

**CLASS XI  
BIOLOGY (044)**

**Maximum Marks: 70**

**Time: 3 hours**

**General Instructions:**

- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions. All questions are compulsory.
- (iii) 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.
- (iv) 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.
- (v) Wherever necessary, neat and properly labelled diagrams should be drawn

**SECTION A**

1. Which of the following is a correct statement for taxonomic categories?
  - (a) Group of related genera comprises a species
  - (b) Family has a group of related orders
  - (c) Related orders form the category class
  - (d) Genus comprises a group of related phyla
2. *Adiantum* differs from *Funaria* in the presence of:
  - (a) independent gametophyte
  - (b) multicellular sporophyte
  - (c) flagellate antherozoids
  - (d) dominant sporophyte
3. Which of the following represents the **incorrect** matching between the hormone and its effect?
  - (a) Parathyroid hormone- Hypercalcemia
  - (b) Glucagon-Hyperglycemia
  - (c) Cortisol- Anti-inflammatory
  - (d) Vasopressin- Diuretic
4. During urine formation, the glomerular capillary blood pressure causes filtration of the blood through three layers. Which of the following options shows the correct sequence?
  - (a) endothelium of glomerular blood vessels → basement membranes → epithelium of proximal convoluted tubule
  - (b) epithelium of Bowman's capsule → endothelium of glomerular blood vessels → basement membranes
  - (c) endothelium of glomerular blood vessels → basement membranes → epithelium of Bowman's capsule
  - (d) epithelium of proximal convoluted tubule → basement membranes → epithelium of Bowman's capsule
5. The figure given below is a diagrammatic representation of a standard ECG.



Select the correct match between Column I and Column II:

Column I	Column II
(A) P wave	(1) Ventricular depolarisation
(B) QRS complex	(2) Excitation or depolarisation of atria
(C) T wave	(3) Ventricular repolarisation

- (a) A-1, B-2, C-3  
 (b) A-3, B-2, C-1  
 (c) A-2, B-1, C-3  
 (d) A-2, B-3, C-1
6. The most unique mammalian characteristic is:
- (a) presence of hair on the skin  
 (b) two pairs of limbs  
 (c) viviparous with internal fertilisation  
 (d) presence of milk producing glands
7. Which one of the following options is the correct gradient of  $pO_2$  (in mmHg) for exchange of gases from alveoli to the blood and from blood to the tissues in humans?
- (a)  $104 \rightarrow 95 \rightarrow 40$   
 (b)  $40 \rightarrow 40 \rightarrow 45$   
 (c)  $140 \rightarrow 195 \rightarrow 140$   
 (d)  $140 \rightarrow 140 \rightarrow 145$
8. Choose the correct matching of the plant hormones with their functions.

<u>Hormone</u>	<u>Function</u>
A. Ethylene	i. Promotes bolting in cabbage
B. ABA	ii. Overcomes apical dominance
C. Cytokinin	iii. Inhibits seed germination
D. Gibberellin	iv. Synchronises fruit set in pineapples

- (a) A-ii, B-iii, C-iv, D-i  
 (b) A-iv, B-i, C-ii, D-iii  
 (c) A-iv, B-iii, C-ii, D-i  
 (d) A-iii, B-ii, C-i, D-iv
9. Given below are the steps of Z scheme of light reaction:
- (A) Electrons in PSI absorb light and get excited.  
 (B) Electrons move downhill from one carrier to another.  
 (C) Excited electrons picked up by Electron acceptor and passed on to ETS.  
 (D) Excited electrons picked up by Electron acceptor and passed on to  $NADP^+$ .  
 (E) Electrons in PSII absorb light and get excited.

The correct sequence of steps is:

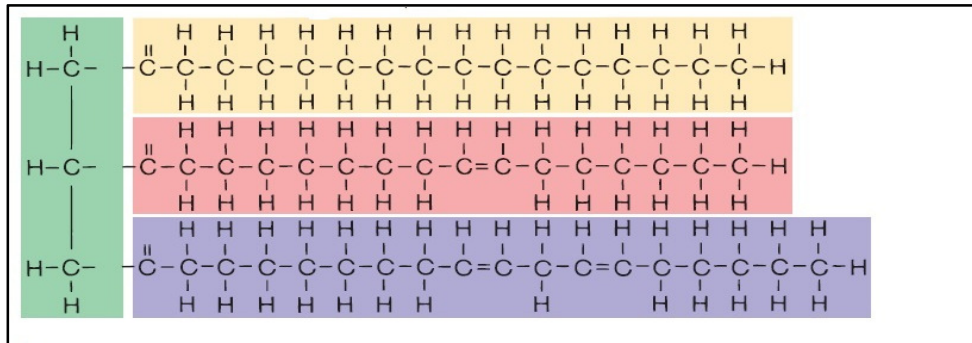
- (a) A, C, B, E, D
- (b) E, C, B, A, D
- (c) E, C, A, D, B
- (d) A, C, E, B, D

10. Match the Column I (class) with Column II (animals):

<u>Column I</u>	<u>Column II</u>
(1) Arthropoda	(A) <i>Ancylostoma</i>
(2) Aschelminthes	(B) <i>Ichthyophis</i>
(3) Mollusca	(C) <i>Locusta</i>
(4) Amphibia	(D) <i>Chaetopleura</i>

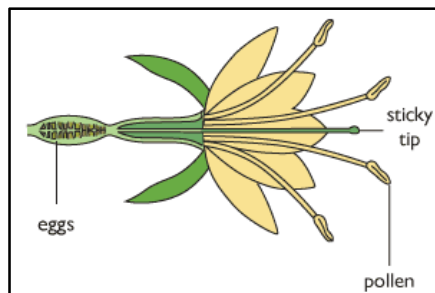
- (a) 1-A, 2-B, 3-C, 4-D
- (b) 1-B, 2-C, 3-D, 4-A
- (c) 1-C, 2-A, 3-D, 4-B
- (d) 1-D, 2-A, 3-B, 4-C

11. Correctly identify the organic compound (shown in the given diagrammatic representation) and its components.



- (a) Triglyceride: - 1 Glycerol, 3 saturated fatty acids
- (b) Triglyceride: - 1 Glycerol, 2 unsaturated fatty acids, 1 saturated fatty acid
- (c) Triglyceride: - 1 Glycerol, 2 saturated fatty acids, 1 unsaturated fatty acid
- (d) Triglyceride: - 3 Glycerol, 2 unsaturated fatty acids, 1 saturated fatty acid

12. To which category type does the given flower belong, based on the position of floral parts on the thalamus?



- (a) Hypogynous
- (b) Perigynous
- (c) Epigynous
- (d) Syngynous

**Question No. 13 to 16 consist of two** statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- A. Both A and R are true and R is the correct explanation of A.
  - B. Both A and R are true and R is not the correct explanation of A.
  - C. A is true but R is false.
  - D. A is False but R is true.
13. **Assertion:** Cnidocytes are used for defence and to capture the prey.  
**Reason:** Cnidocytes contain the stinging capsules or nematocysts.
14. **Assertion:** Ball and socket joints are the most mobile joints.  
**Reason:** It is characterised by the presence of fluid filled synovial cavity.
15. **Assertion:** Phosphorylation of glucose forms glucose-6-phosphate in glycolysis.  
**Reason:** The enzyme invertase hydrolyses sucrose into glucose and galactose.
16. **Assertion:** Many small circular DNA called plasmids are present in certain bacteria.  
**Reason:** Plasmids confer resistance to antibiotics in bacteria.

### SECTION B

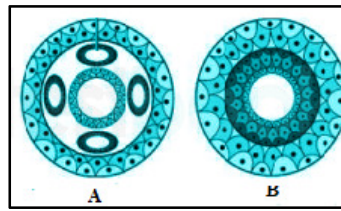
17. Athletes A and B are selected in a team for marathon and sprinting. Athlete A has more white muscle fibres while B is blessed with more red muscle fibres. Which one of them is fitter for running a marathon? Justify your answer.

**OR**

GFR in a healthy individual is approximately 125 ml/min, but in Akshat, the GFR value has fallen down to 90 ml/min. How will his hypothalamus help him to cope up with this situation?

18. Give reasons:
- (i) The diatoms have left behind a large amount of cell wall deposits in their habitats.
  - (ii) Spores of slime moulds are extremely resistant and can survive for many years in adverse conditions.
19. Selective weed killers kill some plants but not others. This can be useful for getting rid of dandelions (dicot) in a lawn without killing the grass. They are generally used to prepare weed free lawns by the gardeners.
- (a) Name the selective weed killer mentioned in the above paragraph.
  - (b) Name one more synthetic hormone belonging to this group and state its one commercial application.
20. Categorise the following as homopolymers and heteropolymers:
- (i) Cellulose
  - (ii) Collagen
  - (iii) Inulin
  - (iv) Chitin

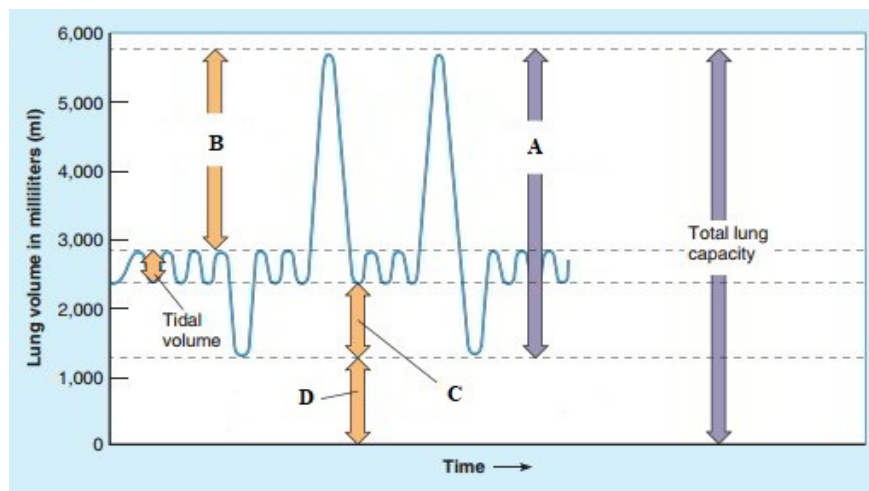
21. The figure given below shows the diagrammatic sectional view of two types of coelom in animals.



- (a) Name the two types of coeloms A and B and identify which one of the two is present in *Fasciola*.  
 (b) Explain briefly how the coelom of *Cucumaria* is different from the coelom shown in figure A.

### SECTION C

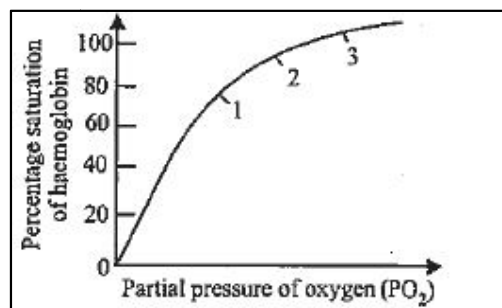
22. Analyse the given graph showing different respiratory volumes and capacities and answer the following questions:



- (a) Define the pulmonary capacity depicted as A.  
 (b) Differentiate between B and C in the given graph.

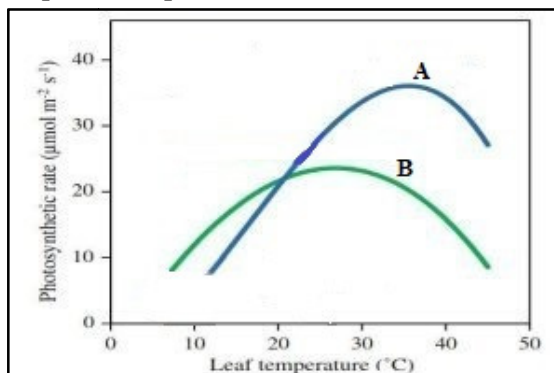
**OR**

Analyse the given graph and answer the questions that follow:



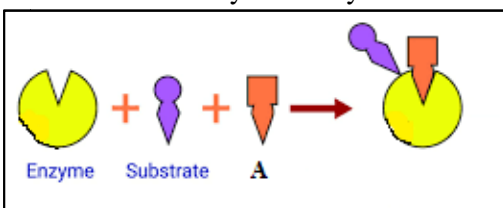
- (a) What is the curve depicted in the figure known as?  
 (b) At which of the points, 1, 2 or 3 on the graph, will the  
 (i)  $p\text{CO}_2$  be maximum?  
 (ii)  $\text{H}^+$  concentration be minimum?

23. Analyse the temperature responses of plants A and B:



- (a) Identify the plant which forms oxaloacetic acid as the first product of CO<sub>2</sub> fixation. Justify.  
 (b) Identify the plant which shows more photorespiratory losses. Justify.

24. (a) Discuss the effect of A on the rate of the enzyme catalysed reaction depicted below:



- (b) Define the term 'activation energy'.

25. Draw the ultra structure of a eukaryotic cilia.

OR

With the help of a diagram, represent the structure of plasma membrane according to the fluid mosaic model.

26. Study the given table showing the major divisions of algae and their main characteristics. Answer the questions that follow:

Class	Major Pigments	Stored food	Cell wall composition	Flagellar number and position of insertion
Phaeophyceae	Chl a, c and (i)_____	Mannitol and Laminarin	Cellulose and (iii)_____	2, unequal, lateral
Rhodophyceae	Chl a, d and phycoerythrin	(ii)_____	Cellulose, pectin and polysulphate esters	(iv)_____

- (a) Identify (i), (ii), (iii) and (iv).  
 (b) State the importance of presence of (iii) in *Sargassum*.

27. Give a comparative account of Basidiomycetes and Ascomycetes under the following heads:

- (i) Asexual spores  
 (ii) Sexual spores

28. (a) State the structure and function of the following parts in frog:

- (i) Cloaca (ii) Sinus venosus

(b) How can one distinguish between a male frog and female frog morphologically?

## SECTION D

29. A pregnant lady gets her blood tested and one of the hormonal parameters in the report is found as under. Analyse the report and answer the following questions:

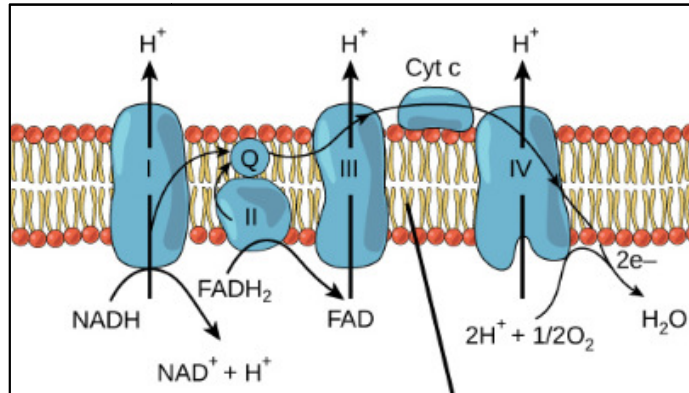
Hormone	Result (mU/ml)	Reference Range(mU/ml)
T3	0.88	1.30-3.10
T4	2.72	4.30-12.50
TSH	8.20	0.25-5.50

- (a) Identify the condition this lady is suffering from.
- (b) Name the source gland of the above three hormones.
- (c) Mention any four effects on the growing foetus if this condition is left untreated?

**OR**

Which mineral nutrient could be included in her diet to normalise her hormonal levels? State its role.

30. The given diagram shows electron transport system that occurs in mitochondria in aerobic cellular respiration.



- (a) Name the electron transport system protein that forms complex II.
- (b) State the specific location of cytochrome c in the inner mitochondrial membrane.
- (c) State the specific reaction and pathway from which complex II receives electrons in aerobic cellular respiration.

**OR**

An uncoupling agent such as carbon monoxide disrupts the ETS and inhibits complex IV. How does this prevent ATP synthesis?

## SECTION E

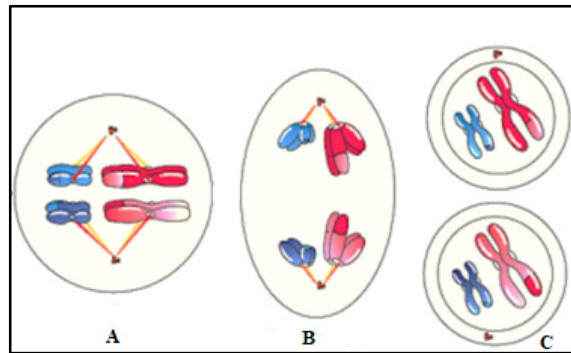
31. Nerve impulses get conveyed and transmitted via action potentials, which are brief changes in membrane potential. Neurons have a resting membrane potential of around -60 mV, this is due to net negative charge on the inner side of the neural membrane and net positive charge on the outer side of the neural membrane. This separation of charges results in electrical potential.

- (a) Passive movement of which ions mainly generates this membrane potential?
- (b) Concentration of which ion is more inside the neuron in resting membrane potential and why?
- (c) Acute autoimmune process may lead to PNS demyelination and other neurological conditions. How does the PNS demyelination affect the velocity of nerve impulse transmission? Explain.

The autonomic regulation of the heart is a very prominent activity for cardiac muscles that beats until death. This regulation is maintained by the involvement of Autonomic Nervous System (ANS). There is an extensive innervation of the myocardium. Cardiovascular functions are also modulated through reflex mechanism that involve baroreceptors, the chemical composition of the blood and via the release of various hormones.

- Name the specific part of the brain that modulates the cardiac function.
- Signals from which part of the ANS will increase the cardiac output in a person undergoing stress and fear of riding a giant roller coaster? What is the underlying mechanism involved?
- Hormones released from which gland of the body increases the cardiac output?
- Define cardiac output and mention its average volume in a healthy individual.

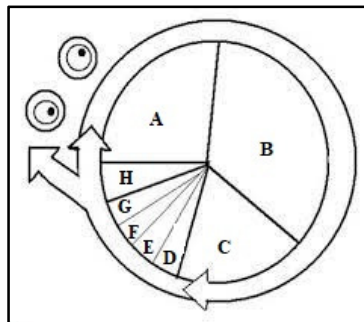
32. Ritika observed the permanent slides of different stages of meiosis and drew the diagrams as follows:



- Name the stages A, B and C observed by her and state the main identifying features of the same.
- Briefly describe the salient features of zygotene and pachytene phases of Prophase-I.

**OR**

A diploid cell with DNA content  $2C$  and 24 chromosomes goes through the different stages of cell cycle.



- In which of the phases A to H, the DNA content is increased to  $4C$ ? What will be the number of chromosomes in this phase?
- In which of the phases A to H, is chromosome morphology most easily observed? How are the chromosomes arranged in this phase?
- Adult heart cells although metabolically active, do not divide until required. Which phase of the cell cycle do they exhibit? What is the other term used for this phase?
- State one significance of mitosis in animals.



33. (a) Explain the anatomy of a monocotyledonous stem.  
(b) Give two points of difference between the anatomy of an isobilateral and dorsiventral leaf.

**OR**

- (a) Write a note on the given floral characteristics of belladonna flower:  
(i) Gynoecium  
(ii) Androecium
- (b) Draw the floral diagram of the family to which belladonna belongs to.