the essential roles of ribosome during translation. (U)
40. Differentiate point mutation and frame-shift mutation. (U)
41. What is point mutation? Give an example for a genetic disorder in human beings caused by point mutaion. (K)
42. Mention the four levels at which regulation of gene expression can be exerted in eukaryotes. (K)
43. Mention the enzymes encoded by lac 'z', lac 'y' with their function. (K)
44. Mention the role of repressor and inducer in regulation of gene expression. (U)
45. Mention the functions of β-galactosidase and permease in lactose metabolism in *E. coli*. (K)
46. How does the Lac-operon function in the absence of inducer (lactose) in the medium? (U)
47. How does the Lac-operon function in the presence of inducer (lactose) in the medium? (U)
48. Mention the role of repressor and inducer in regulation of gene expression. (U)
49. Mention the function of repressor protein. What change occurs when lactose is added to the medium containing *E. coli*? (U)
50. In the medium where *E.coli* was growing, lactose was added, which induced the Lac-operon. Then, why does Lac-operon shut down some time after addition of lactose into the medium. (U)
51. Mention any two goals of Human Genome Project (HGP). (K)
52. Mention the two approaches with respect to the methodology of sequencing DNA in Human Genome Project. (K)
53. Mention two salient features of human genome. (K)
54. With reference to human genome, what is single nucleotide polymorphism (SNP)? Mention its significance. (K)
55. Mention two applications of Human Genome Project. (K)
56. Mention two common vectors used for the amplification of DNA fragments during the sequening of human genome. (K)

THREE MARK QUESTIONS:

1. The base sequence in one of the DNA strands is TAGCATGAT. Based on this answer the following: (U)
   (a) Give the base sequences of its complementary strand.
   (b) How are these base pairs held together in a DNA molecule?
   (c) What was the observation of Chargaff on the base ratio in double stranded DNA?
2. Explain packaging of DNA in prokaryotes. (U)

3. The length of a DNA molecule in a typical mammalian cell is calculated to be approximately 2.2 meters. How is the packaging of this long molecule done to accommodate it within the nucleus having a size of approximately 6μ. (A)
4. List any three criteria that a molecule has to fulfill to act as a genetic material. (K)
5. Why is DNA molecule a more stable genetic material than RNA? Explain. (U)
6. Explain how Avery, MacLeod and McCarty did determine, the biochemical nature of the molecule responsible for transforming R – strain into S – strain bacteria. (U)
7. Draw a labeled schematic sketch of replication fork of DNA. Explain the role of enzymes involved in DNA replication. (U)
8. Describe the structure of a transcriptional unit. (U)
9. "RNA polymerases in eukaryotes show a clear cut division of labour". Substantiate.
10. Explain the function of the following: (K)
    (a) Promoter (b) tRNA (c) Exons
11. Explain the stages of post-transcriptional modification of hnRNA in eukaryotes.
12. With reference to post-transcriptional modifications in eukaryotes, explain splicing, capping and tailing. (U)
13. Given below is a part of the template strand of a structural gene TAC CAT TAG GAT. Based on this, answer the following: (U)
    (a) Write its transcribed mRNA strand with its polarity
    (b) Explain the mechanism involved in initiation of transcription on this strand.
14. Draw a schematic representation which shows the structure of a transcription unit and show the following in it: (U)
    (a) Direction in which transcription occurs (b) Polarity of the two strands involved (c) Template strand (d) Terminator
15. Explain non-overlapping nature, unambiguity and degeneracy of genetic code. (U)
16. Explain three features of genetic code. (U)
17. Define the terms point mutation, frame – shift insertion mutation and frame – shift deletion mutation. (K)
18. Define translation. Mention the initiator codon and three stop codons. (U)
19. Mention the role of ATP and ribosomes in protein synthesis. (K)
20. Why tRNA is called an adapter molecule? Draw the structure of the tRNA adapter molecule which can bind with initiator codon. (A)
21. Mention the anticodon of AUG. Justify the statement that AUG has dual role in translation. (A)
22. Mention the structural genes of Lac-operon and the ezymes produced by each of them. (K)
23. Draw a diagrammatic sketch of the Lac-operon when lactose is absent in the medium. (S)
24. Draw a diagrammatic sketch of the Lac-operon when lactose is present in the medium. (S)
25. (a) In human genome, which one of the chromosomes has the most genes and which one has the least? (K)
    (b) What is single nucleotide polymorphism? Mention the significance SNPs. (K)
26. Mention the three goals of HGP. (K)
27. Mention any three salient features of HGP. (K)
28. Mention three applications of Human Genome Project. (K)
29. List out three applications of DNA fingerprinting. (K)
30. What is DNA fingerprinting? Mention two of its applications. (K)
31. List the steps of DNA finger printing technique. (K)

FIVE MARK QUESTIONS:

1. Explain the structure of double helical DNA as proposed by Watson and Crick. (U)
2. Draw the diagram of a nucleosome and explain the packaging of DNA in eukaryotes. (U)
3. Explain Griffith's transformation experiment which proved that DNA is the genetic material. (U)
4. Describe the experiment of Hershey – Chase which proves that DNA is the genetic material. (U)
5. Explain semi-conservative replication of DNA with a diagram. (U)
6. Describe the experiment of Messelson and Stahl that proves that replication of DNA is semi-conservative. (U)
7. Explain the structure of transcription unit with a labeled diagram. (U)
8. Describe the process of transcription in bacteria with a labeled diagram. (U)
9. Describe the process of transcription in eukaryotes with a labeled diagram. (U)
10. What is genetic code? Explain any four salient features of genetic code. (U)
11. Explain the different steps involved in translation. (U)
12. Explain Lac-operon concept with diagrams. (U)
13. Mention any five salient features of HGP. (K)
14. What is DNA finger printing? Write the sequential steps involved in DNA fingerprinting. Mention two applications of this technique. (K)

Chapter 7
EVOLUTION

ONE MARK QUESTIONS:

1. What does evolutionary biology deal with? (K)
2. Name the unit used to measure stellar distances? (K)
3. How old is the universe? (K)
4. Mention the theory that explains the Origin of Universe. (K)
5. Name the galaxy to which earth belongs. (K)
6. Why the atmosphere on earth before the origin of life is regarded as reducing atmosphere? (A)
7. Who proposed the theory of chemical evolution of origin of life? (K)
8. When was the earth formed? (K)
9. What does the theory of Panspermia propose? (K)
10. State the theory of spontaneous generation.(K)
11. Who provided an experimental proof for chemical evolution of life? (K)
12. What was the temperature maintained in Stanley Miller's experiment in the spark discharge chamber? (K)
13. What is 'fitness' according to Charles Darwin? (K)
14. What are fossils? (K)
15. Name the method which is used to calculate the age of a fossil? (K)
16. Who proposed embryological evidence for evolution? (K)
17. Who disapproved the embryological evidence for evolution which was proposed by E Heckel? (K)
18. What are homologous organs ? (K)
19. Mention an example for homologous organs. (K)
20. Define divergent evolution. (K)
21. Give an example for divergent evolution. (K)
22. What kind of evolution thorns of *Bougainvillea* and tendrils of *Cucurbita* represent? (K)
23. With respect to evolution, what do the forelimbs of whales, bats and cheetah signify? (K)
24. "Even though the forelimbs of bat, whale, cheetah and human being perform different functions, they indicate common ancestry". Justify the statement. (A)
25. "Homologous organs originated due to divergent evolution". Justify with a reason. (A)
26. What are analogous organs? (K)
27. Give an example for analogous organs. (K)
28. Define convergent evolution. (K)
29. Give an example for convergent evolution. (K)
30. Why the wings of butterfly and birds are called analogous organs? (A)
31. "Analogous organs arose due to convergent evolution". Justify with a reason. (A)
32. Why evolution is considered as a stochastic process? (A)
33. Anthropogenic action hastens evolution. Justify with an example. (A)
34. State a reason for the increased population of dark coloured moths coinciding with the loss of lichens (on tree barks) during industrialization period in England. (A)
35. What is adaptive radiation? (K)
36. Give an example for adaptive radiation. (K)
37. "Darwin's finches represent one of the best examples of adaptive radiation". Justify. (A)

38. “Australian marsupials represent one of the best examples of adaptive radiation”. Justify. (A)
39. Define saltation. (K)
40. What is the reason for speciation according to Hugo de Vries? (K)
41. Name the plant on which Hugo de Vries worked. (K)
42. Define gene pool. (K)
43. Define gene frequency. (K)
44. Define genetic equilibrium. (K)
45. State Hardy-Weinberg's principle. (K)
46. What does Hardy-Weinberg equation $p^2 + 2pq + q^2 = 1$ convey? (A)
47. What would an alteration in Hardy-Weinberg equilibrium lead to? (A)
48. Define gene migration. (K)
49. Define gene flow. (K)
50. Define genetic drift. (K)
51. Define natural selection. (K)
52. Predict the type of natural selection in which more individuals acquire mean character value for different traits. (A)
53. Predict the type of natural selection in which more individuals acquire value other than the mean character value for different traits. (A)
54. Predict the type of natural selection in which more individuals acquire peripheral character value at both ends of the distribution curve for different traits. (A)
55. When the first invertebrates formed on earth? (K)
56. Name the ancestors of modern day frogs and salamanders. (K)
57. When did jawless fish evolved on earth? (K)
58. When were the sea weeds found for the first time on earth? (K)
59. Which were the first organisms that invaded land? (K)
60. What is the significance of Coelacanth in evolution? (K)
61. Name the fish with stout and strong fins that appeared during the course of evolution which could move on land and go back to water. (K)
62. Name the fish which evolved into the first amphibians. (K)
63. Name the ancestral form of dinosaurs. (K)
64. Name a fish like reptile that lived in water. (K)
65. Name the biggest dinosaur. (K)
66. When did dinosaurs disappear from earth? (K)
67. Name a character that makes reptiles more successful than amphibians. (K)
68. Name the first mammals to evolve on earth. (K)
69. Where did Australopithecines live? (K)
70. Write the scientific name of Java man. (K)
71. Name the ancestor of man who essentially ate fruit and hunted with stone weapon .(K)
72. Name the first human like being to evolve on earth. (K)
73. What is the brain capacity of *Homo habilis*? (K)
74. When was pre-historic cave art developed by *Homo sapiens*?(K)
75. What is the brain capacity of *Homo erectus* ?(K)
76. What is the brain capacity of Neanderthal man?(K)
77. Where did Neanderthal man live?(K)
78. Mention the approximate period in which Neanderthal man lived? (K)

79. Name the ancestor of human who used hides to protect his body and buried the dead. (K)
80. Write the scientific name of man-like primate who probably lived in East African grasslands about 3 – 4 million years ago. (K)
81. Name the first human-like hominid to evolve who had a brain capacity of 650 – 800 cc. (K)
82. Write the scientific name of man-like primate that lived about 1.5 million years ago which had a large brain with cranial capacity of 900 cc. and which probably ate meat. (K)
83. When did modern *Homo sapiens* arise? (K)
84. When did agriculture came and human settlements started? (K)

TWO MARK QUESTIONS:

1. Name any two theories that explain the origin of life. (K)
2. How could the experiment of Louis Pasteur dismiss theory of spontaneous generation of life. (A)
3. Mention two assumptions of Oparin and Haldane with reference to Origin of life. (K)
4. How does Miller's experiment supports the theory of chemical evolution? (A)
5. Name the naturalist who also came to similar conclusions on evolution as Darwin and where did he work? (K)
6. List any four areas which provide evidences for evolution. (K)
7. What is divergent evolution? Give an example. (K)
8. What is divergent evolution? Mention an example in plants. (K)
9. What is divergent evolution? Mention an example in animals. (K)
10. Explain with the help of an example the type of evolution which is based on homology. (U)
11. State the evolutionary relationship giving reasons between the thorn of *Bougainvillea* and tendril of *Cucurbita*. (A)
12. Give two examples for homologous organs. (K)
13. What are homologous organs? Mention an example. (K)
14. What are homologous organs? Mention an example from plants. (K)
15. What are homologous organs? Mention an example from animals. (K)
16. Comment on the similarity between the thorn of *Bougainvillea* and tendril of C*ucurbita* with reference to evolution. (U)
17. Analyze the evolutionary relationship between forelimbs of whales and human. (A)
18. Mention the type of evolution that has resulted in the development of flippers of penguins and dolphins. What are such structures called? (U)
19. (a) Select the homologous structures from the combinations given below: (U)
    (i) Tuber of potato and sweet potato
    (ii) Eyes of octopus and mammals
    (iii) Forelimbs of whales and bats
    (iv) Thorns of *Bougainvillea* and tendrils of *Cucurbita*
    (b) State the kind of evolution they represent. (U)
20. What is convergent evolution? Give an example. (K)
21. What is convergent evolution? Give an example in plants. (K)
22. What is convergent evolution? Give an example in animals. (K)
23. Explain with the help of an example the type of evolution which is based on analogy. (U)
24. State the evolutionary relationship giving reasons between sweet potato and potato. (A)
25. Give two examples for analogous organs. (K)

26. What are analogous organs? Give an example. (K)
27. What are analogous organs? Give an example from plants. (K)
28. What are analogous organs? Give an example from animals. (K)
29. What type of organs the eye of an octopus and that of a human are called? Name the evolutionary process they represent. (U)
30. Is the eye of octopus analogous or homologous to the eye of humans? Give reasons to support your answer. (A)
31. Is sweet potato analogous or homologous to potato tuber? Give reasons to support your answer. (A)
32. Differentiate divergent evolution from convergent evolution. (U)
33. Differentiate homologous organs and analogous organs. (U)
34. What is adaptive radiation? List two examples for adaptive radiation. (K)
35. Mention an example where more than one adaptive radiation have occurred in an isolated geographical area. Name the type of evolution involved in it. (U)
36. Mention two examples of evolution by anthropogenic action. (K)
37. Mention the two key concepts of Darwinian theory of evolution. (K)
38. How does 'fitness' of individuals help in evolution according to Darwin? (A)
39. List any four factors that affect Hardy-Weinberg's equilibrium. (K)
40. List any four factors that affect genetic equilibrium. (K)
41. Giving two reasons, explain how Hardy-Weinberg equilibrium is affected ? (U)
42. What is natural selection ? Mention the three ways through which natural selection operates. (K)
43. Mention the evolutionary significance of the following organisms: (a) Shrews (b) Lobefins (K)
44. Write the names of any two extinct dinosaurs. (K)
45. List any two characteristic features of *Tyranosaurus rex.* (K)
46. Name the fish like reptile and the largest dinosaur that appeared on earth during the course of evolution.
47. About 65 million years ago, the dinosaurs suddenly disappeared from the earth. What could be the reasons. (U)
48. Name the primates that lived 15 million years ago. Mention any two of their characteristics. (K)
49. Mention two features of Ramapithecus.
50. List two characteristic features of Australopithecines. (K)
51. Mention two features of Neanderthal man.
52. Mention any two characteristic features of *Homo erectus*. (K)
53. Write the probable differences in eating habits of *Homo habilis* and *Homo errectus.*(K)

THREE MARK QUESTIONS:

1. Explain Big Bang theory of origin of universe. (K)
2. What were the conditions on primitive earth before the origin of life according to the theory of chemical evolution of life? (K)
3. Draw a labelled diagram of Miller's experimental set-up.
4. (i) What were the different gases did the flask used as an experimental setup by S.L.Miller contained? (K)
   (ii) What conditions of primitive earth was recreated in the flask? (K)
   (iii) Write the conclusion drawn from this experiment. (K)
5. How paleontological evidences have helped in understanding the evolution of life forms? (U)

6. After industrialization in England, it was observed that white winged moth did not survive.
   (i) What is the cause? (K)
   (ii) What was the change and why it had happened? (K)
   (iii) Which organism is known as natural indicator to air pollution? (K)
7. Differentiate homologous and analogous organs with an example for each. (U)
8. Differentiate convergent evolution and divergent evolution with an example for each. (U)
9. "Australian marsupials and Australian placental mammals explain convergent evolution and adaptive radiation". Justify the statement. (A)
10. (i) Mention the evolutionary process that has resulted in evolution of placental wolf and Tasmanian wolf. (K)
    (ii) Explain the evolutionary process by which Tasmanian wolf evolved. (U)
    (iii) Compare placental wolf and Tasmanian wolf. (U)
11. Explain Lamarck's theory of evolution of life forms. (U)
12. How is Darwin's concept of evolution different from that of Hugo de Vries concept of mutation? (A)
13. Explain Hardy-Weinberg principle with the help of equation. (A)
14. State Hardy – Weinberg law. List four evolutionary factors which disturb genetic equilibrium. (K)
15. State Hardy – Weinberg law. Explain two evolutionary factors which disturb Hardy – Weinberg equilibrium. (U)
16. Explain briefly three factors that affect Hardy – Weinberg or genetic equilibrium. (U)
17. Define the terms gene pool, gene flow and genetic drift. (K)
18. Define the terms saltation, gene pool and gene flow. (K)
19. Define the terms saltation, gene pool and genetic drift. (K)
20. Describe three different ways by which natural selection can affect the frequency of a heritable trait in a population. (K)
21. List three characteristic features of Dryopithecus. (K)
22. Mention any three features of *Homo habilis*. (K)
23. Mention three characteristics of Neanderthal man who lived in near east and Central Asia? (K)
24. Write the brain capacities of the following pre-historic human: (K)
    (i) *Homo habilis* (ii) *Homo erectus* (iii) *Neanderthal man.*
25. List the period, brain capacity and probable food of *Homo erectus* stage of human evolution. (K)
26. List the period, brain capacity and probable food of *Homo erectus* stage of human evolution.
27. List the period, brain capacity and one feature of Neanderthal man of human evolution.
28. Name the different stages of human evolution in sequential order. (K)
29. Arrange the following ancestral forms of man in the order of their evolution:
    (a) *Homo habilis* (b) *Homo erectus* (c) Neanderthal man (d) Dryopithecus (e) Ramapithecus (f) Australopithecines (K)

FIVE MARK QUESTIONS:

1. Explain Miller's experiment with the help of a neat labeled diagram. Write the conclusion that can be drawn from the experiment. (S)
2. Explain evolution by natural selection by taking an example of white-winged moths and dark-winged moths of England in pre and post-indutrialization period. (U)
3. How does comparative anatomy and morphology act as an evidence for evolution? Explain with the help of suitable examples. (U)

4. Identify the following pairs as homologous or analogous. (K)
    (a) Bones of forelimbs of whales and bats
    (b) Eyes of octopus and of mammals
    (c) Thorn of *Bougainvillea* and tendril of *Cucurbita*
    (d) Sweet potato and potato
    (e) Wings of butterfly and birds.
5. According the Darwinian theory, the rate of appearance of new forms is linked to their life cycles. Explain. (U)
6. Explain Darwin's view about evolution. (U)

Chapter 8
HUMAN HEALTH AND DISEASE

ONE MARK QUESTIONS:

1. Define health. (K)
2. What are pathogens? (K)
3. What are infectious diseases? (K)
4. Mention an example for infectious disease. (K)
5. What are non-infectious diseases? (K)
6. Write the scientific name of the pathogen that causes typhoid. (K)
7. Name a disease you have studied with symptoms like sustained high fever, stomach pain, constipation, loss of appetite. (K)
8. Write the scientific name of the pathogen which causes sustained high fever, stomach pain, constipation, loss of appetite. (K)
9. Mention the mode of transmission of *Salmonella typhi*. (K)
10. Name the disease diagnosed by Widal test. (K)
11. Name the test which confirms typhoid. (K)
12. Name the test which confirms infection by *Salmonella typhi*. (K)
13. Write the scientific name of the pathogen that causes malaria. (K)
14. Name the diasease caused by *Plasmodium vivax* in man. (K)
15. Name a disease you have studied with symptoms like chill and high fever recurring every three to four days.(K)
16. Write the scientific name of the pathogen which causes chill and high fever recurring every three to four days. (K)
17. Name the infectious forms of *Plasmodium* which enter human body through mosquito bite. (K)
18. Name the sexual stages of *Plasmodium* that are developed in human RBCs. (K)
19. Name the toxin released by the ruptured RBCs which causes chill and high fever recurring every three to four days in malaria. (K)
20. In which cells of human body, *Plasmodium* reproduces only by asexual method? (K)
21. In which cells of human body, *Plasmodium* reproduces both by asexual and sexual methods? (K)
22. Name the fish which is used to control the population of mosquito larvae. (K)
23. Mention the scientific name of the vector which transmits malaria. (K)
24. Mention any one vector-borne disease in man. (K)
25. Write the scientific name of the vector which transmits chikungunya. (K)
26. Write the scientific name of the vector which transmits dengue. (K)
27. Write the scientific name of the pathogen that causes pneumonia. (K)
28. Name the disease caused by *Haemophilus influenzae* in man. (K)
29. Name a disease you have studied with symptoms like fever, chill, headache, cough and bluish colour of finger nails and lips. (K)
30. Write the scientific name of the pathogen which causes fever, chill, headache, cough and bluish colour of finger nails and lips. (K)
31. Write the scientific name of the pathogen that causes common cold. (K)
32. Name the disease caused by rhinoviruses in man. (K)

33. Name the disease you have studied with symptoms like nasal congestion and discharge, sore throat, hoarsenes, cough and headache. (K)
34. Write the scientific name of the pathogen which causes nasal congestion and discharge, sore throat, hoarsenes, cough and headache. (K)
35. Write the scientific name of the pathogen that causes amoebiasis. (K)
36. Name the disease caused by *Entamoeba histolytica* in man. (K)
37. Name a disease you have studied with symptoms like stools with excess mucous and blood clots, abdominal pain and cramps and constipation. (K)
38. Write the scientific name of the pathogen which causes abdominal pain and cramps, stools with excess mucous and blood clots and constipation. (K)
39. Write the scientific name of the pathogen that causes ascariasis. (K)
40. Name a disease you have studied with symptoms like blockage of intestine, internal haemorrhage and anemia. (K)
41. Write the scientific name of the intestinal parasite which causes blockage of intestine, internal haemorrhage and anemia. (K)
42. Write the scientific name of the pathogen that causes filariasis. (K)
43. Name the disease caused by *Wuchereria bancrofti*. (K)
44. Name the disease caused by *Wuchereria malayi*. (K)
45. Name the disease you have studied with symptoms like inflammation of the lower limbs and deformities in the genital organs. (K)
46. Mention the pathogen which causes inflammation of the lower limbs and deformities in the genital organs. (K)
47. Write the scientific name of the pathogen that causes ringworm disease. (K)
48. Name the disease caused by *Epidermophyton* in man. (K)
49. Name the disease caused by *Microsporum* in man.
50. Name the disease caused by *Trichophyton* in man.
51. Name a disease you have studied with symptoms like dry, scaly lesions on various parts of the body accompanied by itching. (K)
52. Write the scientific name of the pathogen which causes dry, scaly lesions on various parts of the body accompanied by itching. (K)
53. Define immunity. (K)
54. Define innate immunity. (K)
55. Mention one physical barrier that provides immunity to our body. (K)
56. How does skin provide immunity to the body? (U)
57. How does mucus membrane provide immunity to the body? (U)
58. Mention one physiological barrier that provides immunity to our body. (K)
59. How do physiological barriers provide immunity to the body? (U)
60. Mention one cellular barrier that provides immunity to our body. (K)
61. How do natural killer cells and macrophages provide immunity to the body? (U)
62. Mention one cytokine barrier that provides immunity to our body. (K)
63. What are interferons?(K)
64. How do interferons provide immunity to the body? (U)
65. Name the protein produced by the virus-infected human cells which prevent further multiplication of viruses. (K)
66. What is primary immune response? (K)

67. What is secondary immune response? (K)
68. What do you mean by anamnestic response of the immune system? (U)
69. Why secondary response of the immune system to a pathogen is highly intensified and fast? (A)
70. Name the type of immunity given by antibody producing B- lymphocytes. (K)
71. Define an antibody. (K)
72. How many polypeptide chains are present in an antibody molecule? (K)
73. What is the function of T-lymphocyte? (K)
74. Name the type of immunity given by T- lymphocytes. (K)
75. Name the type of immunity which is responsible for the graft rejection. (K)
76. What is responsible for 'graft rejection' in some of the organ transplantation surgeries? (U)
77. Define active immunity. (K)
78. Mention an example for active immunity. (K)
79. Define passive immunity. (K)
80. Mention an example for passive immunity. (K)
81. What is colostrums? (K)
82. Mention the chief type of antibody present colustrum of human female. (K)
83. Which property of immune system is the principle of immunization or vaccination? (U)
84. Define vaccination. (K)
85. Define passive immunization. (K)
86. Mention the type of immunity provided by preformed antibodies when administered against snake bite. (K)
87. Name the fungus which is used to produces hepatitis B vaccine. (K)
88. What is allergy? (K)
89. What are alleregens (K)
90. Name the immunoglobulin that is released during allergy. (K)
91. Name a chemical produced by the mast cells which causes allergy. (K)
92. Mention a drug that is used to quickly reduce the symptoms of allergy. (K)
93. Define autoimmunity. (K)
94. Give an example for autoimmune disorder. (K)
95. What are lymphoid organs? (K)
96. What are primary lymphoid organs? (K)
97. What are secondary lymphoid organs? (K)
98. Mention an example for primary lymphoid organ. (K)
99. Mention an example for a secondary lymphoid organ. (K)
100. Why bone marrow and thymus considered as primary lymphoid organs? (A)
101. Why spleen, Peyer's patches of small intestine and appendix are considered as secondary lymphoid organs? (A)
102. Name the site of lymphocyte production. (K)
103. Name the organ in human body which acts as 'blood filterer'. (K)
104. Why spleen can be regarded as the 'blood filterer' of human body? (A)
105. Expand AIDS. (K)
106. Expand HIV. (K)
107. Expand ELISA. (K)
108. What is syndrome? (K)
109. Name the group of viruses to which HIV belongs. (K)

110. Name the causative virus for AIDS. (K)
111. Mention one mode of transmission of HIV. (K)
112. Name the process by which the genome of HIV replicates in the host cell. (K)
113. Name the enzyme by which the HIV genome replicates in the host cell. (K)
114. Why a person suffering from AIDS is at a risk of suffering from infections by different kinds of pathogens? (A)
115. How is HIV in AIDS patients responsible for decreased immunity to various pathogens? (U)
116. Which is the widely used diagnostic test for AIDS? (K)
117. What are tumors? (K)
118. What are benign tumors? (K)
119. What are malignant tumors? (K)
120. Define metastasis. (K)
121. What is contact inhibition? (K)
122. Why normal cells do not exhibit uncontrolled growth and division unlike cancer cells? (A)
123. What are proto-oncogenes? (K)
124. What are oncogenic viruses? (K)
125. What are carcinogens? (K)
126. How do UV rays cause neoplastic transformation?(U)
127. Mention one diagnostic tool which is used to detect cancer. (K)
128. Name the biological response modifier used in the treatment of cancer. (K)
129. How does the administration of α-interferons help cancer patients? (U)
130. Why the immune system should be activated in cancer patients by administering biological response modifiers? (A)
131. What is adolescence? (K)
132. Write the scientific name of the plant from which cannabinoids are obtained. (K)
133. Write the scientific name of the plant from which coca alkaloids are obtained. (K)
134. Mention the chemical present in heroin. (K)
135. Which drug is commonly called ‘smack’? (K)
136. Which drug is commonly called ‘coke’? (K)
137. Which drug is commonly called ‘crack’? (K)
138. Give an example for a plant with hallucinogenic properties. (K)
139. Name a drug which is used as an effective sedative and painkiller in patients who have undergone surgery. (K)
140. Why morphine is often used in patients who have undergone surgery? (A)
141. How is nicotine responsible for raised blood pressure and increased heart rate in man? (U)
142. How does smoking cause oxygen deficiency in the body? (U)
143. Define addiction. (K)
144. With reference to drugs, define dependence. (K)
145. Why persons taking drugs intravenously are more likely to acquire infections like AIDS and hepatitis B? (A)
146. How some narcotic drugs and anabolic steroids enhance the performance of sports persons? (U)

TWO MARKS QUESTIONS:

1. What are infectious diseases? Mention an example. (K)
2. What are non-infectious diseases? Mention an example. (K)

3. Differentiate infectious diseases from non-infectious diseases. (U)
4. Mention any four means by which good health can be achieved. (K)
5. Write the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Malaria
6. Write the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Amoebiasis
7. Write the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Pneumonia
8. Write the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Common cold
9. Write the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Ascariasis
10. Write the scientific names of the pathogens which cause: (K)
    (a) Typhoid (b) Fialariasis
11. Write the scientific names of the pathogens which cause: (K)
    (a) Typhoid (b) Ringworm disease
12. Write the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Amoebiasis
13. Write the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Pneumonia
14. Write the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Common cold
15. Write the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Ascariasis
16. Write the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Filariasis
17. Write the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Ringworm disease
18. Write the scientific names of the pathogens which cause: (K)
    (a) Amoebiais (b) Pneumonia
19. Write the scientific names of the pathogens which cause: (K)
    (a) Amoebiais (b) Common cold
20. Write the scientific names of the pathogens which cause: (K)
    (a) Amoebiais (b) Ascariasis
21. Write the scientific names of the pathogens which cause☹K)
    (a) Amoebiais (b) Filariasis
22. Write the scientific names of the pathogens which cause: (K)
    (a) Amoebiais (b) Ringworm disease
23. Write the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Common cold
24. Write the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Ascariasis
25. Write the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Filariasis
26. Write the scientific names of the pathogens which cause: (K)

(a) Pneumonia (b) Ringworm disease

27. Write the scientific names of the pathogens which cause: (K)
    (a) Common cold (b) Ascariasis
28. Write the scientific names of the pathogens which cause: (K)
    (a) Common cold (b) Filariasis
29. Write the scientific names of the pathogens which cause: (K)
    (a) Common cold (b) Ringworm disease
30. Write the scientific names of the pathogens which cause: (K)
    (a) Ascariasis (b) Filariasis
31. Write the scientific names of the pathogens which cause: (K)
    (a) Ascariasis (b) Ringworm disease
32. Write the scientific names of the pathogens which cause: (K)
    (a) Filariasis (b) Ringworm disease
33. Write the scientific name of the pathogen that causes typhoid and mention its mode of transmission. (K)
34. Write the scientific name of the pathogen that causes malaria and mention its mode of transmission. (K)
35. Write the scientific name of the pathogen that causes pneumonia and mention its mode of transmission. (K)
36. Write the scientific name of the pathogen that causes common cold and mention its mode of transmission. (K)
37. Write the scientific name of the pathogen that causes amoebiasis and mention its mode of transmission. (K)
38. Write the scientific name of the pathogen that causes ascariasis and mention its mode of transmission. (K)
39. Write the scientific name of the pathogen that causes filariasis and mention its mode of transmission. (K)
40. Write the scientific name of the pathogen that causes ringworm disease and mention its mode of transmission. (K)
41. With regard to malaria, write the scientific name of the causative agent and two symptoms. (K)
42. With reference to pneumonia, write the scientific name of the causative agent and two symptoms.(K)
43. With regard to typhoid, write the scientific name of the causative agent and two symptoms. (K)
44. With reference to common cold, write the scientific name of the causative agent and two symptoms. (K)
45. With regard to ascariasis, write the scientific name of the causative agent and two symptoms. (K)
46. With reference to ringworm disease, write the scientific name of the causative pathogen and two symptoms. (K)
47. With reference to amoebiasis, write the scientific name of the causative pathogen and two symptoms. (K)
48. Name a disease you have studied with symptoms like blockage of intestine, internal haemorrhage and anemia. Mention the scientific name of the causative agent of this disease. (K)
49. Name a disease you have studied with symptoms like sustained high fever, stomach pain, constipation and loss of appetite. Mention the scientific name of the causative pathogen of this disease. (K)

50. Name a disease you have studied with symptoms like fever, chill, headache, cough and bluish colour of finger nails and lips. Mention the scientific name of the causative pathogen of this disease. (K)
51. Name a disease you have studied with symptoms like nasal congestion and discharge, sore throat, hoarseness, cough and headache. Mention the scientific name of the causative pathogen of this disease. (K)
52. Name a disease you have studied with symptoms like chill and high fever recurring every three to four days. Mention the scientific name of the pathogen causing this disease. (K)
53. Name a disease you have studied with symptoms like stools with excess mucous and blood clots, abdominal pain and cramps and constipation. Mention the scientific name of the pathogen causing this disease. (K)
54. Name a disease you have studied characterized by slowly developing chronic inflammation of lymphatic vessels of the lower limbs and gross deformities of limbs. Mention the scientific name of the pathogen causing this disease. (K)
55. Name a disease you have studied with symptoms like dry, scaly lesions on various parts of the body accompanied by itching. Mention the scientific name of the causative pathogen of this disease. (K)
56. Write the scientific name of the pathogen which causes sustained high fever, stomach pain, constipation, loss of appetite. Mention the name of this disease. (K)
57. Write the scientific name of the pathogen which causes fever, chill, headache, cough and bluish colour of finger nails and lips. Mention the name of this disease. (K)
58. Write the scientific name of the pathogen which causes nasal congestion and discharge, sore throat, hoarseness, cough and headache. Mention the name of this disease. (K)
59. Write the scientific name of the pathogen which causes chill and high fever recurring every three to four days. Mention the name of this disease. (K)
60. Write the scientific name of the pathogen which causes abdominal pain and cramps, stools with excess mucous and blood clots and constipation. Mention the name of this disease. (K)
61. Write the scientific name of the pathogen which causes slowly developing chronic inflammation of lymphatic vessels of the lower limbs and gross deformities of limbs. Mention the name of this disease. (K)
62. Write the scientific name of the pathogen which causes dry, scaly lesions on various parts of the body accompanied by itching. Mention the name of this disease. (K)
63. Write the scientific name of the intestinal parasite which causes blockage of intestine, internal haemorrhage and anemia. Mention the name of this disease. (K)
64. Mention any two types of innate barriers of defence with an example each. (K)
65. Mention any two physiological barriers that provide non-specific type of defense to our body. (K)
66. Mention the roles of B and T lymphocytes. (K)
67. Draw a neat labeled diagram of an antibody molecule. (S)
68. List four secondary lymphoid organs of our body. (K)
69. Differentiate primary and secondary immune responses. (U)
70. Name the two of special types lymphocytes present in our blood which are responsible for primary and secondary responses. (K)
71. What are primary lymphoid organs? Mention two examples. (K)
72. What are secondary lymphoid organs? Mention two examples. (K)
73. Differentiate primary and secondary lymphoid organs. (U)

74. Define vaccine. Mention the principle on which vaccination or immunization is based. (K)
75. Differentiate between active immunity and passive immunity. (U)
76. What is colostrum? Name the antibody present in it. (K)
77. What is an allergy ? Name two chemicals released by the mast cells at the time of allergy. (K)
78. What is allergy? Name the antibody produced during allergic responses. (K)
79. What is allergy? List two symptoms of allergic reactions. (K)
80. What is auto-immune disease? Mention an example. (K)
81. Distinguish between benign and malignant tumors. (U)
82. The cells of malignant tumors are considered dangerous. Justify with two reasons. (A)
83. Mention any two characteristics of cancer cell. (K)
84. What are carcinogens? Mention any examples. (K)
85. Mention two modes of transmission of HIV in humans. (K)
86. Mention any four common warning signs of drug and alcohol abuse in youth. (K)
87. Name an opioid drug and its source plant (scientific name). How does it affect human body? (K)
88. Name the plant (scientific name) from which cocaine is obtained. What is the effect of cocaine in humans? (K)
89. Name the plant (scientific name) from which cannabinoid is obtained. What is the effect of cannabinoids in humans? (K)
90. Mention the names of any two drugs which are commonly abused and write the binomial name of the plants from which these drugs are extracted. (K)
91. Mention any four effects of smoking cigarettes. (K)
92. Differentiate addiction and dependence with reference to alcohol and drugs. (U)
93. What is 'dependence' with respect to drug abuse? Mention any two withdrawal symptoms. (K)
94. Mention any four withdrawal symptoms in drug addicts. (K)
95. Mention any four adverse effects of drug abuse. (K)
96. Mention four side effects of the use of anabolic steroids in males. (K)
97. Mention four side effects of the use of anabolic steroids in females. (K)
98. Explain any two prevention and control measures of drug and alcohol abuse. (K)

THREE MARK QUESTIONS:

1. Differentiate infectious diseases from non-infectious diseases with an example for each. (U)
2. With reference to typhoid, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)
3. With reference to pneumonia, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)
4. With reference to common cold, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)
5. With reference to amoebiasis, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)
6. With reference to malaria, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)
7. With reference to ascariasis, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)
8. With reference to filariasis, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)

9. With reference to ringworm disease, write the scientific name of the causative pathogen, mode of transmission and two symptoms. (K)
9. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Malaria (c) Amoebiasis
10. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Malaria (c) Pneumonia
11. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Malaria (c) Common cold
12. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Malaria (c) Ascariasis
13. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Malaria (c) Filariasis
14. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Malaria (c) Roundworm disease
15. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Amoebiasis (c) Pneumonia
16. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Amoebiasis (c) Common cold
17. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Amoebiasis (c) Ascariasis
18. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Amoebiasis (c) Filariasis
19. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Amoebiasis (c) Roundworm disease
20. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Pneumonia (c) Common cold
21. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Pneumonia (c) Ascariasis
22. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Pneumonia (c) Filariasis
23. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Pneumonia (c) Roundworm disease
24. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Common cold (c) Ascriasis
25. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Common cold (c) Filariasis
26. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Common cold (c) Roundworm disease
27. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Ascriasis (c) Filariasis
28. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Ascriasis (c) Roundworm disease
29. Mention the scientific names of the pathogens which cause: (K)
   (a) Typhoid (b) Filariasis (c) Roundworm disease
30. Mention the scientific names of the pathogens which cause: (K)

(a) Malaria (b) Amoebiasis (c) Pneumonia

31. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Amoebiasis (c) Common cold
32. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Amoebiasis (c) Ascariasis
33. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Amoebiasis (c) Filariasis
34. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Amoebiasis (c) Roundworm disease
35. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Pneumonia (c) Common cold
36. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Pneumonia (c) Ascariasis
37. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Pneumonia (c) Filariasis
38. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Pneumonia (c) Roundworm disease
39. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Common cold (c) Ascariasis
40. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Common cold (c) Filariasis
41. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Common cold (c) Roundworm disease
42. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Ascariasis (c) Filariasis
43. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Ascariasis (c) Roundworm disease
44. Mention the scientific names of the pathogens which cause: (K)
    (a) Malaria (b) Filarisis (c) Filariasis
45. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Pneumonia (c) Common cold
46. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Pneumonia (c) Ascariasis
47. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Pneumonia (c) Filariasis
48. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Pneumonia (c) Roundworm disease
49. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Common cold (c) Ascariasis
50. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Common cold (c) Filariasis
51. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Common cold (c) Roundworm disease
52. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Ascariasis (c) Filariasis

53. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Ascariasis (c) Roundworm disease
54. Mention the scientific names of the pathogens which cause: (K)
    (a) Amoebiasis (b) Filariasis (c) Roundworm disease
55. Mention the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Common cold (c) Ascariasis
56. Mention the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Common cold (c) Filariasis
57. Mention the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Common cold (c) Roundworm disease
58. Mention the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Ascariasis (c) Filariasis
59. Mention the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Ascariasis (c) Roundworm disease
60. Mention the scientific names of the pathogens which cause: (K)
    (a) Pneumonia (b) Filariasis (c) Roundworm disease
61. Mention the scientific names of the pathogens which cause: (K)
    (a) Common cold (b) Ascariasis (c) Filariasis
62. Mention the scientific names of the pathogens which cause: (K)
    (a) Common cold (b) Ascariasis (c) Roundworm disease
63. Mention the scientific names of the pathogens which cause: (K)
    (a) Common cold (b) Filariasis (c) Roundworm disease
64. Mention the scientific names of the pathogens which cause: (K)
    (a) Ascariasis (b) Filariasis (c) Roundworm disease
65. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Malaria (c) Amoebiasis
66. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Malaria (c) Pneumonia
67. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Malaria (c) Common cold
68. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Malaria (c) Ascariasis
69. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Malaria (c) Filariasis
70. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Malaria (c) Roundworm disease
71. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Amoebiasis (c) Pneumonia
72. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Amoebiasis (c) Common cold
73. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Amoebiasis (c) Ascariasis
74. Mention two symptoms each of the following diseases: (K)
    (a) Typhoid (b) Amoebiasis (c) Filariasis
75. Mention two symptoms each of the following diseases: (K)

(a) Typhoid (b) Amoebiasis (c) Roundworm disease

76. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Pneumonia (c) Common cold
77. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Pneumonia (c) Ascariasis
78. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Pneumonia (c) Filariasis
79. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Pneumonia (c) Roundworm disease
80. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Common cold (c) Ascriasis
81. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Common cold (c) Filariasis
82. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Common cold (c) Roundworm disease
83. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Ascriasis (c) Filariasis
84. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Ascriasis (c) Roundworm disease
85. Mention two symptoms each of the following diseases: (K)
(a) Typhoid (b) Filariasis (c) Roundworm disease
86. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Amoebiasis (c) Pneumonia
87. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Amoebiasis (c) Common cold
88. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Amoebiasis (c) Ascariasis
89. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Amoebiasis (c) Filariasis
90. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Amoebiasis (c) Roundworm disease
91. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Pneumonia (c) Common cold
92. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Pneumonia (c) Ascariasis
93. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Pneumonia (c) Filariasis
94. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Pneumonia (c) Roundworm disease
95. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Common cold (c) Ascariasis
96. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Common cold (c) Filariasis
97. Mention two symptoms each of the following diseases: (K)
(a) Malaria (b) Common cold (c) Roundworm disease

98. Mention two symptoms each of the following diseases: (K)
    (a) Malaria (b) Ascariasis (c) Filariasis
99. Mention two symptoms each of the following diseases: (K)
    (a) Malaria (b) Ascariasis (c) Roundworm disease
100. Mention two symptoms each of the following diseases: (K)
    (a) Malaria (b) Filarisis (c) Filariasis
101. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Pneumonia (c) Common cold
102. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Pneumonia (c) Ascariasis
103. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Pneumonia (c) Filariasis
104. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Pneumonia (c) Roundworm disease
105. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Common cold (c) Ascariasis
106. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Common cold (c) Filariasis
107. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Common cold (c) Roundworm disease
108. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Ascariasis (c) Filariasis
109. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Ascariasis (c) Roundworm disease
110. Mention two symptoms each of the following diseases: (K)
    (a) Amoebiasis (b) Filariasis (c) Roundworm disease
111. Mention two symptoms each of the following diseases: (K)
    (a) Pneumonia (b) Common cold (c) Ascariasis
112. Mention two symptoms each of the following diseases: (K)
    (a) Pneumonia (b) Common cold (c) Filariasis
113. Mention two symptoms each of the following diseases: (K)
    (a) Pneumonia (b) Common cold (c) Roundworm disease
114. Mention two symptoms each of the following diseases: (K)
    (a) Pneumonia (b) Ascariasis (c) Filariasis
115. Mention two symptoms each of the following diseases: (K)
    (a) Pneumonia (b) Ascariasis (c) Roundworm disease
116. Mention two symptoms each of the following diseases: (K)
    (a) Pneumonia (b) Filariasis (c) Roundworm disease
117. Mention two symptoms each of the following diseases: (K)
    (a) Common cold (b) Ascariasis (c) Filariasis
118. Mention two symptoms each of the following diseases: (K)
    (a) Common cold (b) Ascariasis (c) Roundworm disease
119. Mention two symptoms each of the following diseases: (K)
    (a) Common cold (b) Filariasis (c) Roundworm disease
120. Mention two symptoms each of the following diseases: (K)

(a) Ascariasis (b) Filariasis (c) Roundworm disease

121. Mention three types of innate barriers of defence with an example each. (K)
122. Define immunity. Explain how skin and mucous membrane help in providing immunity as physical barriers? (U)
123. Differentiate active immunity and passive immunity with an example for each. (U)
124. Differentiate primary and secondary lymphoid organs with two examples for each. (U)
125. What is allergy? List the symptoms of allergic reactions. (K)
126. Mention any three characteristics of cancer cell. (K)
127. What are carcinogens? Mention any two groups of carcinogens with an example for each. (K)
128. Mention the names of three drugs which are commonly abused and write the binomial name of the plants from which these drugs are extracted. (K)
129. Briefly explain any three prevention and control measures of drug and alcohol abuse. (U)

FIVE MARK QUESTIONS:

1. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Typhoid (b) Pneumonia (c) Common cold (d) Malaria (e) Amoebiasis
2. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Typhoid (b) Pneumonia (c) Common cold (d) Malaria (e) Ascariasis
3. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Typhoid (b) Pneumonia (c) Common cold (d) Malaria (e) Filariasis
4. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Typhoid (b) Pneumonia (c) Common cold (d) Malaria (e) Ringworm disease
5. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Pneumonia (b) Common cold (c) Malaria (d) Amoebiasis (e) Ascariasis
6. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Pneumonia (b) Common cold (c) Malaria (d) Amoebiasis (e) Filariasis
7. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Pneumonia (b) Common cold (c) Malaria (d) Amoebiasis (e) Ringworm disease
8. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Common cold (b) Malaria (c) Amoebiasis (d) Ascariasis (e) Filariasis
9. Mention the scientific name of the causative agent and two symptoms of the following: (K)
   (a) Common cold (b) Malaria (c) Amoebiasis (d) Ascariasis (e) Ringworm disease
10. What is innate immunity? Briefly discuss any four innate immunity barriers. (U)
11. What are lymphoid organs? Mention the types with their functions and examples. (K)
12. List different lymphoid organs and tissues and explain their role in immunity. (U)
13. Define immunity. Explain active immunity and passive immunity with examples. (U)
14. Explain the life cycle of HIV in human body. (U)
15. Write the schematic representation of the life cycle of HIV. (S)
16. Explain different techniques which help in cancer detection and diagnosis. (U)
17. What is addiction? List four warning signals and four harmful effects caused by drug abuse. (K)
18. Explain prevention and control measures of alcohol and drug abuse. (K)

Chapter 9
STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION

ONE MARK QUESTIONS:

1. What is animal husbandry? (K)
2. What is dairying? (K)
3. What is dairy farm management? (K)
4. Name an improved breed of cow. (K)
5. What is poultry? (K)
6. Name an improved breed of poultry bird. (K)
7. What is a breed? (K)
8. What is the aim of animal breeding? (K)
9. What is inbreeding? (K)
10. Mention the strategy that is used to develop purelines in cattle? (K)
11. Mention the strategy that is used to increase homozygosity in cattle for desired character. (K)
12. Name the kind of breeding which exposes harmful recessive genes? (K)
13. How harmful recessive genes are eliminated in inbreeding? (U)
14. What is inbreeding depression? (K)
15. How is inbreeding depression overcome? (A)
16. What is out breeding? (K)
17. What is out-crossing? (K)
18. What is cross-breeding? (K)
19. What is interspecific hybridization? (K)
20. Name a breed of sheep developed in Punjab by crossing Bikaneri ewes and Marino ram. (K)
21. How was *Hisardale* breed developed by cross breeding technique? (U)
22. Give an example for an interspecific hybrid animal. (K)
23. What is artificial insemination? (K)
24. Why cow is administered hormones in MOET? (A)
25. What do you mean by super ovulation? (K)
26. At which stage the fertilized eggs are recovered and transferred to surrogate mother in MOET technique? (U)
27. Name the technology that can successfully increase the herd size of cattle in a short time. (K)
28. Define bee keeping or Apiculture. (K)
29. Name the most common species reared in India for bee keeing. K
30. List any one economically important products for human obtained from *Apis indica*. U
31. What is fishery? (K)
32. Name a common edible marine fish. (K)
33. Name a common edible fresh water fish. (K)
34. What is plant breeding? (K)
35. What is germplasm collection? (K)
36. Expand IRRI. (K)
37. Name the Nobel Laureate who developed semi dwarf variety of wheat. (K)

38. Name any one disease resistant and high yielding variety of wheat introduced in India. (K)
39. Write the scientific name of south Indian sugarcane. (K)
40. Write the scientific name of north Indian sugarcane. (K)
41. How is north Indian sugarcane inferior to south Indian sugarcane? (U)
42. Give an example for viral pathogen of cultivated crops. (K)
43. Give an example for fungal disease of crop plants. (K)
44. Give an example for bacterial disease of cultivated crops. (K)
45. Name the wheat variety that is resistant to hill bunt. (K)
46. Name the Brassica variety that is resistant to white rust. (K)
47. Name the cauliflower variety that is resistant to black rot. (K)
48. Name the cowpea variety that is resistant to bacterial blight. (K)
49. Name the chilli variety that is resistant to C*hilly mosaic virus*. (K)
50. Name the disease for which *Pusa Swarnim* (Karan rai) variety of *Brassica* is resistant. (K)
51. Name the disease for which *Pusa Shubra* variety of cauliflower is resistant. (K)
52. Name the disease for which *Pusa Komal* variety of cowpea is resistant. (K)
53. Name the disease for which *Sada Bahar* variety of chilli is resistant. (K)
54. Name the diseases for which *Himgiri* variey of wheat is resistant. (K)
55. What is mutation breeding? (K)
56. Name the pathogen to which *Parbhani Kranti* is resistant. (K)
57. Name the variety of bhindi or lady's finger (*Abelmoschus esculentus*) that was obtained by mutation breeding. (K)
58. Name the insect pest for which *Pusa gaurav* variety of *Brassica* crop is resistant. (K)
59. Name the insect pest for which *Pusa sem* 2 variety of flat bean crop is resistant. (K)
60. Name the insect pest for which *Pusa sawani* variety of bhindi crop is resistant. (K)
61. Name the improved variety of *Brassica* which is resistant to aphids. (K)
62. Name the improved variety of flat bean which is resistant to jassids, aphids and fruit borers. (K)
63. Name the improved variety of bhindi which is resistant to fruit and shoot borer. (K)
64. Define hidden hunger. (K)
65. Define biofortification. (K)
66. What are single cell proteins? (K)
67. Give an example for an organism that is used to obtain single cell proteins. (K)
68. Name an alternative source of protein for animal and human nutrition. (K)
69. Name the microorganism having high rate of biomass production and growth which is used for the production of single cell proteins. (K)
70. Why *Methylophilus methylotrophus* is a preferred microorganism in the production of single cell proteins? (A)
71. What is tissue culture? (K)
72. Define the term totipotency. (K)
73. Why are plant cells considered as totipotent? (A)
74. A part of the internode of a plant can give rise to thousands of plants through tissue culture. Which property of plant is responsible for this? (A)
75. Define the term explant. (K)
76. Sucrose is necessary in the plant tissue culture nutrient medium. Give reason. (A)
77. Mention a growth regulator used in tissue culture nutrient medium. (K)
78. What is micropropagation? (K)

79. Name the technique employed to get large number of plants in a short period. (K)
80. Define the term somaclones. (K)
81. Why plants obtained through micropropagation are termed as somaclones? (A)
82. How are virus-free plants obtained by tissue culture technique? (A)
83. Plants raised by tissue culture using meristem as explants are virus-free. Why? (A)
84. What are somatic hybrids? (K)
85. What is somatic hybridization? (K)
86. A protoplast of tomato plant is fused with that of potato to form a new hybrid plant. Name the hybridization technique involved here.

TWO MARK QUESTIONS:

1. Name any two poultry birds which are used for food and eggs. (K)
2. Write any two advantages of inbreeding. (U)
3. What is inbreeding? Mention the drawback of inbreeding? (K)
4. Write the reason for inbreeding depression. How can it be overcome? (U)
5. What happens if there is continuous inbreeding in animals? Discuss the strategy to overcome the problem associated with continuous inbreeding. (U)
6. Write the difference between inbreeding and outbreeding. (U)
7. Differentiate between outcrossing and crossbreeding. (U)
8. What is interspecific hybridization? Give suitable example. (K)
9. Name two major controlled breeding techniques employed in animal breeding. (K)
10. Name the breeds used to develop a new breed of sheep called *Hisardale*. (K)
11. Why bee hives are kept in a crop field during flowering period? A
12. Give any two examples for edible fresh water fishes. (K)
13. Give any two examples for edible marine water fishes. (K)
14. List any two edible aquatic animals other than fishes. (K)
15. Name the two culture techniques which can increase production of both marine and fresh water plants and animal. (K)
16. Write any four traits for which plant breeding is done. (K)
17. Mention the drawbacks of cross hybridization among selected parents in plant breeding? (K)
18. Name two high yielding wheat varieties which were introduced in India in 1963. (K)
19. Which are the two rice varieties that were used to produce semi dwarf rice variety in 1966 in our country? (K)
20. Name two high yielding semi dwarf rice varieties developed in India. (K)
21. Why *Sonalika* and *Kalyan* varieties are superior to the traditional varieties of wheat? (A)
22. Why is the south Indian sugarcane, *Saccharum officinarum*, preferred by agriculturists? (A)
23. Name two species of sugar cane of India which were hybridized to get a better variety. (K)
24. What do you mean by resistance of host plant to diseases? (K)
25. Name any two fungal diseases in plants. (K)
26. Name any two viral diseases in plants. (K)
27. How are disease resistant varieties advantageous over traditional varieties of crop plants in plant breeding? (A)
28. Name any two diseases for which *Himgiri* variety of wheat is resistant. (K)
29. What are the effects of diet which lacks essential micronutrients? (K)
30. Mention any two objectives of biofortification. (K)

31. How biofortified maize and wheat are considered as nutritionally improved? (A)
32. Name any two microorganisms which are used for the production of single cell proteins. (K)
33. Write the ingredients that are used in the tissue culture nutrient medium. (U)
34. Name two growth regulators used in plant tissue culture nutrient medium. (K)
35. With reference to tissue culture, define the terms totipotency and explant. (K)
36. With reference to tissue culture, define the terms totipotency and micropropagation. (K)
37. With reference to tissue culture, define the terms totipotency and somaclones. (K)
38. With reference to tissue culture, define the terms totipotency and meristem culture. (K)
39. With reference to tissue culture, define the terms totipotency and somatic hybrid. (K)
40. With reference to tissue culture, define the terms totipotency and somatic hybridisation. (K)
41. With reference to tissue culture, define the terms explant and micropropagation. (K)
42. With reference to tissue culture, define the terms explant and somaclones. (K)
43. With reference to tissue culture, define the terms explant and meristem culture. (K)
44. With reference to tissue culture, define the terms explant and somatic hybrid. (K)
45. With reference to tissue culture, define the terms explant and somatic hybridisation. (K)
46. With reference to tissue culture, define the terms micropropagation and somaclones. (K)
47. With reference to tissue culture, define the terms micropropagation and meristem culture. (K)
48. With reference to tissue culture, define the terms micropropagation and somatic hybrid. (K)
49. With reference to tissue culture, define the terms micropropagation and somatic hybridisation. (K)
50. With reference to tissue culture, define the terms somaclones and meristem culture. (K)
51. With reference to tissue culture, define the terms somaclones and somatic hybridisation. (K)
52. With reference to tissue culture, define the terms meristem culture and somatic hybrid. (K)
53. With reference to tissue culture, define the terms meristem culture and somatic hybridisation. (K)
54. Differentiate between somaclones and somatic hybrids. (U)

THREE MARK QUESTIONS:

1. Mention the measures to be taken to realize the yield potential in cattle in a dairy farm. (K)
2. What is inbreeding? Describe the breeding strategy employed in inbreeding. (U)
3. What is inbreeding? Write any two advantages of inbreeding. (K)
4. Differentiate out-crossing, cross breeding and interspecific hybridization. (U)
5. Differentiate inbreeding, outbreeding and cross breeding. (U)
6. Explain cross breeding with an example. (U)
7. Explain the steps involved in MOET. (U)
8. List the characteristics of *Saccharum officinarum* and *Saccharum barberi*. What are the combined desirable characters obtained by hybridizing these two varieties? (U)
9. List the diseases caused by fungi in cultivated crops. (K)
10. Write the disease resistant crop varieties for the following diseases. (K)
    (a) White rust (b) Black rot (c) Hill bunt
11. Write the resistant crop varieties for the following insect pests: (K)
    (a) Aphids (b) Jassids (c) Shoot borer
12. List three examples for morphological, biochemical or physiological characters which give natural insect or pest resistance in host crop plants. (K)
13. What is biofortification? List two examples for biofortified crop plants and their importance. (U)

14. Write any three objectives of plant breeding for improved nutritional qualities. (U)
15. Give any three examples for biofortified plants with their significance. (K)
16. Mention any three biofortified vegetable yielding plants with their significance. (K)
17. Write three applications of plant tissue culture. (U)
18. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Totipotency (c) Micropropagation
19. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Totipotency (c) Somaclones
20. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Totipotency (c) Somatic hybrid
21. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Totipotency (c) Meristem culture
22. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Totipotency (c) Somatic hybridization
23. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Micropropagation (c) Somatic hybrid
24. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Micropropagation (c) Somaclone
25. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Micropropagation (c) Somatic hybrid
26. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Micropropagation (c) Meristem culture
27. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Micropropagation (c) Somatic hybridisation
28. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Somaclones (c) Soamatic hybrid
29. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Somaclones (c) Meristem culture
30. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Somaclones (c) Soamatic hybridisation
31. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Soamatic hybrid (c) Meristem culture
32. With reference to tissue culture, explain the following: (K)
    (a) Explant (b) Soamatic hybrid (c) Somatic hybridization

FIVE MARK QUESTIONS:

1. List out any five aspects of dairy farm management. (K)
2. Define poultry. List out any four components of poultry farm management. (K)
3. (a) What is artificial insemination? What is its advantage in animal breeding? 2M (U) (b) Discuss the MOET technique of animal breeding. 3M (U)
4. Write five requirements for successful Bee keeping. K
5. What is bee-keeping? Write any four points to be followed for successful bee-keeping. (K)
6. What is artificial insemination? What is its significance? Explain a controlled breeding technique in which artificial insemination is employed. (U)
7. Describe the steps involved in breeding a new variety of genetic crop. (U)

8. What is biofortification? Mention its objectives. Mention two examples for biofortified crops with their importance. (U)
9. With reference to tissue culture, explain the following: (U)
   (a) Explant (b) Totipotency (c) Somaclones (d) Somatic hybrids (e) Micropropagation.
10. List three objectives of biofortification. Why are biofortified maize and wheat varieties considered as nutritionally improved varieties? (A)

Chapter 10
MICROBES IN HUMAN WELFARE

ONE MARK QUESTIONS:

1. Name the bacterium that converts milk into curd. (K)
2. Expand LAB. (K)
3. How does LAB convert milk into curd? (A)
4. Why small amount of curd is added to fresh milk as inoculums to convert it into curd? (A)
5. Write any one use of LAB other than curding. (K)
6. How LAB increases nutritional quality of milk? (A)
7. Mention the gas which is responsible for the puffed up appearance of dough. (K)
8. Dough used for making 'dosa' has puffed up appearance. Why? (A)
9. Name the scientific name of the microorganism used to for making bread. (K)
10. Write the scientific name of baker's yeast. (K)
11. Write the scientific name of fungus used in the fermentation of dough in bakery. (K)
12. What is toddy? (K)
13. Name the traditional drink obtained from fermenting sap from palm. (K)
14. Name the plant from which toddy is obtained. (K)
15. Name the bacterium that is used for production of 'Swiss cheese'. (K)
16. Name the gas responsible for large holes in 'Swiss cheese'. (K)
17. Mention the group of organisms which are used in the production of 'Roquefort cheese'. (K)
18. Write the scientific name of brewer's yeast. (K)
19. Name the metabolic reaction which results in the production of ethanol by yeast. (K)
20. Name alcoholic drink obtained without distillation. (K)
21. Name alcoholic drink obtained with distillation. (K)
22. Name the scientific name of the organism used for fermenting malted cereals and fruit juices to produce ethanol. (K)
23. Name the product obtained by fermenting malted cereals and fruit juices. (K)
24. Name the first antibiotic to be discovered. (K)
25. Name the scientist who discovered penicillin. (K)
26. Name the antibiotic that was extensively used to treat American soldiers who were wounded in World War II. (K)
27. Name the scientific name of the source organism for citric acid. (K)
28. Name the scientific name of the source organism for lactic acid. (K)
29. Name the scientific name of the source organism for butyric acid. (K)
30. Name the scientific name of the source organism for acetic acid. (K)
31. Name the scientific name of the source organism for streptokinase. (K)
32. Name the scientific name of the source organism for Cyclosporin A. (K)
33. Name the scientific name of the source organism for Statin. (K)
34. Name the scientific name of the source organism for ethanol. (K)
35. Name the scientific name of the source organism for penicillin. (K)
36. Name the microorganism which produces butyric acid.
37. Name the microorganism which produces acetic acid.
38. Name the microorganism which produces lactic acid.

39. Name the microorganism which produces acetic acid.
40. Name the enzyme used in laundry to remove oily stains? (K)
41. Why lipases are used in detergent formulations? (A)
42. Name an enzyme used to clarify bottled fruit juices. (K)
43. Why bottled juices are clearer than homemade juices? (A)
44. What is clot buster? (K)
45. Write the clinical significance of clot buster. (U)
46. A person has been diagnosed with 'clots' in his blood vessels. Suggest a bioactive chemical of microbial origin to treat this person. (A)
47. Write the clinical significance of Cyclosporin A. (U)
48. Patients who have undergone organ transplantation are administered Cyclosporin A. Why? (A)
49. Write the clinical significance of Statin. (U)
50. How statin reduces cholesterol? (A)
51. A person after a clinical analysis of blood finds out that his blood has high cholesterol content. Suggest a bioactive chemical of microbial origin to treat this person. (A)
52. Why sewage water cannot be discharged directly into rivers? (A)
53. How floating debris is removed in primary sewage treatment? (A)
54. How grit is removed in primary sewage treatment? (A)
55. Expand STP. (K)
56. What is primary sludge? (K)
57. Expand BOD. (K)
58. What is the significance of BOD? (K)
59. Define Biological Oxygen Demand? (K)
60. Why sewage water is treated until the BOD is reduced? (A)
61. What are anaerobic sludge digesters? (K)
62. What is active sludge? (K)
63. What are flocs? (K)
64. Write the scientific name of the microbe present in the rumen of the cattle. (K)
65. What is the function of *Methanobacterium* in the rumen of cattle? (K)
66. What are methanogens? (K)
67. Which is the major gaseous component of biogas? (K)
68. Define biocontrol. (K)
69. Biocontrol of insects and pests is desirable and beneficial compared to the use of insecticides and pesticides. Justify this with a reason. (A)
70. Identify the principle on which biocontrol is based. (A)
71. Why eradication of pests completely is undesirable? (A)
72. Mention a biocontrol agent which gets rid of aphids. (K)
73. Mention a biocontrol agent which gets rid of mosquitoes. (K)
74. Give an example for a biocontrol agent against butterfly caterpillar. (K)
75. Name the fungus used in biological control of pathogens which cause plant diseases. (K)
76. Why baculoviruses are excellent biological control agents? (A)
77. Name the species specific baculovirus which is used in the biocontrol of many insects and other arthropods. (K)
78. Expand IPM in relation to agriculture and farming. (K)
79. What are biofertilizers? (K)

80. Use of biofertilisers in agriculture ensures a better environment. Justify. (A)
81. Name the scientific name of the microorganism that serves as an important biofertilizer in paddy fields. (K)
82. Give an example for a fungus which forms mycorrhiza. (K)
83. Name the bacterium found in the root nodule of leguminous plants. (K)
84. Write the function of *Rhizobium* in roots of leguminous plants. (K)
85. Give an example for free living bacterium which fixes atmospheric nitrogen. (K)
86. Mention the role of *Azospirilum* as biofertilizer. (K)

TWO MARK QUESTIONS:

1. Mention any two significant roles of LAB. (K)
2. Write any two uses of LAB other than its role in converting milk into curd. (K)
3. Name any two distilled and two undistilled alcoholic beverages. (K)
4. Name two enzymes used to clarify bottled juices. (K)
5. Name any two bacteria which are used in the production of organic acids. (K)
6. Mention the scientific name of the source organism of streptokinase. How does this bioactive molecule function in our body? (U)
7. Mention the scientific name of the source organism of cyclosporin A. Mention the function of cyclosporine A. (K)
8. Mention the scientific name of the source organism of antibiotic penicillin. Mention the function of penicillin. (K)
9. List any two bioactive molecules of fungal origin and explain how those molecules help in restoring good health in humans. (U)
10. Mention the scientific names of the source organisms of butyric acid and acetic acid. (K)
11. Mention the scientific names of the source organisms of butyric acid and citric acid. (K)
12. Mention the scientific names of the source organisms of butyric acid and lactic acid. (K)
13. Mention the scientific names of the source organisms of acetic acid and citric acid. (K)
14. Mention the scientific names of the source organisms of acetic acid and lactic acid. (K)
15. Mention the scientific names of the source organisms of lactic acid and citric acid. (K)
16. Name the microbe used for statin production. How do statins lower blood cholesterol level? (A)
17. Mention the scientific names of source organisms of ethanol and butyric acid. (K)
18. Mention the scientific names of source organisms of ethanol and lactic acid acid. (K)
19. Mention the scientific names of source organisms of ethanol and acetic acid. (K)
20. Mention the scientific names of source organisms of ethanol and citric acid. (K)
21. Mention the scientific names of source organisms of ethanol and penicillin. (K)
22. Mention the scientific names of source organisms of ethanol and streptokinase. (K)
23. Mention the scientific names of source organisms of ethanol and cyclosporin A. (K)
24. Mention the scientific names of source organisms of ethanol and statin. (K)
25. Mention the scientific names of source organisms of butyric acid and penicillin. (K)
26. Mention the scientific names of source organisms of butyric acid and streptokinase. (K)
27. Mention the scientific names of source organisms of butyric acid and cyclosporin A. (K)
28. Mention the scientific names of source organisms of butyric acid and statin. (K)
29. Mention the scientific names of source organisms of lactic acid and penicillin. (K)
30. Mention the scientific names of source organisms of lactic acid and streptokinse. (K)
31. Mention the scientific names of source organisms of lactic acid and cyclosporin A. (K)

32. Mention the scientific names of source organisms of lactic acid and statin. (K)
33. Mention the scientific names of source organisms of acetic acid and penicillin. (K)
34. Mention the scientific names of source organisms of acetic acid and streptokinase. (K)
35. Mention the scientific names of source organisms of acetic acid and cyclosporin A. (K)
36. Mention the scientific names of source organisms of acetic acid and statin. (K)
37. Mention the scientific names of source organisms of citric acid and penicillin. (K)
38. Mention the scientific names of source organisms of citric acid and streptokinase. (K)
39. Mention the scientific names of source organisms of citric acid and cyclosporin A. (K)
40. Mention the scientific names of source organisms of citric acid and statin. (K)
41. Mention the scientific names of source organisms of penicillin and streptokinase. (K)
42. Mention the scientific names of source organisms of penicillin and cyclosporin A. (K)
43. Mention the scientific names of source organisms of penicillin and statin. (K)
44. Mention the scientific names of source organisms of streptokinase and cyclosporin A. (K)
45. Mention the scientific names of source organisms of streptokinase and statin. (K)
46. Mention the scientific names of source organisms of statin and cyclosporin A. (K)
47. Write the steps involved in primary treatment of sewage. (U)
48. What is BOD? Write its significance. (U)
49. What are flocs? Write their significance in sewage treatment. (U)
50. Name two groups of organisms which constitute flocs. Write their significance. (U)
51. Name any two gases produced during sludge digestion in sewage treatment. (K)
52. Write two uses of biogas. (U)
53. Biocontrol of insects and pests is desirable and beneficial compared to the use of insecticides and pesticides. Justify this with two reasons. (A)
54. Give any two examples for free living bacteria which can fix atmospheric nitrogen. (K)
55. Give any two examples for cyanobacteria which can fix atmospheric nitrogen. (K)
56. How do cyanobacteria act as biofertilizers? (A)

THREE MARK QUESTIONS:

1. Write about any three microorganisms and their role in household products. (U)
2. What are antibiotics? Name thefirst antibiotic to be discovered and the person who discovered it. (K)
3. Mention any three bacteria which are used in the production of organic acids. Mention the products obtained from them. (K)
4. Explain three biological methods to control pests and diseases. (U)
5. Mention the microbial source (scientific name) and the function of penicillin, cyclosporin A and statin. (K)
6. Mention the microbial source (scientific name) and the function of penicillin, cyclosporin A and streptokinase. (K)
7. Mention the microbial source (scientific name) and the function of penicillin, streptokinase and statin. (K)
8. Mention the microbial source (scientific name) and the function of streptokinase, cyclosporin A and statin. (K)
9. Explain the roles of lipase, pectinase and penicillin in human welfare. (K)
10. Explain the roles of lipase, pectinase and streptokinase in human welfare. (K)
11. Explain the roles of lipase, pectinase and statin in human welfare. (K)

12. Explain the roles of lipase, pectinase and cyclosporin A in human welfare. (K)
13. Explain the roles of pectinase, penicillin and streptokinase in human welfare. (K)
14. Explain the roles of pectinase, penicillin and statin in human welfare. (K)
15. Explain the roles of pectinase, penicillin and statin in human welfare. (K)
16. Explain the roles of penicillin, statin and streptokinase in human welfare. (K)
17. Explain the roles of penicillin, statin and cyclosporin A in human welfare. (K)
18. Explain the roles of statin, streptokinase and cyclosporin A in human welfare. (K)
19. Draw a neat labeled diagram of Biogas plant. (S)
20. Explain the role of any three microorganisms as biofertilizers. (K)
21. Mention any three significances for plants having symbiotic association with fungi. K
22. List any three benefits for plants from mycorrhiza. (U)

FIVE MARK QUESTIONS:

1. Explain the role of microbes in house-hold products. (U)
2. Explain the role of microbes in the production of industrial products. (U)
3. Explain different stages involved in sewage treatment. (U)
4. Describe the biogas plant with a neat labeled diagram. (U)
5. Explain the role of any five microorganisms as biocontrol agents.
6. Describe the role of microbes as biofertilizers. (U)
7. Write the scientific names of microbes from which following products are obtained: (K)
   (a) Ethanol (b) Acetic acid (c) Butyric acid (d) Citric acid (e) Lactic acid
8. Write the scientific names of microbes from which following products are obtained: (K)
   (a) Ethanol (b) Acetic acid (c) Butyric acid (d) Citric acid (e) Statin
9. Write the scientific names of microbes from which following products are obtained: (K)
   (a) Ethanol (b) Acetic acid (c) Butyric acid (d) Citric acid (e) Streptokinase
10. Write the scientific names of microbes from which following products are obtained: (K)
    (a) Ethanol (b) Acetic acid (c) Butyric acid (d) Citric acid (e) Cyclosporin A
11. Write the scientific names of microbes from which following products are obtained: (K)
    (a) Acetic acid (b) Butyric acid (c) Citric acid (d) Lactic acid (e) Statin
12. Write the scientific names of microbes from which following products are obtained: (K)
    (a) Acetic acid (b) Butyric acid (c) Citric acid (d) Lactic acid (e) Streptokinase
13. Write the scientific names of microbes from which following products are obtained: (k)
    (a) Acetic acid (b) Butyric acid (c) Citric acid (d) Lactic acid (e) Cyclosporin A
14. Write the scientific names of microbes from which following products are obtained: (k)
    (a) Butyric acid (b) Citric acid (c) Lactic acid (d) Statin (e) Streptokinase
15. Write the scientific names of microbes from which following products are obtained: (k)
    (a) Butyric acid (b) Citric acid (c) Lactic acid (d) Statin (e) Cyclosporin A
16. Write the scientific names of microbes from which following products are obtained: (k)
    (a) Citric acid (b) Lactic acid (c) Statin (d) Streptokinase (e) Cyclosporin A
17. Write the products obtained from following microorganisms: (K)
    (a) *Clostridium butylicum* (b) *Trichoderma polysporum* (c) *Aspergillus niger* (d) *Monascus purpureus* (e) *Streptococcus*
18. Write the products obtained from following microorganisms: (K)
    (a) *Clostridium butylicum* (b) *Aspergillus niger* (c) *Saccharomyces cerevisiae* (d) *Monascus purpureus* (e) *Streptococcus*

19. Write the products obtained from following microorganisms: (K)
    (a) *Trichoderma polysporum* (b) *Aspergillus niger* (c) *Saccharomyces cerevisiae* (d) *Monascus purpureus* (e) *Streptococcus*
20. Mention the products obtained from the following microbes and explain their roles in human welfare: (K)
    (a) *Methanobacterium* (b) *Trichoderma polysporum* (c) *Penicillium notatum* (d) *Monascus purpureus* (e) *Streptococcus*

Chapter 11
BIOTECHNOLOGY: PRINCIPLES AND PROCESSES

ONE MARK QUESTIONS:

1. Define biotechnology. (K)
2. How genetic engineering overcomes the limitation of traditional hybridization? (U)
3. What is genetic engineering? (K)
4. What is gene cloning? (K)
5. What is the role of 'ori' in DNA cloning? (K)
6. Why alien DNA is linked with 'ori' site of a vector in gene cloning? (A)
7. The desired gene cannot multiply unless it gets incorporated into host genome. Why? (A)
8. What is plasmid? (K)
9. What is the contribution of Stanley Cohen and Herbert Boyer to the field of biotechnology? (U)
10. Name the group of enzymes that are called "molecular scissors". (K)
11. Why restriction endonucleases are called 'molecular scissors' ?
12. What is plasmid? (K)
13. Write the function of DNA ligase. (K)
14. Why DNA ligases can be considered as "molecular glues" or "molecular stitchers"? (A)
15. Name the enzyme used to join two DNA fragments. (K)
16. What are exonucleases? (K)
17. What are endonucleases? (K)
18. Restriction enzymes are considered as a type of endonucleases. Why? (A)
19. Mention an example of REN. (K)
20. What does 'R' stand for in EcoRI? (K)
21. What are recognition sequences or sites in DNA? (K)
22. What are palindromic sequences? (K)
23. What is the importance of gel electrophoresis in recombinant DNA technology? (K)
24. Name the technique used to separate DNA fragments in rDNA technology. (K)
25. Why DNA fragments move towards anode under electric field through a medium in gel electrophoresis? (A)
26. "Gel electrophoresis is considered as a very important technique in recombinant DNA technology". Why? (A)
27. Which stain is used to visualize the separated DNA in gel electrophoresis? (K)
28. What is elution? (K)
29. Why origin of replication in a vector is considered an essential site? (A)
30. What is a selectable marker? (K)
31. With reference to recombinant DNA technology, what is transformation? (K)
32. Why selectable marker in a vector is considered as an essential site? (A)
33. What does 'rop' code for in pBR322? (U)
34. Vectors need to have very few or preferably single recognition site in recombinant DNA technique. Why?(A)
35. Why selection of recombinants due to inactivation of antibiotics is a cumbersome procedure. (A)
36. What is insertional inactivation? (K)
37. Name a plant pathogenic bacterium used as vector for cloning genes in dicot plants. (K)

38. Name the organism in which Ti plasmid is present. (K)
39. Name the plasmid present in *Agrobacterium tumefaciens*. (K)
40. Name a pathogenic virus which can be disarmed and used to deliver genes into animal cells. (K)
41. Retroviruses are disarmed before using to deliver desired genes into animal cell. Why? (A)
42. With reference to recombinant DNA technology, what is meant by competent host? (U)
43. What is microinjection?(K)
44. What is the significance of microinjection? (K)
45. What is biolistics? (K)
46. What is the significance of bioliistics or gene gun? (K)
47. Mention the enzyme used to isolate DNA from bacterial cell. (K)
48. Mention the enzyme used to isolate DNA from plant cell. (K)
49. Mention the enzyme used to isolate DNA from fungal cell. (K)
50. What is the use of chitinase in recombinant DNA technology? (U)
51. What is the use of cellulase in recombinant DNA technology? (U)
52. Why chilled ethanol is used in DNA isolation. (A)
53. Expand PCR. (K)
54. What is polymerase chain reaction (PCR)? (K)
55. What is primer? (K)
56. Name the thermostable enzyme used in polymerase chain reaction. (K)
57. Name the bacterium from which thermostable Taq polymerase is obtained. (K)
58. What is the unique feature of *Taq polymerase*? (U)
59. What is the use of *Taq* polymerase enzyme? (U)
60. Why Taq polymerase is preferred over the normal DNA polymerase in polymerase chain reaction? (A)
61. What is recombinant protein? (K)
62. What are bioreactors? (K)
63. What is downstream processing? (K)

TWO MARKS QUESTIONS:

1. What is biotechnology? Mention any two uses of it to mankind. (K)
2. Mention two core techniques that enabled birth of modern biotechnology. (K)
3. What is the limitation of traditional hybridization procedures of plant and animal breeding? How is this overcome by genetic engineering? (U)
4. Name two bacteria that were used for developing recombinant DNA technique by Stanley Cohen and Herbert Boyer. (K)
5. Mention any four biological tools required for recombinant DNA technology. (K)
6. Differentiate between exonuclease and endonuclease. (U)
7. Explain the convention for naming restriction endonucleases scientifically. (U)
8. What are restriction enzymes? Mention any two examples. (K)
9. Mention any four restriction enzymes. (K)
10. Write note on functioning of restriction endonuclease. (U)
11. Mention the roles of restriction endonucleases and DNA ligase in genetic engineering. (K)
12. Name the technique involved in separation and isolation of DNA fragment. Which dye is used to stain gel to make the DNA visible under UV light? (K)

13. Explain the steps employed during genetic engineering to isolate the DNA fragments that are separated by gel electrophoresis? (U)
14. Draw a neat labeled diagram of a typical agarose gel electrophoresis unit. (S)
15. What is selectable marker? What is its role in genetic engineering? (K)
16. Write a note selectable marker. (U)
17. With reference to plasmids, what are the roles of 'ori' and selectable marker? (U)
18. A selectable marker is a must in a vector. Why? (A)
19. With reference to rDNA technology, what do you mean by 'insertional inactivation' and write the significance of it. (U)
20. With reference to recombinant DNA technology, explain microinjection and biolistics. (U)
21. How bacteria like *Escherichia coli* are made competent to take up recombinant DNA? (U)
22. What is biolistics? In which organisms is it generally used? (K)
23. Name the bacterium from which Taq polymerase is obtained. What is the unique feature of Taq polymerase? (U)

THREE MARKS QUESTIONS:

1. What is biotechnology? Mention two core techniques that enabled the birth of modern biotechnology. (K)
2. Explain three basic steps of gene cloning. (U)
3. Mention the three basic steps in genetically modifying an organism. (K)
4. What are restriction enzymes? How do they function? (U)
5. Make a diagrammatic representation of recombinant DNA technology.(S)
6. What is plasmid? Mention the significance of 'ori' in a plasmid. (K)
7. What is plasmid? Mention the significance of selectable marker in a plasmid. (K)
8. What is plasmid? Mention the significance of cloning site in a plasmid. (K)
9. Explain the procedure of making bacterial cells and animal cells competent to take up recombinant DNA. (U)
10. Explain the procedure of making bacterial cells and plant cells competent to take up recombinant DNA. (U)
11. Sketch and label pBR322. (S)
12. Sketch and label three steps of PCR technique. (S)
13. What is polymerase chain reaction? List three stages of PCR technique. Mention the polymerase enzyme used in PCR. (K)
14. Mention six optimum conditions which are maintained in bioreactor. (K)
15. Mention sequential steps involved in rDNA technology. (K)
16. With reference to recombinant technology, define: (K)
    (a) Cloning (b)Elution (c) Transformation(K)
17. Write a note on isolation of DNA in recombinant DNA technology. (U)
18. Explain the steps involved in the separation and isolation of DNA fragments in recombinant DNA technology. (U)
19. Write a note on bioreactor. (U)
20. Draw a labelled diagram of simple stirred tank bioreactor. (S)
21. Draw a neat diagram of sparged stirred tank bioreactor. (S)
22. Write a note on downstream processing. (U)

FIVE MARKS QUESTIONS:

1. Explain structure of pBR322 with neat labeled diagram.(S)
2. Describe the characteristics that a plasmid should possess to be used as a cloning vector in genetic engineering. (U)
3. Explain briefly the steps involved in recombinant DNA technology. (U)
4. What is polymerase chain reaction? Name the bacterium from which the polymerase enzyme used in this technique is obtained. Write the schematic representation of this technique. (K/S)
5. Give reason for the following statements: (A)
   (a) Alien DNA is linked with 'ori' site of a vector in gene cloning.
   (b) Restriction enzymes are called 'molecular scissors'.
   (c) DNA ligase can be called 'molecular glue' or 'molecular stitcher'.
   (d) Gel electrophoresis is considered as a very important technique in recombinant DNA technology.
   (e) DNA fragments move towards anode under electric field through a medium in gel electrophoresis.
6. Give reason for any five of the following statements. (U)
   (a) Origin of replication in a vector is an essential site required for gene cloning.
   (b) Selectable marker in a vector is essential site without which identifying recombinant DNA becomes difficult.
   (c) Vectors need to have very few or preferably single recognition site in recombinant DNA technique.
   (d) Selection of recombinants due to inactivation of antibiotics is a cumbersome procedure.
   (e) Chilled ethanol is used in DNA isolation.

Chapter 11
BIOTECHNOLOGY AND ITS APPLICATIONS

ONE MARK QUESTIONS:

1. Expand GMO. (K)
2. How the use of harmful effects of fertilizer and chemicals can be reduced by using biotechnological applications? (A)
3. What is gene therapy? (K)
4. What does 'Bt' represent in Bt cotton? (K)
5. Even though Bt toxin can kill many insects, it will not kill the bacteria that produces it. Why? (A)
6. Even though Bt toxin is inactive, it kills the insect when enters its midgut. Why? (A)
7. Mention a gene that produces insecticidal protein in Bt cotton. (K)
8. Why is the gene encoding 'cry' protein inserted into a crop plants? (A)
9. Define RNA interference. (K)
10. What are transposons? (K)
11. Which biotechnological technique is used to avoid *Meloidogyne incognitia* infestation in tobacco plant? (K)
12. Name the nematode which infects the roots of tobacco plant and reduces the yield. (K)
13. Why the translation of mRNA is prevented in RNA interference process? (A)
14. Why is it advisable to use insulin obtained through genetic engineering rather than insulin obtained from an animal source? (A)
15. Name the disease which can be treated by clinical gene therapy. (K)
16. Expand ADA. (K)
17. Which method is a permanent cure for ADA deficiency disorder? (U)
18. Expand ELISA. (K)
19. Mention the principle on which ELISA is based. (U)
20. Which method of disease diagnosis is used to detect HIV in suspected AIDS patients? (K)
21. Define biopiracy? (K)
22. Mention an Indian traditional herbal medicine on which biopiracy attempts were made. (K)
23. What are transgenic animals? (K)
24. Name the first transgenic cow? (K)
25. Name the human protein produced by genetically modified animal which is used to treat emphysema? (K)
26. What is the special feature of milk produced by the transgenic cow, Rosie? (K)
27. A multinational company outside India tried to sell new varieties of turmeric without proper patent rights. What is such an act referred to as? (A)

TWO MARKS QUESTIONS:

1. Mention any four benefits of genetically modified organisms. (K)
2. Mention two genes that are responsible for producing Cry protein to control cotton bollworms. (K)
3. How does inactive protoxin of Bt toxin kills the insect once it is ingested? (U)
4. Which animals were the sources of insulin before the genetically engineered insulin was produced? Why this insulin was replaced by genetically engineered insulin. (U)

5. Define gene therapy. Mention a disease which has been treated using this technique.
6. Why is the introduction of genetically engineered lymphocytes into a ADA deficiency patient not a permanent cure? Suggest a possible permanent cure.
7. Mention any two modern methods of disease diagnosis. (K)
8. Mention two applications of Polymer Chain Reaction as a molecular diagnostic tool.
9. ELISA is one of the methods of molecular diagnosis. What is the principle of this technique and how does it help in detecting HIV infection ?
10. What are transgenic animals? Give any two examples. (K)
11. What is the role of Genetic Engineering Approval committee (GEAC)? (U)
12. Explain any two benefits of transgenic animals.
13. How transgenic animals can help in the study normal physiology and development? (U)
14. How transgenic animals can help in the study diseases? (U)
15. Transgenic animals can be used to produce biological products. Justify with two examples. (A)
16. How transgenic animals can be help in the study of vaccine safety? (U)
17. How transgenic animals can help in the study chemical safety? (U)
18. Differentiate between pro-insulin and a mature insulin. (U)

THREE MARKS QUESTIONS:

1. Mention three critical research areas of biotechnology. (K)
2. What are genetically modified organisms? Mention any four benefits of genetically modified organisms. (K)
3. Mention six benefits of genetically modified organisms. (K)
4. What is Bt toxin? How does it kill cotton boll worms? (U)
5. Explain the procedure of developing nematode resistant tobacco plant by RNA interference. (U)
6. What is gene therapy? Explain the steps involved in curing ADA deficiency by gene therapy. (U)
7. Mention three applications of PCR as a tool of molecular diagnosis. (K)
8. Briefly explain the steps involved in PCR based molecular diagnosis to detect mutations in cancer patients. (U)
9. What is biopiracy? Explain it with respect to Basmati rice. (U)
10. Write a note on production of human insulin by genetic engineering. (U)
11. Explain any three benefits of creating transgenic animals.
12. What is biopiracy? Explain it with reference to Basmati Rice. (U)

FIVE MARKS QUESTIONS:

1. “Genetically modified plants can reduce the use of chemical pesticides”. Justify this. (A).
2. Define RNA interference. Name the nematode for which tobacco plant was made resistant by this technique. Explain how this resistance was achieved in tobacco plant. (U)
3. Explain the applications of biotechnology in the field of medicine. (U)
4. One of the applications of biotechnology is the production of insect resistant crop plants. Justify the statement with reference to Bt cotton. (U)
5. Explain various techniques of molecular diagnosis. (U)
6. Give reasons: (A)
   (a) Even though Bt toxin can kill many insects, it will not kill the bacteria that produces it.
   (b) Even though Bt toxin is inactive, it kills the insect when enters its midgut.
   (c) The gene encoding ‘cry’ protein inserted into a crop plants.

(d) The translation of mRNA is prevented in RNA interference process.

(e) It advisable to use insulin obtained through genetic engineering rather than insulin obtained from an animal source.

Chapter 13
ORGANISMS AND POPULATIONS

ONE MARK QUESTIONS:

1. What is ecology? (K)
2. Define ecological niche. (K)
3. What are eurythermal organisms? (K)
4. What are stenothermal organisms? (K)
5. What are euryhaline organisms? (K)
6. What are stenohaline organisms? (K)
7. Define homeostasis. (K)
8. Why are certain organisms in the ecosystem called regulators? (U)
9. Why are certain organisms in the ecosystem called conformers? (U)
10. Why evolutionary biologists believe that mammals are successful animals on earth? (A)
11. What is the significance of sweating profusely in mammals during summer? (U)
12. What is the significance of shivering in mammals during summer? (U)
13. Very small animals are rarely found in polar region. Give reason. (U)
14. Why conformers have not evolved to become regulators? (A)
15. How do seeds remain dormant for considerable period of time? (A)
16. Define migration. (K)
17. Define aestivation (K)
18. Define hibernation(K)
19. Define diapause. (K)
20. What is an adaptation? (K)
21. How do kangaroo rats in North American deserts meet their water requirement? (A)
22. How does kangaroo rat in North American deserts conserve water? (A)
23. Many desert plants have a special photosynthetic (CAM) pathway. How does this help the desert plants? (K)
24. Mention an adaptation in desert plants to conserve water. (K)
25. Many desert plants have their stomata arranged in deep pits. How does this help these desert plants? (K)
26. "Some animals, if unable to migrate, might avoid the stress by escaping in time". Justify the statement citing one example. (A)
27. State Allen's rule. (K)
28. Why mammals from colder climate generally have shorter ears and limbs? (A)
29. Mention an adaptation in aquatic mammals of polar seas to reduce loss of body heat. (K)
30. What is blubber? (K)
31. Why total haemoglobin content is higher in people who live at high altitudes, than people living in the plains. (U)
32. At higher altitudes, a man suffers from altitude sickness with symptoms like nausea, fatigue and heart palpitation. Why? (A)
33. Define population. (K)
34. What is age distribution with respect to population? (K)
35. Define natality. (K)

36. Define mortality. (K)
37. What is immigration with reference to population? (K)
38. What is emigration with reference to population? (K)
39. What is an age pyramid? (K)
40. Percent cover or biomass is a more meaningful measure of the population size. Justify the statement with an example. (U)
41. What is meant by exponential growth of population? (K)
42. Write the equation for exponential growth of a population. (K)
43. Write the integral form of the equation for exponential growth of a population. (K)
44. What is meant by logistic growth of population? (K)
45. Write the equation for logistic growth of a population. (K)
46. The logistic growth model is considered more realistic than the exponential growth model. Give reason. (A)
47. Why exponential growth model is not realistic compared to logistic growth model (A)
48. Name an animal that breeds only once in its life time. (K)
49. Name a plant that breeds only once in its life time. (K)
50. Mention the type of population interaction where both the interacting species are benefitted.(K)
51. Name the type of population interaction in which only one interacting species is benefitted while the other is neither benefitted nor harmed. (K)
52. Name the type of population interaction in which only one interacting species is benefitted while the other is affected. (K)
53. Name the type of population interaction in which one interacting species is harmed while the other is unaffected. (K)
54. Define amensalism. (K)
55. Name the principle behind biological pest control method adapted in agriculture. (K)
56. Predators in nature are prudent. Why? (A)
57. How do some species of insects and frogs avoid being detected easily by their predators? (A)
58. What are phytophagous insects? (K)
59. Why cattle and goats never browse *Calotropis*? (A)
60. Mention one chemical substance produced by plants as defence against grazing animals. (K)
61. Define competition. (K)
62. What is interference competition? (K)
63. Define competitive release. (K)
64. State Gause's competitive exclusion principle. (K)
65. What is resource partitioning? (K)
66. What are ectoparasites? (K)
67. What are endoparasites? (K)
68. Mention an example for parasitic plant. (K)
69. What is brood parasitism? (K)
70. Define commensalism. (K)
71. Define mutualism. (K)
72. Define mycorrhizae. (K)
73. Name the type of interaction between fungi and roots of higher plants. (K)
74. Name the type of interaction between cattle and egret. (K)
75. Name the type of interaction between cuckoo and crow. (K)

76. Give the name of Mediterranean orchid that exhibits 'sexual deceit'.(K)

TWO MARK QUESTIONS:

1. Mention the four basic levels of biological organization that ecology is concerned with? (K)
2. Name the two factors responsible for the formation of major biomes on earth. (K)
3. List the major biomes of India. (K)
4. Mention the major abiotic factors of an environment. (K)
5. Differentiate eurythermal and stenothermal organisms. (U)
6. Differentiate euryhaline and stenohaline organisms.(U)
7. Mention four measures by which organisms cope with stressful conditions in their habitat. (K)
8. Write the mechanisms in humans to regulate body temperature in summer and winter. (K)
9. Show a diagrammatic representation of organismic response to abiotic stresses. (S)
10. Thermoregulation is energetically expensive for many organisms. Justify the statement with example. (A)
11. Explain with an example how animals keep constant body temperature by behavioral means? (U)
12. What is migration? Give an example. (K)
13. The organisms if unable to migrate might avoid the stress by escaping in time. Justify the statement with two examples. (K)
14. What is diapause? Mention an example. (K)
15. Write any two adaptations in desert plants to minimize water loss. (K)
16. How do kangaroo rats meet their water requirement and also minimize water loss? (U)
17. Mention two physiological adaptations in kangaroo rat for desert life. (K)
18. Mention any two measures by which the human body compensates low oxygen availability at higher altitudes. (K)
19. Mention any four population attributes. (K)
20. Name the four basic processes that fluctuates population density. (K)
21. Mention the two patterns of population growth in organisms. (K)
22. Show diagrammatic representation of exponential and logistic growth curves of population growth in a combined diagram. (S)
23. Mention any four types of interspecific interactions in organisms. (K)
24. Define predation. Give any two examples. (K)
25. Mention two adaptations in plants to escape from grazers and browsers. (K)
26. Explain interference competition with an example. (U)
27. Explain competitive release with an example. (U)
28. Write short note on resource partitioning with a suitable example. (K)
29. Mention two adaptations in organisms for parasitic mode of life. (K)
30. What are ectoparasites? Give example. (K)
31. What are endoparasites? Give an example. (K)
32. Define commensalism. Give examples. (K)
33. Define mutualism. Give an example. (K)
34. What is brood parasitism? Give an example. (K)

THREE MARK QUESTIONS:

1. Describe any three suspended activities in organisms against abiotic stresses with appropriate examples. (K)

2. Mention the cause and any two symptoms of altitude sickness. Explain how the human body compensates oxygen loss at high altitude? (U)
3. Write a note on altitude sickness. (U)
4. What is resource partitioning? Describe with an example. (K)
5. What is parasitism? Mention the types of parasites with an example for each. (K)
6. What is parasitism? Write a note on brood parasitism. (U)
7. What is parasitism? Mention two adaptations in organisms for parasitic mode of life. (K)
8. What is mutualism? Why plant – animal interaction often involves co - evolution of mutualists? (U)
9. Explain how Mediterranean orchid '*Ophrys*' employs sexual deceit to ensure pollination? (U)

FIVE MARK QUESTIONS:

1. What is ecology? Explain the role of major abiotic factors in any ecosystem. (U)
2. Define homeostasis. Describe how organisms cope with stressful conditions in their habitat. (U)
3. Explain Verhulst – Pearl logistic growth with a diagram and write its mathematical expression. (S)
4. Describe exponential growth with a suitable diagram and give its mathematical equation. (S)
5. Mention any five population interactions with an example for each. (K)
6. Define competition. Explain interference competition and competitive release with suitable examples. (U)
7. Explain the role of predation in an ecosystem with suitable examples. Add a note on morphological and defensive adaptations in plant and animal preys against their predators? (A)
8. What is mutualism? Explain any four examples of mutualism. (U)
10. What is mutualism? Why does plant - animal interaction often involves co - evolution of mutualists? Justify your answer with an example. (U)
9. 'Parasitic mode of life ensures free lodging and free meals'. Justify the statement by listing the special adaptations developed by parasites. (U)
10. Name the type of interactions seen in each of the following examples: (K)
    (a) *Ascaris* worms living in the intestine of humans
    (b) Wasp pollinating an inflorescence
    (c) Clown fish living among the tentacles of sea anemone
    (d) Disappearance of smaller barnacles when *Balanus* dominated the coast of Scotland
    (e) Five closely related species of warblers living on the same tree

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Chapter 14
ECOSYSTEM

ONE MARK QUESTIONS:

1. Define ecosystem. (K)
2. Biosphere is regarded as global ecosystem by ecologists. Give reason. (U)
3. Define stratification. (K)
4. Define productivity. (K)
5. What is primary productivity? (K)
6. What is secondary productivity? (K)
7. What is gross primary productivity? (K)
8. What is net primary productivity? (K)
9. Define decomposition. (K)
10. Define detritus. (K)
11. Earthworms are called 'farmer's friends'. Why? (A)
12. What are detrivores? (K)
13. Define humification. (K)
14. What is mineralization with reference to decomposition? (K)
15. Define food chain. (K)
16. Define trophic level. (K)
17. In which food chain, organic matter occupies the base? (K)
18. In terrestrial ecosystem, through which food chain greater fraction of energy flows? (K)
19. In aquatic ecosystem, through which food chain greater fraction of energy flows? (K)
20. Define food web. (K)
21. What is standing crop? (K)
22. State 10% law. (K)
23. What are ecological pyramids? (K)
24. Why is the pyramid of biomass in sea generally inverted? (A)
25. Pyramid of energy is always upright and can never be inverted. Why? (A)
26. Give an example for inverted ecological pyramid. (K)
27. 'Ecological pyramids have limitations'. Justify with a reason. (A)
28. What is ecological succession? (K)
29. What are pioneer species? (K)
30. What is climax community? (K)
31. Define sere(s). (K)
32. What are seral stages or seral communities? (K)
33. What is primary succession? (K)
34. What is secondary succession? (K)
35. What is hydrarch succession? (K)
36. What is xerarch succession? (K)
37. Why is primary succession a very slow process? (A)
38. Why is secondary succession much faster than primary succession? (A)
39. Define standing state. (K)
40. Define biogeochemical cycle. (K)

41. Why is carbon cycle considered as a gaseous cycle? (A)
42. Whys is phosphorous cycle considered as a sedimentary cycle? (A)
43. Human activities have influenced carbon cycle. Justify with a reason. (A)
44. What are ecosystem services? (K)

TWO MARK QUESTIONS:

1. List two basic or fundamental categories of ecosystems on earth with an example for each. (K)
2. Mention the four primary functions of an ecosystem. (K)
3. Define productivity and mention its types. (K)
4. Distinguish between primary productivity and secondary productivity. (U)
5. Distinguish between gross primary productivity and net primary productivity. (U)
6. Mention two conditions which increase the rate of decomposition in ecosystem. (K)
7. Mention two conditions which decrease the rate of decomposition in ecosystem. (K)
8. Show schematic representation of grazing food chain (GFC). (S)
9. Distinguish between food chain and food web. (U)
10. 'Ecological pyramids have limitations'. Justify with two reasons. (A)
11. Distinguish between primary and secondary ecological successions. (U)
12. What are pioneer species? Give an example. (K)
13. Differentiate between pioneer species and climax community. (U)
14. Differentiate standing crop and standing state. (U)
15. Compare gaseous and sedimentary cycles. (U)
16. List two differences between carbon cycle and phosphorous cycle. (U)

THREE MARKS QUESTIONS:

1. Describe the components of an aquatic ecosystem taking pond as an example. (U)
2. Explain the factors that regulate decomposition. (U)
3. Define food chain. Mention the types of food chain. (K)
4. Show diagrammatic representation of different trophic levels in an ecosystem. (S)
5. What are ecological pyramids? Mention any two types. (K)
6. Write the diagrammatic representation of pyramid of number in a grassland ecosystem with appropriate units. (S)
7. Write diagrammatic representation of an erect pyramid of biomass with appropriate units. (S)
8. Write the diagrammatic representation of pyramid of energy with appropriate units. (S)
9. 'Ecological pyramids have limitations'. Justify with three reasons. (A)
10. Define ecological succession. Differentiate primary and secondary ecological successions. (U)
11. Define ecological succession. Mention the two types of succession in plants based on the nature of habitat. (K)
12. With reference to ecological succession, define the following: (a) Sere (b) Pioneer species (c) Climax community. (K)
13. Explain primary succession on bare rocks. (U)
14. Explain primary succession in water. (U)
15. What is biogeochemical cycle? Mention the types of biogeochemical cycles with an example for each. (K)
16. Compare gaseous and sedimentary cycles with an example for each. (U)
17. List three differences between carbon cycle and phosphorous cycle. (U)

18. Write the schematic representation of phosphorous cycle. (S)
19. “Ecosystem services should carry a hefty price tag”. Justify with six of reasons. (U)

FIVE MARKS QUESTIONS:

1. What is productivity? Mention the types of primary productivity. Compare primary productivity and secondary productivity in an ecosystem. (K)
2. Describe the various steps involved in the process of decomposition. (U)
3. What are ecological pyramids? Write the diagrammatic representation of pyramid of energy with appropriate units. Why is pyramid of energy always upright and can never be inverted? (U)
4. What are ecological pyramids? Write the diagrammatic representation of an erect pyramid of biomass. Why pyramid of biomass in sea generally inverted? (U)
5. ‘Ecological pyramids have limitations’. Justify with four reasons. (A)
6. Define ecological succession. Differentiate primary and secondary ecological successions. Why the rate of primary succession is slower but that of secondary succession is faster? (U)
7. Describe ecological succession on bare rock and in water. (U)
8. Write the simplified model of carbon cycle in the biosphere. (S)
9. Explain carbon cycle in the biosphere. (U)
10. Explain phosphorous cycle with a schematic representation. (S)

Chapter 15
BIODIVERSITY AND CONSERVATION

ONE MARK QUESTIONS:

1. Define Biodiversity. (K)
2. Who popularized the term 'biodiversity'? (K)
3. What is genetic diversity? (K)
4. India has more than 50,000 different strains of rice. Mention the level of biodiversity it represents. (U)
5. Give an example for genetic diversity. (K)
6. Name an active chemical produced by medicinal plant *Rauwolfia vomitoria*. (K)
7. What is species diversity? (K)
8. What is ecological or ecosystem diversity? (K)
9. Among vertebrates, which group of animals has the highest number in global biodiversity? (K)
10. What is India's share (in percentage) in global species diversity? (K)
11. How many mega diversity countries are present in the world? (K)
12. Write the equation that describes species richness – area relationship. (U)
13. What are frugivorous animals? (K)
14. Who proposed the 'rivet popper" hypotheses? (K)
15. Name the forest which is referred to as the 'lungs of the planet'? (K)
16. How the current species extinction is different from the previous episodes of extinction? (K)
17. How does fragmentation of large habitats due to human activities lead to the decline of wildlife population? (U)
18. Give example for a species which has become extinct due to overexploitation. (K)
19. Name an alien species which has been introduced into India that has posed threat to native species in India. (K)
20. "Introduction of alien species causes biodiversity loss". Justify this statement with one appropriate example. (A)
21. What is co-extinction? (K)
22. Define bioprospecting. (K)
23. What are 'biodiversity hotspots'? (K)
24. How many biodiversity hotspots have been identified so far in the world? (K)
25. How many biodiversity hotspots have been identified in India? (K)
26. Why Western Ghats range is considered as one of the biodiversity hotspots? (A)
27. Name one biodiversity hotspot in India. (K)
28. What are endemic species? (K)
29. What is *in situ* conservation? (K)
30. Give an example for *in situ* conservation. (K)
31. What are sacred grooves? (K)
32. How are sacred grooves important in conserving biodiversity? (U)
33. What is *ex situ* conservation? (K)
34. Give an example for *ex situ* conservation. (K)
35. How cryopreservation helps in the conservation of biodiversity? (U)
36. Mention any one advanced technique used in *ex situ* conservation. (K)

TWO MARK QUESTIONS:

1. Define biodiversity. Write any two levels of biodiversity. (K)
2. Differentiate genetic diversity and species diversity. (U)
3. Differentiate genetic diversity and ecological diversity. (U)
4. Differentiate species diversity and ecological diversity. (U)
5. "India is rich in genetic diversity". Justify the statement by giving two examples. (A)
6. How do ecologists estimate the total number of species present in the world? (U)
7. Name the most species-rich taxonomic group among animals and mention its percentage within animal species. (K)
8. Write the major problems in completing the biological wealth inventory of India. (U)
9. Mention David Tilman's observation with respect to species richness in a community. (U)
10. Name any four recent extinct organisms as per IUCN Red list. (K)
11. Mention "The Evil Quartet" of biodiversity loss. (K)
12. Give examples of two species which have become extinct due to overexploitation. (K)
13. "Introduction of alien species causes biodiversity loss". Justify this statement with two appropriate examples. (A)
14. Write a note on co-extinction. (U)
15. List any two ecosystem services provided by biodiversity. (K)
16. Mention two biodiversity hotspots of India. (K)
17. Mention methods for conserving biodiversity. (K)
18. Differentiate *in situ* conservation and *ex situ* conservation. (U)
19. What is *ex situ* conservation? Mention two examples. (K)
20. What are sacred groves? Mention any two examples. (K)
21. Write any two advanced techniques used in *ex situ* conservation. (K)

THREE MARKS QUESTIONS:

1. Briefly explain the three levels of biodiversity. (U)
2. "Tropical rain forests have greater biodiversity compared to temperate forest". Justify with three reasons. (A)
3. Draw a graphical representation of species area relationship. (S)
4. Explain the species-area relationship of biodiversity according to Alexander Von Humboldt. (U)
5. In the formula Log S=Log C- Z log A to find out species-area relationship, what does 'S', 'A' and 'Z' stand for? (U)
6. Write the salient features of stable community with reference to biodiversity. (U)
7. Describe the "rivet popper" hypothesis. (U)
8. List out the three general effects of loss of biodiversity. (K)
9. Explain any three major causes of biodiversity loss. (U)
10. "Alien species invasion leads to extinction of indigenous species". Justify the statement by giving three appropriate examples. (A)
11. "There is a great need to conserve biodiversity". Justify with six reasons. (A)
12. Briefly explain narrowly utilitarian reason for conserving biodiversity. (U)
13. Briefly explain broadly utilitarian reason for conserving biodiversity. (U)
14. "Biodiversity plays a major role in providing many ecosystem services". Justify the statement with three reasons. (A)

FIVE MARKS QUESTIONS:

1. Define biodiversity. Explain the major causes of biodiversity loss. (U)
2. What are endemic species? Differentiate *in situ* conservation and *ex situ* conservation with examples. (U)
3. Explain species area relationship with graphical representation. (S)
4. Describe different ecosystem services provided by biodiversity. (U)

Chapter 16
ENVIRONMENTAL ISSUES

ONE MARK QUESTIONS:

1. Define pollution. (K)
2. What are pollutants? (K)
3. Name the act passed by government of India to control environmental pollution. (K)
4. What is electrostatic precipitator? (K)
5. Mention the purpose for which scrubber is used in industries. (K)
6. Why lead should not be added to petrol that is used as fuel in modern automobiles? (A)
7. Name any one metal catalyst used in catalytic converters. (K)
8. What is noise? (K)
9. Expand CNG. (K)
10. "Compressed Natural Gas is advantageous over petro or diesel". Justify with one reason. (A)
11. "Biochemical oxygen demand (BOD) is an index of water pollution". Justify with a reason. (A)
12. How do you estimate the amount of biodegradable organic matter in sewage water? (K)
13. Why is there a sharp decline in dissolved oxygen downstream a river from the point of sewage discharge? (A)
14. What is algal bloom? (K)
15. Define biomagnification. (K)
16. Why addition of wastes from agricultural operations to water bodies may cause excessive growth of algae? (A)
17. What is eutrophication? (K)
18. What is cultural eutrophication? (K)
19. Name the large masses of floating plants formed in the lake during eutrophication. (K)
20. Disposal of sewage into water without proper treatment may cause outbreak of serious diseases in humans. Give reason. (A)
21. What is ecological sanitation? (K)
22. How hospital wastes are disposed? (U)
23. Mention the role of incinerators in controlling pollution. (K)
24. What is e-waste? (K)
25. What is polyblend? (K)
26. Nuclear waste is extremely potent waste which can cause damage to organisms. Justify with a reason. (A)
27. What is greenhouse effect? (K)
28. Why does a traditional greenhouse warm up? (A)
29. What would be the average temperature of the earth's surface without greenhouse effect? (K)
30. What is global warming? (K)
31. Mention one effect of global warming? (K)
32. Why CO_2 is considered as a green house gas? (A)
33. Which part of the atmosphere ha 'bad' ozone? (K)
34. Which part of the atmosphere ha 'good' ozone? (K)
35. Name one chemical responsible for ozone layer depletion. (K)
36. What is 'ozone hole'? (K)

37. Mention the function of ozone layer in the stratosphere. (K)
38. Name the unit used for measurement of thickness of ozone in a column of air. (K)
39. What is snow blindness? (K)
40. What is the main goal of Montreal Protocol? (K)
41. Define deforestation. (K)
42. Define reforestation. (K)
43. In which part of India Jhum cultivation is practised? (K)
44. Name the award instituted by the Government of India for protection of wildlife. (K)

TWO MARK QUESTIONS:

1. Write any four effects of air pollution. (K)
2. Mention four effects of noise pollution in humans. (K)
3. Write any two preventive measures for noise pollution. (K)
4. Write any two preventive measures of air pollution. (K)
5. Name the gaseous pollutant that is removed by a scrubber. How is this pollutant removed by the scrubber? (U)
6. Write the harmful effects of particulate matter present in air on human health. (U)
7. How do catalytic converters help in controlling air pollution? (U)
8. "Compressed Natural Gas (CNG) is better than petrol or diesel". Justify with two reasons. (U)
9. List two causes of water pollutuion. (K)
10. List two effects of water pollution. (K)
11. Write the effects of DDT magnification in fish eating birds. (U)
12. What is algal bloom? Mention its effects. (K)
13. What is cultural or accelerated? Mention the two chief contaminants present in sewage, industrial and agricultural wastes which is responsible for this. (K)
14. Write the effect of thermal waste water on aquatic ecosystem. (K)
15. What is ecological sanitation? Mention its advantages. (K)
16. What is polyblend? Write the advantages of polyblend? (U)
17. Name any four green house gases. (K)
18. Write any two control measures of global warming. (A)
19. Ozone layer in the stratosphere becomes thinner due to the release of CFCs. Give s reason. (A)
20. Explain briefly the international efforts to prevent ozone layer depletion. (U)
21. List four causes of desertification. (K)
22. Mention the major causes for soil erosion. (K)
23. Differentiate deforestation and reforestation. (U)
24. Mention two causes of deforestation. (K)
25. Mention the percentage of forest cover recommended by the National Forest Policy (1988) for the plains and the hills. (K)
26. Write four consequences of deforestation. (K)

THREE MARKS QUESTIONS:

1. Draw a neat labeled diagram of scrubber. (S)
2. What is electrostatic precipitator? How are particulate matter removed by electrostatic precipitators? (U)
3. Draw a diagram of electrostatic precipitator. (S)

4. Write the measures taken by Delhi government to reduce the vehicular pollution. (K)
5. What is noise? Mention four effects of noise pollution in humans. (K)
6. List three causes of water pollutuion. (K)
7. List three effects of water pollution. (K)
8. What is biomagnification? How biomagnification of DDT affects fish-eating birds? (U)
9. Schematically represent biomagnification of DDT in an aquatic food chain. (S)
10. Write a note on e-wastes. (U)
11. Mention the effects of radioactive wastes in humans. How are these wastes disposed? (U)
12. Explain the mechanism by which thinning of ozone layer occurs. (U)
13. Name a chemical that causes ozone depletion in the stratosphere. Mention any two effects of ozone depletion in humans. (K)
14. List three effects of ozone depletion. (K)
15. What is desertification? Mention the causes for desertification. (K)
16. What is deforestation? Mention two causes of deforestation. (K)
17. What is deforestation? List two consequences of deforestation. (K)
18. Write a note on Jhum cultivation. (U)

FIVE MARKS QUESTIONS:

1. What is pollution? Mention the causes and preventive measures of air pollution. (U)
2. Write a brief account of functioning of electrostatic precipitator with a neat labeled diagram. (U)
3. Define eutrophication? Explain the stages involved in eutrophication. (U)
4. Explain the effects of water pollution. (U)
5. What measures, as an individual, would you take to reduce environmental pollution? (A)
6. How does greenhouse effect occur in nature? (U)
7. What is global warming? Explain effects of global warming and list the control measures to prevent global warming. (U)
8. Discuss the consequences of global warming and ozone layer depletion. (U)
9. Write the meaning of the following: (K)
   (a) Algal bloom (b) Biomagnification (c) Eutrophication (d) Polyblend (e) Greenhouse effect
10. What is integrated organic farming? Explain the organic farming technique practised by Ramesh Chandra Dagar. (U)
11. Describe the participation of people in the conservation of forests by taking Bishnoi community incident and Chipko movement as examples. Add a note on Joint Forest Management (JFM). (U)

DESIGN OF THE QUESTION PAPER

Time: 3 Hours 15 Minutes (of which 15 minutes for reading the question 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.
Note: Variation of one mark per chapter/unit is allowed. However the total marks should not exceed 105.

B. 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 mark – short answer (SA1)**		8	5	
C	**3 mark – short answer (SA2)**		8	5	
D	**5 mark – long answer (LA)**	Section –I	05	04	
		Section – II	05	03	

C. 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)

WEIGHTAGE TO THE UNIT/CHAPTER (BLUE PRINT FOR ENTIRE SYLLABUS)

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

SAMPLE QUESTION PAPER – 1

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: 10 x 1 = 10

1. Name the type of pollination that brings genetically different types of pollen to the stigma.
2. Mention the role of LH during spermatogenesis.
3. What is foetal ejection reflex?
4. With reference to the Mendelian laws of inheritance define the term "dominance".
5. Which genetic disease is characterized by the reduced synthesis of haemoglobin?
6. 'Evolution can also occur by anthropogenic action'. Give an example for this.
7. Mention the role of *Azospirillum* as biofertilizer.
8. "Gel electrophoresis is considered as a very important technique in recombinant DNA technology". Why?
9. Define 'standing state'.
10. How cryopreservation helps in the conservation of biodiversity?

PART – B

Answer FIVE of the following questions in 3 – 5 sentences each, wherever applicable: 5 x 2 = 10

11. Give reasons for the following:
    (a) Compared to internal fertilization, external fertilization is disadvantageous to the animal.
    (b) Chances of survival of young ones are more in viviparous animals than in oviparous animals.
12. Write a note on double fertilization.
13. Sketch and label a nucleosome.
14. Mention any two physiological barriers that provide non-specific type of defense to our body.
15. List any two bioactive molecules of fungal origin and explain how those molecules help in restoring good health in humans.
16. Explain the method of introduction of alien DNA into bacterial cells.
17. "Alien species are highly invasive and are a threat to local species". Substantiate this with any two examples**.**
18. Mention any two effects of Ozone depletion on humans.

PART – C

Answer FIVE of the following questions in 40 – 80 words each, wherever applicable: 5 x 3 = 15

19. Name the following:
    (a) The organism in which cell division itself is a mode of reproduction
    (b) The type of reproductive cycle in non-primate mammals
    (c) The plant that flowers only once in its life time
20. List any six features of genetic code.
21. Explain sex determination in birds**.**
22. Mention the important points needed for successful beekeeping.

23. Sketch and label a typical biogas plant.
24. What is gene therapy? Explain the steps involved in curing ADA deficiency by gene therapy.
25. Describe rivet popper hypothesis.
26. "Ecosystems should carry a hefty price tag for its various services". Enlist any three of them.

PART-D

Section-I

Answer FOUR of the following questions in 200 – 250 words each, wherever applicable: 4 x 5 = 20

27. Answer the following:
    (a) Write a note on Pollination in *Vallisneria*. (2)
    (b) List the differences between microsporogenesis and megasporogenesis**.** (2)
    (c) What is the number of chromosomes in each of the endosperm cells of a plant that has 36 chromosomes in its meiocytes? (1)
28. Draw a neat labeled diagrammatic view of human male reproductive system.
29. (a) Comment on the essential features required for an ideal contraceptive. (2)
    (b) Write a note on the steps involved in the creation of "test tube baby". (2)
    (c) Name a hormone releasing IUD. (1)
30. State the law of Independent assortment. Explain it with an example.
31. With the help of suitable diagrams, explain the process of transcription in bacteria.
32. What were the views of Charles Darwin about the evolution of life forms?

Section-II

Answer THREE of the following questions in 200 – 250 words each, wherever applicable: 3 x 5 = 15

33. (a) Explain how different techniques help in cancer detection and diagnosis. (4)
    (b) How does smoking cause oxygen deficiency in the body? (1)
34. Describe briefly the steps involved in the breeding of new genetic variety of crops.
35. (a) Explain how DNA is isolated from cells. (3)
    (b) Differentiate between exonuclease and endonuclease. (1)
    (c) What is the uniqueness of *Taq polymerase*? (1)
36. Name the type of interactions seen in each of the following examples:
    (a) *Ascaris* worms living in the intestine of humans.
    (b) Wasp pollinating an inflorescence.
    (c) Clown fish living among the tentacles of sea anemone.
    (d) Disappearance of smaller barnacles when *Balanus* dominated the coast of Scotland.
    (e) Five closely related species of warlbers living on the same tree.
37. Draw a neat labeled diagram of electrostatic precipitator and explain. Mention the importance of electrostatic precipitator.

BLUE PRINT FOR SUMMATIVE ASSESSMENT

SUBJECT: BIOLOGY (36)

2nd year PUC

SL. NO	UNIT	TEACHING HOURS	KNOWLEDGE				UNDERSTANDING				APPLICATION/ APPRECIATION				EXPRESSION/ SKILL				TOTAL QUESTIONS				MARKS WEIGHTAGE
	2ND PUC	120	1M	2M	3M	5M	1M	2M	3M	5M	1M	2M	3M	5M	1M	2M	3M	5M	1M	2M	3M	5M	
VI	REPRODUCTION	29	-	-	1	1	2	2	-	1	1	-	-	-	-	-	-	1	3	2	1	3	25
VII	GENETICS AND EVOLUTION	30	2	-	1	1	-	-	1	2	1	-	-	-	-	1	-	-	3	1	2	3	26
VIII	BIOLOGY AND HUMAN WELFARE	25	-	1	1	1	-	1	-	-	1	-	-	1	-	-	1	-	1	2	2	2	21
IX	BIOTECHNOLOGY	12	1	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-	1	1	1	1	11
X	ECOLOGY	24	1	1	1	1	1	-	1	-	-	1	-	-	-	-	-	1	2	2	2	2	22
		120	40 % 43 marks				30% 32 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.

SAMPLE QUESTION PAPER – 2

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

GENERAL INSTRUCTIONS:

(iv) This question paper consists of four parts – A, B, C and D. Part D consists of two parts, Section-I and Section-II.

(v) All the Parts are compulsory.

(vi) 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: 10 x 1 = 10

1. What is Perisperm?
2. Name the oral contraceptive for the females developed by CDRI.
3. Who disproved the theory of spontaneous generation?
4. Name the diagnostic test which confirms typhoid.
5. Name the pathogen which causes malignant malaria.
6. What is the medical use of cyclosporin A?
7. A restriction enzyme digests DNA into fragments. Name the technique used to check the progression of this enzyme and to separate the DNA fragments.
8. State Allen's rule.
9. Define standing crop.
10. How cryopreservation is useful in conserving biodiversity?

PART-B

Answer FIVE of the following in 3 – 5 sentences each, wherever applicable: 5 x 2 = 10

11. What are meiocytes? Mention the chromosome number in meiocyte of human beings.
12. Differentiate chasmogamous flowers and cleistogamous flowers.
13. How are non medicated IUDs different from hormone releasing IUDS?
14. Mention any four objectives of RCH.
15. Mention the number of chromosomes found in the following cells of humans:
    (a) Primary oocyte (b) Secondary oocyte (c) Ootid (d) Follicle.
16. What is modified allele? How the modified allele affects the phenotype of an organism?
17. Distinguish between the template and coding strands of DNA.
18. Mention two classes of nucleases. Suggest their respective roles.

PART-C

Answer FIVE of the following in 40 – 80 words each, wherever applicable: 5 x 3 = 15

19. Name any three units of vegetative propagation in plants with the names of plants in which they are present.
20. What is pedigree analysis? Draw schematic representation of Autosomal dominant trait (Myotonic dystrophy).
21. State any three criteria which a molecule must fulfill to act as a genetic material.
22. Explain mutation breeding with note on plants developed through mutation breeding.
23. Mention any three features of vectors that are most suitable for the purpose for recombinant DNA technology.
24. What do you mean by biodiversity? What are the different types of Biodiversity?
25. Explain how solid wastes can be disposed in different ways.

26. Draw a neat labeled diagram of electrostatic precipitator.

PART-D

Section I

Answer FOUR of the following in 200 – 250 words each, wherever applicable: 4 x 5 = 20

27. Explain the structure of mature female gametophyte with the help of a neat labelled diagram.
28. What is menstrual cycle? Explain the phases of menstrual cycle.
29. State the law of independent assortment. Explain hybrid cross experiment with reference to seed colour and seed shape.
30. Describe the experiment conducted by Hershey and Chase which proves that DNA is the genetic material?
31. Describe Miller's experiment with neat labeled diagram.
32. Explain the components of a biogas plant with a neat labeled diagram

Section II

Answer THREE of the following in 200 – 250 words each, wherever applicable: 3 x 5 = 15

33. Explain the life cycle of plasmodium with reference to malaria disease.
34. Briefly describe the steps involved in plant breeding technology.
35. What are genetically modified organisms? How are GM plants useful?
36. Define the following terms and give one example for each:
    (a) Amensalism (b) Parasitism (c) Commensalism (d) Resource partitioning (e) Competitive release
37. Represent schematically & describe the phosphorus cycle in an ecosystem.

BLUE PRINT II PUC – BIOLOGY

SAMPLE PAPER-2

SL. NO	UNIT	TEACHING HOURS	KNOWLEDGE				UNDESTANDING				APPLICATION/ APPRECIATION				EXPRESSION/ SKILL				TOTAL QUESTIONS				MARKS WEIGHTAGE
		120	1 M	2 M	3 M	5 M	1 M	2 M	3 M	5 M	1 M	2 M	3 M	5 M	1 M	2 M	3 M	5 M	1 M	2 M	3 M	5 M	
1	REPRODUCTION IN ORGANISMS	29	2	1	1	0	0	2	0	0	0	2	0	0	0	0	0	1	2	5	1	2	25
2	GENETICS AND EVOLUTION	30	1	1	0	1	0	0	2	1	0	1	0	0	0	0	0	1	1	2	2	3	26
3	BIOLOGY AND HUMAN WELFARE	25	2	0	0	1	1	0	1	1	0	0	0	1	0	0	0	0	3	0	1	3	21
4	BIOTCHNOLOGY	12	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	11
5	ECOLOGY	24	0	0	2	0	0	0	1	0	1	0	0	0	0	0	0	1	3	0	3	2	22
		120	40% 42 marks				30% 33 marks				15% 15 marks				15%15 marks								105

SAMPLE QUESTION PAPER – 3

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: 10 x 1 = 10

1. Why pollen grains are very well preserved as fossils?
2. Replication in the region of euchromatin would be faster. Justify.
3. With reference to Human Genome Project, what do SNPs refer to?
4. Define genetic equilibrium.
5. How does the administration of α-interferons help cancer patients?
6. Write the scientific name of the microbe which is used in the manufacture of citric acid.
7. Mention the principle on which ELISA is based.
8. Logistic growth model is more realistic than exponential growth model. Why?
9. Why is the pyramid of biomass in sea generally inverted?
10. What is the disadvantage of lead in petrol which is used as a fuel in modern automobiles?

PART – B

Answer the following questions in 3 – 5 sentences each, wherever applicable: 5 x 2 = 10

11. Why is water hyacinth called “the terror of Bengal”?
12. What do you understand by pericarp and perisperm?
13. Differentiate spermiogenesis and spermiation.
14. How is ZIFT different from ICSI?
15. Define pleiotropy. Mention an example.
16. Write the scientific name of the plant from which cocaine is obtained. What is the effect of cocaine in humans?
17. Why is the introduction of genetically engineered lymphocytes into a ADA deficiency patient not a permanent cure? Suggest a possible permanent cure.
18. Justify with the help of two examples where a deliberate attempt by humans has led to the extinction of a particular species on earth.

PART – C

Answer FIVE of the following in 40 – 80 words each, wherever applicable: 5 x 3 = 15

19. What is asexual reproduction? Explain encystation and sporulation in *Amoeba*.
20. Name the hormonal composition of the oral contraceptive used by human females. How does it help in contraception?
21. Explain sex determination mechanism in honey bees.
22. Explain why DNA is a better genetic material than RNA.
23. What is divergent evolution? Explain this with reference to the forelimbs of Cheetah and whales.
24. What is biofortification? Mention four examples for biofortified crops.
25. What is Bt toxin? How does it toxin kill cotton boll worms?

26. Biodiversity plays a major role in providing many ecosystem services. Explain.

PART-D

Section I

Answer FOUR of the following in 200 – 250 words each, wherever applicable: 4 x 5 = 20

27. Describe the structure of megasporangium of angiosperms with a diagram.
28. Draw a labelled diagram of human sperm.
29. With the help of a diagram, explain the structure of transcriptional unit.
30. Write the schematic diagram of the life cycle of *Plasmodium*.
31. What is polymerase chain reaction? Name the bacterium from which the polymerase enzyme used in this technique is obtained. Write the schematic representation of this technique.
32. What is cultural eutrophication? Explain the stages involved in eutrophication.

Section II

Answer THREE of the following in 200 – 250 words each, wherever applicable: 3 x 5 = 15

33. Explain thalassemia as an example for Mendelian disorder.
34. (a) How is the herd size increased by Multiple Ovulation and Embryo Transfer (MOET) technology? (3)
    (b) Differentiate out-crossing and cross breeding. (2)
35. Explain the various statges in the secondary treatment of sewage.
36. 'Parasitic mode of life ensures free lodging and free meals'. Justify listing the special adaptations developed by parasites.
37. Describe the various steps involved in the process of decomposition of detritus.

BLUE PRINT
SAMPLE QUESTION PAPER - 3

UNIT	Content Unit	Teaching Hours	Knowledge				Understnding				Application/ Appreciation				Expression/ Skill				Total				Marks Weightage
			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			2	1	1	1	1						1	1	4	2	2	25
2	GENETICS AND EVOLUTION	30	1	1	3	1	1			1	1								3	1	3	2	24
3	BIOLOGY IN HUMAN WELFARE	25	1	1	1	1	1			1								1	2	1	1	3	22
4	BIOTECHNOLOGY	12			1						1	1						1	1	1	1	1	11
5	ECOLOGY	24	1			1			1	1	2	1		1					3	1	1	3	23
		120	3	6	18	15	2	4	6	20	5	6		5	0	0	0	15	10	16	24	55	105
	GRAND TOTAL		42 M (40%)				32 M (30.5%)				16 M (15.25%)				15 M (14.25%)								

QUESTION BANK PREPARATION COMMITTE

PUC II – BIOLOGY (36)

LIST OF MEMBERS

SL.NO.	NAME	DESIGNATION	EMAIL
1	**ARAVIND KUMAR.K** GPU College, ANAVERI – 577243	CHAIRMAN	aravindbiology@gmail.com
2	**A.SUDHEENDRA HEBBAR** Sri Ramakrishna Vidyashala, Yadavagiri, MYSURU – 570020	REVIEWER	ashebbar66@gmail.com
3	**DR. PUTTASWAMAIAH.B.V** MG GPU COLLEGE (UU016), KUNIGAL-572130	MEMBER	dprsbiology@gmail.com
4	**LAKSHMINARAYAN.K.P** GPU College, KARKALA, UDUPI DIST	MEMBER	Kpln143@gmail.com
5	**UMESH.H.C** DVS (Ind) PU College, SHIMOGA-577201	MEMBER	umeshbrahmi@gmail.com
6	**DIWAKAR.S.K** GPU College, MALUR, KOLAR DIST	MEMBER	divakarbiology@gmail.com
7	**ASHA KUMARI C R** GPU College for Girls (Main), RC ROAD, HASAN-573201	MEMBER	ashagopal.madhu@gmail.com
8	**VERGEES. P** GPU College (Girls - Main), UDUPI	MEMBER	p.vargees@gmail.com
9	**ASHA BAGADEKAR** GPU College (Ind), KUNDAGOL (JJ291), DHARWAD DIST	MEMBER	ashauppin@gmail.com
10	**DR.NIKKY JOHNSON** GPU College (RR078), Police Colony, RAICHUR-584102	MEMBER	nickyjsk@gmail.com
11	**DEVARAJU R** GPU College, KR PURAM, BANGALORE – 560036	MEMBER	reachindev@yahoo.com
12	**DR.SAMPATH** GPU College (Boys), PB Road, PJ Extension, DAVANAGERE -577002	MEMBER	sampath.sringeri@gmail.com
13	**GIRISH TONAPI** GPU College (JG192), Siddalinganagar, Mulugund Road, GADAG	MEMBER	girishtonapi@gmail.com