SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

BIOLOGY

Class 12 - Biology

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
4. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

1. The intermediate zone between adjacent biomes is called: **[1]**

   a) Niche
   b) Photic zone
   c) Ecotone
   d) Ecosphere

2. The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show? **[1]**

   a) S-shaped or sigmoid growth of this insect
   b) The food plants mature and die at the end of rainy season
   c) The population of its predators increases enormously
   d) Its population growth curve is of J-type

3. If a species experiences a 90 percent decline over 10 years (or three generations), would be classified as: **[1]**

   a) Vulnerable
   b) Endangered
   c) Critically endangered
   d) Data deficient

4. Now a day, there is less childless couples. This is due to: **[1]**

   a) Educated population
   b) Uneducated population
   c) Awareness among the couples
   d) Assisted reproductive technologies

5. Monoclonal antibodies are produced from hybrid cells, called hybridomas. The cells employed to obtain these hybridoma cells are: **[1]**

   a) B-lymphocytes and myeloma cells.
   b) B-lymphocytes and carcinoma cells.

c) T-lymphocytes and myeloma cells

d) Lymphoma cells and bone marrow cell.

6. Methanogens belong to: **[1]**

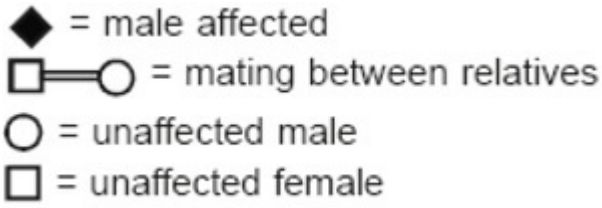
a) Eubacteria

b) Dinoflagellates

c) Archaebacteria

d) Slime moulds

7. Which one of the following symbols and its representation used in the human pedigree analysis is correct? **[1]**



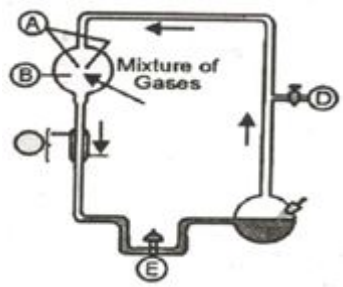
a) unaffected female

b) unaffected male

c) affected male

d) Mating between relatives

8. What was the resultant found in the place marked E? **[1]**



a) Glucose, fatty acids and lipids

b) Some fatty acids and organic acids

c) Some amino acids as glycine and alanine

d) Organic esters only

9. Which of the following is not a producer? **[1]**

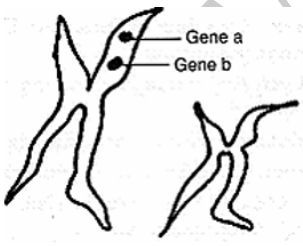
a) Agaricus

b) Spirogyra

c) Nostoc

d) Volvox

10. Given below is a highly simplified representation of human sex chromosomes from a karyotype. The genes a and b could be of: **[1]**



a) Colour blindness and body height

b) Attached ear lobe and Rh blood group

c) Phenylketonuria and haemophilia.

d) Haemophilia and red green colour blindness

11. Big holes in Swiss cheese are made by a: **[1]**

a) a machine

b) a fungus that releases a lot of gases during its metabolic activities

c) a bacterium producing a large amount of carbon dioxide

d) a bacterium that produces methane gas

12. The mechanism that causes a gene to move from one linkage group to another is called: **[1]**

a) Translocation
b) Duplication
c) Crossing-over
d) Inversion

13. **Assertion (A):** Natality increases both population density and population size. **[1]**
Reason (R): Natality increases the number of individuals in an area by births.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

14. **Assertion (A):** Acetic acid is prepared by acetic acid bacteria. **[1]**
Reason (R): Alcoholic fermentation and the conversion of alcohol to acetic acid are aerobic processes.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

15. **Assertion (A):** Detritus food chain may be connected with grazing food chain at some levels. **[1]**
Reason (R): Some organisms of the Detritus food chain are prey to the Grazing food chain animals.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

16. **Assertion (A):** Nature selects only adapted organisms. **[1]**
Reason (R): These adapted organisms may form different species.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

Section B

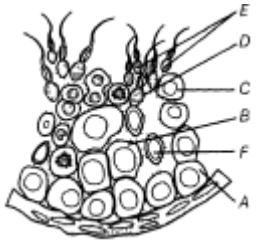
17. Describe the contributions of Alexander Fleming, Ernest Chain and Howard Florey in the field of microbiology. **[2]**

18. Study the mRNA segment given below, which is complete and to be translated into a polypeptide chain and answer the following questions: **[2]**

i. Write codons 'A' and 'B'.
ii. What do they code for?
iii. How is the peptide bond formed between two amino acids in the ribosome?

19. a. Draw a neat diagram of a mature angiospermic embryo sac and label any four cellular components. **[2]**
b. Write the function of filiform apparatus.

20. Name the labels A, B, C, D, E and F in the diagram of seminiferous tubule. **[2]**



21. Mention the common bacterium found in the anaerobic sludge during sewage treatment and also in the rumen of cattle. How is this bacterium commercially useful? **[2]**

OR

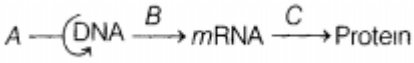
Mention the product and its use produced by each of the microbes listed below

(i) Steptococcus

(ii) Lactobacillus

(iii) Saccharomyces cerevisiae

Section C

22. 

[3]

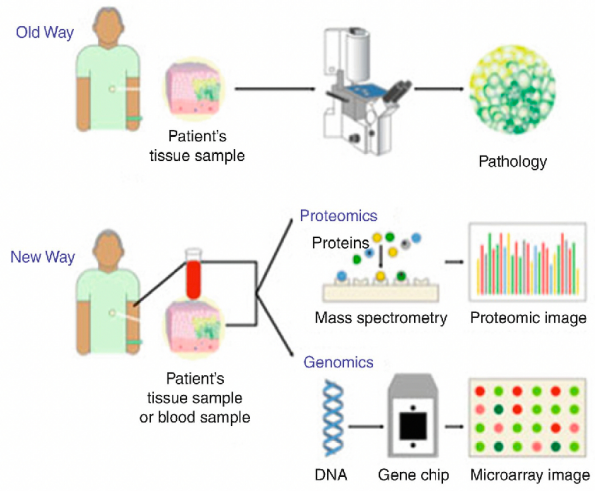
i. Look at the above sequence and mention the event A, B and C.

ii. What does central dogma state in molecular biology? How does it differ in some viruses?

23. F_1 progeny of pea plant bearing violet flowers and snapdragon plant bearing red flowers were selfed to produce their respective F_2 progeny. Compare the phenotypes, the genotypes and the pattern of inheritance of their respective F_2 progeny. **[3]**

24. What is brood parasitism? Explain with the help of an example. **[3]**

25. The image below describes the molecular diagnostic procedures. **[3]**



i. Write any two biochemical/molecular diagnostic procedures for early detection of viral infection.

ii. Explain the principle of any one of them.

26. What are the consequences of loss of biodiversity in a region? Explain. **[3]**

OR

Biodiversity must be conserved as it plays an important role in many ecosystem services that nature provides. Explain any two services of the ecosystem.

27. While creation and presence of variation are directionless, natural selection is directional as it is in the context of adaptation. Comment. **[3]**

28. Following a road accident, four injured persons were brought to a nearby clinic. The doctor immediately injected them with tetanus antitoxin. **[3]**

i. What is tetanus antitoxin?

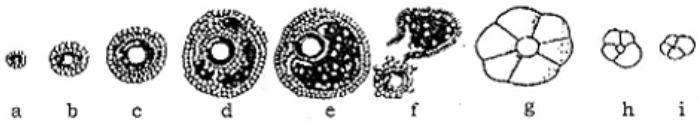
ii. Why were the injured immediately injected with this antitoxin?

iii. Name the kind of immunity this injection provided.

Section D

29. **Read the following text carefully and answer the questions that follow:** **[4]**

The following is the illustration of the sequence of ovarian events (a-i) in a human female.



i. Identify the figure that illustrates ovulation and mentions the stage of oogenesis it represents. (1)

ii. Name the ovarian hormone and the pituitary hormone that have caused the above-mentioned event. (1)

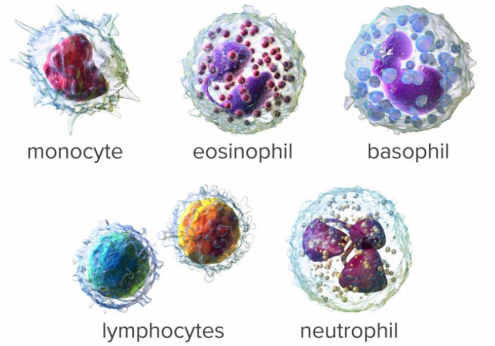
iii. Explain changes that occur in the uterus simultaneously in anticipation. (2)

OR

Draw a labelled sketch of the structure of a human ovum prior to fertilization. (2)

30. **Read the following text carefully and answer the questions that follow:** **[4]**

A lymphocyte is **a type of white blood cell**. Enlarge. Blood cells. Blood contains many types of cells: white blood cells (monocytes, lymphocytes, neutrophils, eosinophils, basophils, and macrophages), red blood cells (erythrocytes), and platelets. Blood circulates through the body in the arteries and veins.



i. Why are the antigens called antibody-generating chemicals? (1)

ii. Which two types of lymphocytes are involved in immunity? (1)

iii. Give the common site of formation of two types of lymphocytes. (2)

OR

What is the site of differentiation of two types of lymphocytes? (2)

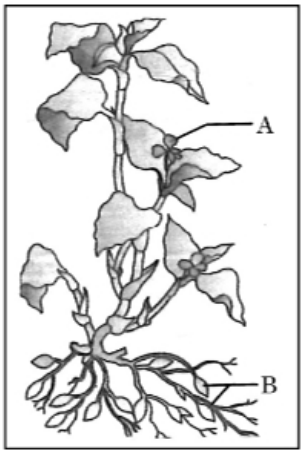
Section E

31. a. Explain the process of double fertilization in angiosperms. **[5]**

b. Why does the development of endosperm preceeds that of embryo?

c. List the parts of a typical dicot embryo.

OR



Observe the picture of Commelina plant bearing two types of flowers given above.

i. Identify the two types of flowers labelled ‘A’ and ‘B’ in the picture.

ii. Compare the two types of flowers with reference to:

1. Characteristic feature
2. modes of pollination

iii. List any two **out breeding devices** in flowering plants. Explain why do plants develop such devices.

32. a. Write the steps that lead to aminoacylation of tRNA in the cell. **[5]**

b. Explain the events that occur in ribosomes during translation in prokaryotes.

OR

a. Write the scientific name of the organism Griffith used in his experiments. State the conclusions he arrived at.

b. Name the scientists and describe how they experimentally proved the biochemical nature of the genetic material which was earlier considered as protein.

33. Bioreactors are the containment vehicles of any biotechnology-based production process. For large scale production and for economic reasons the final success of biotechnological process depends on the efficiency of the bioreactor. **[5]**

Answer the following questions w.r.t. the given paragraph:

i. List the operational guidelines that must be adhered to so as to achieve optimisation of the bioreactor system. Enlist any four.

ii. Mention the phase of the growth we refer to in the statement **Optimisation of growth and metabolic activity of the cells.**

iii. Is the biological product formed in the bioreactor suitable for the intended use immediate? Give reason in support of your answer.

OR

a. Explain the different steps carried out in Polymerase Chain Reaction, and the specific roles of the enzymes used.

b. Mention application of PCR in the field of

i. Biotechnology

ii. Diagnostics