

2000  
BIOLOGY  
(THEORY)  
Full Marks - 70

Pass Marks - 21  
Time : Three Hours

*All questions are compulsory*

*Marks for each question are indicated against it*

*For question nos. 1-5 select the most appropriate one and*

*rewrite the same*

1. Movement of leaflets in Sensitive plant is
  - (a) tropic movement
  - (b) nastic movement
  - (c) mutation
  - (d) mutation.1
  
2. Cytoplasm of striated muscle fibre is called
  - (a) endosperm
  - (b) nucleoplasm
  - (c) karyoplasm
  - (d) sarcoplasm.1
  
3. The structure involved in Genetic Engineering is
  - (a) plasmid
  - (b) codon
  - (c) plastid
  - (d) scissors.1
  
4. Vein differs from artery in having
  - a) narrow lumen
  - b) strong muscular wall

- c) valves
- d) pigmented wall. 1
5. A woman with normal vision marries a man with normal vision and gives birth to a colour-blind son. Her husband dies and she remarries a colour-blind man. What is the probability of her children having this abnormality?
- a) 50% colour blind sons and 50% colour blind daughters.
- b) all sons colour blind and daughters carriers
- c) all daughters colour blind and sons normal.
- d) 50% sons colour blind and all daughters normal. 1
6. Name the central element present in chlorophyll molecule. 1
7. What is the type of pollination when a snail pollinates a flower ? 1
8. Name the appendages through which respiration specially in Neries. 1
9. What is Osmoregulation ? 1
10. Name the kind of skeletal joint which permits movements in single plane only. 1
11. What protected life on earth in its days of origin from harmful radiation? 1
12. Who used the phrase, 'Survival of the fittest' for the first time?
13. Why is energy required to develop root pressure? 1
14. Give *one* point of difference between infection and infestation. 1
15. Give one example each of symbiotic and non-symbiotic bacteria.  $\frac{1}{2} + \frac{1}{2} = 1$
16. What is pericardium and how it is helpful to humans?  $1 + 1 = 2$
17. How an underground stem can be differentiated from a root? Give any four points.  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$
18. Differentiate between Sympatric and allopatric species by giving only two points.  $1 + 1 = 2$
19. Differentiate between manure and fertilisers by giving four points  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$
20. In your basket of fruits, you have banana and mangoes. What types of fruit are represented botanically?  $1 + 1 = 2$
21. A doctor has advised his patient to reduce fluorine content in his diet. Write any two symptoms that the doctor might have noticed in the patient.  $1 + 1 = 2$
22. Draw a human excretory system showing,
- i) left and right kidneys
- ii) renal artery and renal vein
- iii) inferior vena cava and aorta
- iv) a pair of Ureters and Urethra.  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$
23. Draw a metaphase, sub-metacentric SAT-chromosom and depict the correct location of the following :

Centromere, Chromatids, Secondary constriction and Telomere  $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=2$

24. What is genetic counselling? Write its uses before and after marriage. 1+2=3
25. Differentiate between male and female gametophytes of Angiosperm in their origin, number of cells and functions of cells. 1+1+1=3
26. Give *three* points of difference between single and double blood circulation 1+1+1=3
27. It was diagnosed that the body of a patient has lost its power of fighting any infection. Name the possible disease, What type of microbes may be responsible for the disease and how it may spread from one person to another?  $\frac{1}{2}+\frac{1}{2}+2=3$
28. Draw a diagrammatic structure of T. S. of sunflower stem showing i) Epidermis ii) Hypodermis iii) Endodermis iv) Pericycle v) Vascular bundles and vi) pith 3
29. Describe the process of spermatogenesis in human beings and cite its importance. 4+2=6
30. Write *six* points of difference between cyclic and non-cyclic photophosphorylation. 6
31. Giving four examples each from Animals and Plants differentiate between homologous organs. 4+2=6
32. In Snapdragons, tall (DD) is dominant over dwarf (dd), red flower (RR) incompletely dominant over white (rr) flower, the hybrid being pink. A pure tall white is crossed to a pure dwarf red and the Flare self-fertilised. Give the proportion of the expected genotypes and phenotypes in  $F_1$  &  $F_2$ . 6

# BIOLOGY

## Scoring Key /Outline Answer And Marking Scheme

- |   |   |
|---|---|
| 1. b) Nastic movement   | 1 |
| 2. d) Sarcoplasm  | 1 |
| 3. a) Plasmid   | 1 |
| 4. c) Valves  | 1 |
| 5. a) 50% Colour blind sons and 50% colour blind daughters  | 1 |
| 6. Magnesium (Mg)   | 1 |
| 7. Malacophily  | 1 |
| 8. Parapodia  | 1 |
| 9. Removal of excess water from body to keep water content constant.  | 1 |
| 10. Hinge joints e. g. Elbow and knee joint.  | 1 |
| 11. Ozone layer   | 1 |
| 12. Herbert Spencer   | 1 |
| 13. a) To Overcome respiratory inhibitors which tend to reduce the water absorption.  | 1 |
| b) Any other suitable answer.   | 1 |
| 14. Infection is the entry and multiplication of pathogens in the host's body whereas infestation is the presence of large no. of parasitic organism on the surface of host's body. | 1 |
| 15. Examples of Symbiotic bacteria; Rhizobium, etc.   | ½ |
| Non symbiotic bacteria-Azotobacter, etc.  | ½ |
| 16. Pericardium is a double walled membranous sac, enclosing heart.   | 1 |
| It protects heart from shocks and mechanical injuries.  | 1 |
| 17. Any four of the following:  |   |
| (i) Absence of root cap.  | ½ |
| (ii) Absence of root hairs  | ½ |
| (iii) Presence of nodes and internodes  | ½ |
| (iv) presence of foliage and scale  | ½ |
| (v) presence of leafy beds  | ½ |
| (vi) Exogenous branching  | ½ |
| (vii) Stem like internal  | ½ |
| (viii) Any other character  | ½ |

18.

SYMPATRIC SPECIES	ALLOPATRIC SPECIES
i) Found in same geographical area	iv) Found in different geographical area

ii) Occur within original population	v) Occur in different population
iii) Any other suitable points	

(Any two points of one mark each) = 2

19. Any four of the following: (½ mark each)= 2

MANURE		FERTILISER	
i) Natural substance obtained by decomposition		i) Inorganic or organic salt	
ii) Not nutrient specific		ii) Nutrient specific	
iii) Not very rich in plant nutrition		iii) Very rich	
iv) Not very soluble in water		iv) Soluble in water	
v) Gives a lot of humus to soil		v) Does not give humus	
vi) Prepared in field or rural home		vi) Prepared in factories	
vii) Any other point (suitable)			

20. Banana - Berry or becca 1

Mangoes - Drupe 1

21. Any two of: 1+1=2

- Discolouring of the enamel of teeth
- Rigidity of the spinal column & done due to calcification.
- Any other symptoms.

22. Self-explanatory. (Correct drawing & labelling) ½ x4=2

23. Self-explanatory. (Correct drawing & labelling) ½x4=2

24. Genetic counselling:

Giving advice on the basis of genetic information. 1

Uses before marriage

Any two: -

- To avoid possibility of having defective children.
- Blood Test-to avoid AIDS, Haemophilia, Leukaemia etc.
- To detect chromosomal abnormalities e. g. Down's syndrome, Turner's syndrome etc.

½x2= 1

After marriage

Any two: -

- To know about the condition of the foetus.
- To know sex-linked genetic disorders.
- To know congenital diseases.
- Metabolic disorders etc.

25. MALE GAMETOPHYTE

- Origin : derived from pollen grain or microspore.
- No. of cells : 3 cells
- Function : all are functional tube cell carries male gametes which take part in fertilisation

FEMALE GAMETOPHYTE

- megaspore
- 7 cells
- Egg, Definitive nucleus one gynergide to accept pollen tube 1

26. Any three of:

SINGLE BLOOD CIRCULATION

DOUBLE BLOOD CIRCULATION

i. found in fishes	i. found in amphibian, reptiles, birds & mammals.	1
ii. blood passes only once through the heart.	ii. twice through the heart.	1
iii. Only deoxygenated blood passes through the heart	iii. Mixed or oxygenated or deoxygenated blood passes through the heart.	1
iv. less efficient.	iv. more efficient.	
27. Name of the disease: AIDS		½
Microbe: Virus		½
Mode of spread (Any two):		
i. Sexual contact with infected persons.		1
ii. Blood transfusion		1
iii. Mother to child		1
iv. Contaminated syringes and needles		1
v. Any other suitable means		1
28. Self explanatory.		½x6=3
29. Four steps of Spermatogenesis		
i. Multiplication phase and brief description.		1
ii. Growth phase and brief description		1
iii. Maturation phase and brief description		1
iv. Formation of Spermatozoa and brief description		1
Importance:		
Any two:		
i. Formation of four sperms.		1
ii. Maintaining chromosome no. constant from generation to generation by reducing the no, to half in sperms.		1
iii. Occurrence of variants due to crossing over.		1
iv. It gives evidence of the basic relationship of the organisms.		1
30. Any six points		1x6=6
CYCLIC PHOTOPHOS- PHCRYLATION	NON-CYCLIC PHOTOPHS- PHORYLATION	

- |  |  |   |
|--|--|---|
| i. performed by photosystem –I independently                                 | i. performed by collaboration of photosystem. I & II                                     | 1 |
| ii. External source of electron is not required.                             | ii. Requires an external electron donor.   | 1 |
| iii. not connectd with photolysis of water & so no O <sub>2</sub> is evolved | iii. connected with photolysis of water and liberation of O <sub>2</sub> .               | 1 |
| iv. synthesizes only ATP   | iv. Both ATP & NADPH   |   |
| 1  |  |   |
| v. operates under low light intensity and anaerobic condition                | v. operates under optimum light and aerobic condition and in presence of CO <sub>2</sub> |   |
| 1  |  |   |
| vi. occurs mostis in stromal or integranal thylakeides.                      | vi. occurs in the granal thylakoids  |   |
| vii. ATP synthesis is not affected by DCMU                                   | vii. DCMU inhibits it  |   |
| 1  |  |   |
| viii. Any other suitable point.  |  |   |

31. Homologous organs are those which have the same origin and fundamental structure but are different in functions whereas Analogous organ are those which have similar functions but are different in their origin and structural details.

2

Homologous organs from Animals : Any two ½x2 = 1

- i. Fore limbs of frog, lizard, pigeon. whale etc.
- ii. Mouth parts of cockroach, honeybee. mosquito and butterfly.
- iii. Fore limbs of bat, whale, horse, man etc.
- iv. Any other suitable examples.

Homologous organs from plants (Any two) ½+½=1

- i. Thorn of Bougainvillea and tendril of passion flower.
- ii. Spine of barbery and tendril of Lathyrus aphaca.
- iii. Tendrils of pea, and terminal leaflets.
- iv. Any other suitable examples.

Analogous organs from Animals: (any two) ½x2=1

- i. Wings of insect and wings of birds.
- ii. Sting of scorpion and sting of honey bee.
- iii. Flipper of whale and fins of fishes.
- iv. Horns of cattle ( from skin ) and antler of deer (Bony)
- v. Any other examples.

Analogous organ from plants (Any two) : ½x2=1

- i. Spine of Indian plum and thorn of Duranta.
- ii. All tendrils of stems, leaves, flower buds.

- iii. All spines and thorn.
  - iv. All storage organs of plants wheather of stem or root.
32. Genotypes of parents and gametes 1/2+1/2=1
- Genotype and phenotype of F<sub>1</sub>
- Dd Rr (Tall and pink) 1/2+1/2=1
- Correct process to find out F<sub>2</sub> generation. 2
- Phenotypic Ratio =3:6:3:1:2:1 1
- Genotypic Ratio 1: 2: 2: 4. 1: 2: 1: 2:1 1

*HEAD EXAMINER*  
Biology