

BIOLOGY (Theory)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions :

- (i) This question paper consists of four sections **A, B, C** and **D**. Section **A** contains **5** questions of one mark each, Section **B** is of **10** questions of **two** marks each, Section **C** is of **10** questions of **three** marks each and Section **D** is of **3** questions of **five** marks each.
- (ii) All questions are compulsory.
- (iii) There is no overall choice. However, an internal choice has been provided in one question of **2** marks, one question of **3** marks and one question of **5** marks weightage. Attempt only one of the choices in such questions.
- (iv) Question numbers 1 to 5 are to be answered in one word or one sentence each.
- (v) Question numbers 6 to 15 are to be answered in approximately 20-30 words each.
- (vi) Question numbers 16 to 25 are to be answered in approximately 30-50 words each.
- (vii) Question numbers 26 to 28 are to be answered in approximately 80-120 words each.

QUESTION PAPER CODE 57/1/1

SECTION A

1. What would happen to the rate of photosynthesis in C_3 plants if the CO_2 concentration level almost doubles from its present level in the atmosphere ? 1
2. In humans, starch digestion begins in the buccal cavity but stops in the stomach. Why ? 1
3. Name the two most biodiversity-rich zones of India. 1
4. Name the hormone that makes the plants more tolerant to various stresses. 1
5. Name the two major groups of cells required in attaining specific immunity. 1

SECTION B

6. Name the end products of aerobic and anaerobic glycolysis. List two ways by which molecules of ATP are produced in glycolysis during aerobic respiration in a cell. 2

7. Differentiate between Total Fertility Rate (TFR) and Replacement Level (RL). 3
8. Due to uncontrolled excessive hunting the population of tigers in a forest becomes zero. Discuss the long-term effects of this situation on the population of deer in that forest. 2
9. Name the source gland of leutinising hormone (LH). Mention the other hormone along with which it acts on its target cells/organ. Give their two functions. 2
10. Can all the four chambers of the human heart experience systole simultaneously? Explain justifying your answer. 2

OR

- What do you call the circulatory fluid in the body of cockroach ? Mention its three functions.
11. Why did scientists pick hydrogen as the basis for MRI scanning ? Name two parts of the human body that do not appear in an MRI scan. 2
 12. What is thermal stratification ? How does thermal stratification in temperate lakes help in rich growth of phytoplankton during autumn and spring turn-over? 2
 13. Where do PGA and glycine gain entry respectively after being formed during photorespiration in plants ? What happens to them immediately after ? 2
 14. What is meant by bioassay ? Name the two bioassays that are used to examine auxin activity in plants. 2
 15. Explain CO₂ compensation point. 2

SECTION C

16. Define the following and give their values in a normal human adult : 3
 - (i) Tidal volume
 - (ii) Expiratory reserve volume
 - (iii) Inspiratory capacity
17. (i) How do grasslands differ from Savannas ?
 (ii) Name the two major categories of plant forms that dominate the desert vegetation. 3
18. Explain the Capillarity Theory in respect of ascent of water in plants. Name the tissue involved. 3
19. Explain the initiation of muscle contraction. What is the role of Sarcoplasmic Reticulum, Myosin head and F-Actin during contraction in striated muscles ? 3

20. What is meant by ozone shield ? Name two gases that can cause damage to this shield. Give one harmful effect of this damage each on plants and animals. 3
21. Why is sub-culturing essential in plant tissue culture ? 3

OR

- Explain the process of heterosis. How is it different from inbreeding depression?
22. Where and how is urea produced in ureotelic animals ? What happens to the kidney filtrate in descending loop of Henle and collecting tubules in humans ? 3
23. Distinguish between epimorphic and morphallactic regeneration, giving one example of each. 3
24. Mention where the following are located in the human brain, and give one function of each : 3
- (i) Temporal lobe
 - (ii) Cerebellum
 - (iii) Corpus callosum
25. Define innate immunity. Name and explain the category of barrier which involves macrophages. 3

SECTION D

26. What is the basis of classifying cancer ? Name and explain the different categories of cancer. Mention any two approaches for cancer treatment. 5

OR

- What is embryo culture ? What is the objective of this culture ? Describe the three applications of this technique.
27. Draw a diagram of the longitudinal section of a mature anatropous ovule and label any ten parts in it. 5

OR

- Draw a flow-chart to show the hormonal control of the human male reproductive system, highlighting the inhibitory and stimulatory directions in it.
28. Explain the process of biosynthetic phase of photosynthesis occurring in the chloroplast. 5

OR

Describe the process of development of root nodules in a leguminous plant. Name the oxygen scavenger molecule present in the root nodules.

QUESTION PAPER CODE 57/1

SECTION A

1. Name the heaviest and longest bone in the human body. 1
2. Which type of UV radiations can be lethal to organisms ? 1
3. Why does thinning of bones usually start occurring in human females at about 50 years of age ? 1
4. What is polyethylene glycol used for in somatic hybridization ? 1
5. *Drosera* carries out photosynthesis and still traps insects. Why ? 1

SECTION B

6. What is auxetic growth ? Give two examples of organisms showing this kind of growth. 2
7. What is a transgenic crop ? Which plant is used to produce blood anti-coagulant protein ? What is this protein called ? 2
8. Why do temperate regions show a lower value of primary productivity as compared to tropical regions ? Give two reasons. 2
9. What is oxidative decarboxylation ? What happens to pyruvate immediately after this reaction ? Name the enzyme involved in this reaction. 2
10. Which animals suffer from Rinderpest ? Give its two early symptoms and explain how it spreads. 2
11. List any four objectives of the Wild-life (Protection) Act, 1972, amended in 1991. 2
12. An Rh-negative mother has safely delivered her first Rh-positive child. Discuss the problems that can arise as a result of it and can affect a subsequent pregnancy. 2
13. Explain symbiotic nitrogen fixation in leguminous plants. 2
14. What is cretinism ? Give its any two causes. 2
15. What is the end product of glycolysis in aerobes, and where does this process occur ? List the conditions under which fermentation occurs in plant cells. 2

OR

Where exactly does electron transport system operate in Mitochondria ? What is the role of oxygen and $F_0 - F_1$ in this pathway ? How many molecules of ATP are produced when one molecule of NADH goes through this path ?

SECTION C

16. Name the hormone that stimulates the human gall bladder to release bile juice. How does this juice reach the duodenum ? Explain the function of bile juice in food digestion. 3
17. In what form do plants absorb phosphorus from the soil ? Name one cell organelle and one organic molecule that require phosphorus in the cell. List any two phosphorus deficiency symptoms in leaves. 3
18. What are the two intrinsic mechanisms that provide autoregulation of glomerular filtrate ? Explain any one of these. 3
19. Differentiate between quiescent and dormant seeds. Give any four reasons why some seeds need to undergo dormancy. 3
20. What is meant by the term 'Hot Spots' in biodiversity ? List two criteria used for determining a Hot Spot. Name two Hot Spots of India. 3

OR

What is *Brown air* ? Give two harmful effects of this air on humans. How is *grey air* different from *brown air* ?

21. Explain the principle of Sonography. 3
22. Give the location and function in the human eye, of the following : 3
- (i) Cornea
 - (ii) Iris
 - (iii) Vitreous humor
23. Plantlets produced in the laboratory need to be hardened before transplanting them in the field. Explain why they need to be hardened and how it is carried out. 3
24. Name and explain the kind of interaction in the following : 3
- (i) Algae and Fungi in Lichens
 - (ii) Hermit crab and Sea-anemone
 - (iii) Head louse and Humans
25. Name the type and give the effects of the following drugs on humans : 3
- (i) LSD
 - (ii) Morphine
 - (iii) Barbiturates

SECTION D

26. Explain the mechanism of closing and opening of stomata. Name the category of plants which keep their stomata open during the night and closed during the day. 5

OR

Explain the mechanism of C_4 photosynthetic carbon cycle. Name any two plants where it occurs. Mention the difference in the structure of chloroplasts in the mesophyll cells and bundle sheath cells in such plants.

27. Draw labelled diagrams of the following : 5
- (i) T.S. of bilobed anther of an angiosperm
 - (ii) Internal structure of a pollen grain of an angiosperm

OR

Draw a flow-chart showing hormonal control of human female reproductive system. Highlight the positive and negative feedback mechanism in it.

28. What is cardiac cycle ? Explain the different steps involved in the pumping action of the heart during a single cardiac cycle. 5

OR

- (i) What is residual volume ? How much is it in a normal human adult ?
- (ii) Explain the role of diaphragm and ribcage in inspiration and expiration in humans.

Marking Scheme — Biology (Theory)

General Instructions

The Marking Scheme and mechanics of marking

1. In the marking scheme the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.
2. Any words/phrases given within brackets do not have marks.
3. Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.
4. In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a substitute.
5. All awarded marks are to be written in the left hand margin at the end of the question or its part.
6. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place “Half-tick” ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).
7. If no marks are awarded to any part or question put a cross (x) at incorrect value portion and mark it zero (in words only).
8. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
9. Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.
10. If parts have been attempted at different places do the totalling at the end of the part attempted last.
11. If any extra part is attempted or any question is reattempted, score out the last one and write “extra”.
12. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
13. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
14. Points/answer given in brackets in marking scheme are not so important and may be ignored for marking.

QUESTION PAPER CODE 57/1/1
EXPECTED ANSWERS/VALUE POINTS

SECTION A

Q.Nos. 1 - 5 are to be answered in one word or one sentence each

1. Increases / rises (the rate of photosynthesis). [1 mark]
2. Enzyme (salivary amylase) inactivated by the presence of HCl // increase in acidity // lowering pH // presence of HCl. [1 mark]
3. Western Ghats, North East = $\frac{1}{2} + \frac{1}{2}$
(No other alternatives ; only the above two options to be considered) [1 mark]
4. Abscisic acid // ABA [1 mark]
5. Lymphocytes , Antigen presenting cells // B - cells , T - cells // B - Lymphocytes, Macrophages. = $\frac{1}{2} + \frac{1}{2}$ [1 mark]

SECTION B

Q.Nos. 6 - 15 are to be answered in 20 - 30 words each

6. Ignore the first part of the question (It is an incorrect statement) and mark only the second part.
 - (i) Direct transfer of phosphate to ADP / Substrate level phosphorylation = 1
 - (ii) Oxidation of NADH(produced during Glycolysis to NAD⁺) = 1[1 + 1 = 2 marks]
7. TFR - Average number of children that would be born to a woman during her life time (assuming the age specific birth rate of a given year) = 1
RL - Number of children a couple must produce to replace themselves = 1
[1+1 = 2 marks]
8.
 - (i) Initially deer / prey population increases
 - (ii) Increased prey population leads to overgrazing
 - (iii) Overgrazing leads to shortage of herbage
 - (iv) Decrease in deer / prey population due to competition and shortage of food[$\frac{1}{2} \times 4 = 2$ marks]
9. (Anterior) Pituitary/ Adenohypophysis (no marks for posterior pituitary) = $\frac{1}{2}$
FSH/Follicle stimulating hormone = $\frac{1}{2}$

Functions :

- FSH stimulates the growth of ovarian follicles
- FSH stimulates formation of Estrogen

- FSH stimulates sertoli cells to produce hormone inhibin
- FSH stimulates sertoli cells to promote spermatogenesis
- LH and FSH stimulates the Leydig cells to produce testosterone
- LH and FSH trigger ovulation
- LH and FSH stimulate conversion of ovarian follicles into corpus luteum

Any two = $\frac{1}{2} + \frac{1}{2} = 1$

[$\frac{1}{2} + \frac{1}{2} + 1 = 2$ marks]

10. No = $\frac{1}{2}$

Cardiac impulse initiates in atria leading to their systole, travels to ventricles (via AV node, bundle of His and Purkinje fibres) leading to their systole, impulse dies in atria leading to their diastole. = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

[$\frac{1}{2} + 1\frac{1}{2} = 2$ marks]

OR

Haemolymph = $\frac{1}{2}$ mark

Functions :

- Transport of nutrients
- Transport of hormones
- Transport of excretory products
- Maintenance of hydrostatic pressure
- Acts as a reservoir of water
- Haemocytes for wound healing/ coagulation/ phagocytosis

Any three = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

[$\frac{1}{2} + 1\frac{1}{2} = 2$ marks]

11. Its abundance in the human body // Prominent magnetic qualities/ behaviour of H^+ in the water molecule = 1

Teeth, bones = $\frac{1}{2} + \frac{1}{2} = 1$

[1 + 1 = 2 marks]

12. Difference in temperature at different heights/ depths // difference in temperature in different strata/ layers = $\frac{1}{2}$

Surface water cooled during autumn , results in free mixing of water in the whole water body, this turnover redistributes oxygen and nutrients. = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

(Same value points may be marked if drawn in the diagram)

[$\frac{1}{2} + 1\frac{1}{2} = 2$ marks]

13. PGA - enters Calvin cycle, Glyceraldehyde 3-phosphate, = $\frac{1}{2} + \frac{1}{2} = 1$

Glycine - enters mitochondrion, Glycine gives rise to Serine. = $\frac{1}{2} + \frac{1}{2} = 1$

[1 + 1 = 2 marks]

14. Bioassay - quantitative testing of a substance, for its activity in causing a response in a living plant or its parts, = $\frac{1}{2} + \frac{1}{2} = 1$
The Avena/oat curvature test, the root growth inhibition test. = $\frac{1}{2} + \frac{1}{2} = 1$
[1 + 1 = 2 marks]
15. At a given low concentration of CO_2 (and non limiting light) the rate of photosynthesis of a given plant will be equal to the total amount of respiration // The atmospheric concentration of CO_2 at which photosynthesis just compensates for respiration. [2 marks]

SECTION C

Q.Nos. 16 - 25 are to be answered in 30 - 50 words each

16. (i) Tidal volume - The volume of air inspired and expired with every normal breath (during effortless / normal respiration, value=500 ml (+10), = $\frac{1}{2} + \frac{1}{2} = 1$
(ii) ERV - The extra amount of air that can be expired forcefully even beyond the normal tidal expiration, value = 1000 ml (+ 20), = $\frac{1}{2} + \frac{1}{2} = 1$
(iii) IC - The total amount of air a person can take in by distending the lungs to the maximum beginning at normal expiratory level, value = 3000 - 3500 ml. = $\frac{1}{2} + \frac{1}{2} = 1$
[1 × 3 = 3 marks]
17. (i) Grasslands - Treeless herbaceous plant cover, dominated by grass (species) = $\frac{1}{2} + \frac{1}{2} = 1$,
Savannas - (well developed) grass cover interspersed with scattered shrubs/ (small) trees = 1,
(ii) Two major categories of plant forms in desert vegetation - Herbs , succulent xerophytes, shrubs and small trees (Any two). = $\frac{1}{2} + \frac{1}{2} = 1$
[1 + 1 + 1 = 3 marks]
18. Water taken in due to forces of adhesion, between water and walls of (thin) xylem vessels/ tracheids, cohesive forces, between water molecules, until the forces of adhesion and cohesion are balanced by the downward force of gravity = $\frac{1}{2} \times 5 = 2\frac{1}{2}$
Name of the tissue - Xylem. = $\frac{1}{2}$
[2½ + ½ = 3 marks]
19. Neurotransmitter released, at neuromuscular junction, initiates action potential. = $3 \times \frac{1}{2} = 1\frac{1}{2}$
Sarcoplasmic reticulum to release Ca^{+2} / calcium ion which binds with a troponin and results in conformational changes occurring in troponin molecule. = $\frac{1}{2}$
Myosin head has contractile properties as well as ATPase action. = $\frac{1}{2}$
F - actin molecule has active sites which bind to myosin head = $\frac{1}{2}$
[1½ + ½ + ½ + ½ = 3 marks]

20. Stratospheric ozone layer , which protects the earth biota (organisms / life) from harmful effects of strong ultra violet radiations. = $\frac{1}{2} + \frac{1}{2} = 1$

Gases - CH_4 , NO_x , N_2O / CFCs (any two). = $\frac{1}{2} + \frac{1}{2} = 1$ (Consider only the first two gases in the answer)

On Plants - Affect photosynthesis / damage chloroplasts // damage phytoplanktons. = $\frac{1}{2}$

On Animals - Cataract / skin cancer / irritation of eyes / diminished functioning of the immune system. (Any one) = $\frac{1}{2}$

[1 + 1+ $\frac{1}{2}$ + $\frac{1}{2}$ = 3 marks]

21. Regular transferring of some cells / tissues from the original culture , into new culture vessels (containing fresh nutrient media). $\frac{1}{2} + \frac{1}{2} = 1$

Reasons :

(i) Cell / tissue dry matter (biomass) increases = 1

(ii) The level of nutrients in the medium decreases = 1

(iii) The medium volume declines due to evaporation / plant tissue dries = 1

(All together 4 marking points, any three $1 \times 3 = 3$)

[1 \times 3 = 3 marks]

OR

Heterosis - Cross of two unrelated parents / different lines to obtain F_1 or hybrids, superior in character than both (the parents) = $\frac{1}{2} + \frac{1}{2} = 1$

Difference :

Heterosis : Increased heterozygosity , exhibits increased hybrid vigour

Inbreeding depression : Increased homozygosity (of recessive genes) , loss of vigour = $\frac{1}{2} \times 4 = 2$

[1 + 2 = 3 marks]

22. Ammonia, combines with carbon dioxide, in the liver = 1×3

[1 \times 3 = 3 marks]

Ignore the second part of the question , due to improper term "kidney" which should have been "glomerular".

23. Morphallactic - Regeneration in Hydra / Planaria / sponges, repatterning / remodelling of existing tissues and re-establishment of boundaries , regenerated individuals smaller in size. = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

Epimorphic - Regeneration of a lost limb in Salamander / tail of lizard / any other valid example , dedifferentiated cells of adult structures proliferate , eventually redifferentiate into a new correctly patterned structure. $\frac{1}{2} \times 3 = 1\frac{1}{2}$

[1 $\frac{1}{2}$ + 1 $\frac{1}{2}$ = 3 marks]

24. Location to be described or shown in a simple outline sketch
- (i) Temporal lobe - on the sides of the fore brain / above the ear level / region at the side of cerebral cortex / near the temporal area / on sides of cerebrum / under each temple = $\frac{1}{2}$
 Function - Decoding and interpretation of sound / language comprehension/ smell / memory / emotion. = $\frac{1}{2}$
- (ii) Cerebellum - on the backside of the head / brain , behind pons / lower pons , between cerebrum and brain stem , behind cerebrum , at the base of the skull (Any one) = $\frac{1}{2}$
 Function - Involuntary muscle contraction // body balance = $\frac{1}{2}$
- (iii) Corpus callosum
 Location and function - Connects the two cerebral hemispheres. = 1
- [$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + 1 = 3$ marks]
25. The defence elements with which an individual is born, and which are always available to protect a living body. = $\frac{1}{2} + \frac{1}{2} = 1$
 Phagocytic barrier. = $\frac{1}{2}$
 In response to pathogenic infections the total count of leucocytes (macrophages) increases sharply , macrophages are big eaters , which engulf microbes / viruses / cellular debris. = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

[1 + $\frac{1}{2}$ + $1\frac{1}{2}$ = 3 marks]

SECTION D

Q.Nos. 25 - 28 are to be answered in 80 - 120 words each

26. Cancers are classified on the basis of the (original) tissue from where they arise. = 1
- (i) Carcinomas, Arise from epithelial tissue (such as skin or the epithelial lining of internal organs or glands) = $\frac{1}{2} + \frac{1}{2} = 1$
- (ii) Melanomas, Cancerous growth of melanocytes = $\frac{1}{2} + \frac{1}{2} = 1$
- (iii) Sarcomas, Arise from tissue of mesodermal origin (bone, fat / cartilage) = $\frac{1}{2} + \frac{1}{2} = 1$
- (iv) Leukemia / Lymphomas , cancers of haematopoietic cells = $\frac{1}{2} + \frac{1}{2} = 1$
 Any three = $(\frac{1}{2} + \frac{1}{2}) \times 3 = 3$
- [Note : Tissue mentioned without name of the cancer = 0]
 Approach for treatment : Radiotherapy, Surgery , Chemotherapy , Immunotherapy (Any two). = $\frac{1}{2} + \frac{1}{2} = 1$

[1 + 3 + 1 = 5 marks]

OR

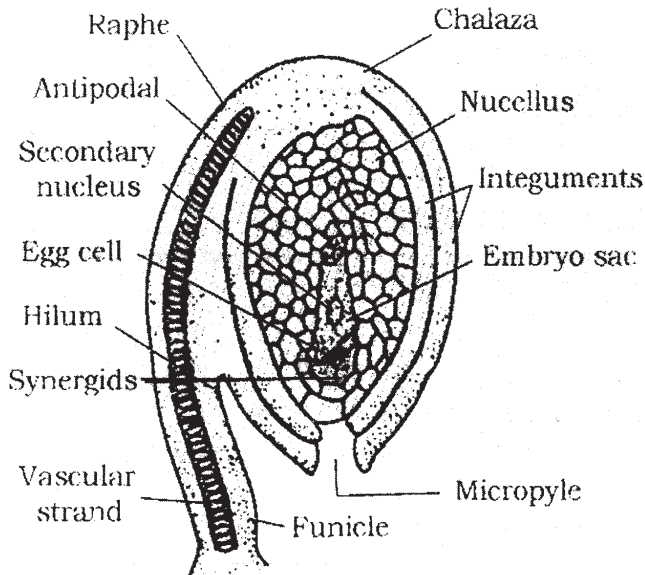
Development of embryo in developing seeds in nutrient medium / in vitro, = 1

Objective - to allow the young embryos to complete development and, ultimately give rise to seedlings, = $\frac{1}{2} + \frac{1}{2} = 1$

Application - to produce Interspecific hybrids, for rapid clonal propagation, to allow embryos to develop into seedlings by eliminating inhibitors and dormancy = $1 \times 3 = 3$

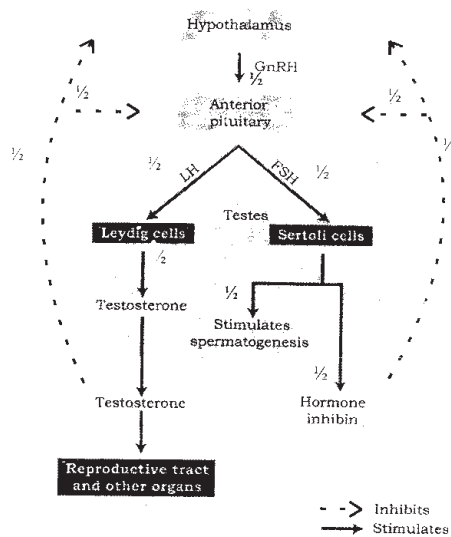
[1 + 1 + 3 = 5 marks]

27.



Note : No mark on the label if indicating line is not reaching the correctly drawn part

OR



Hormonal control of male reproductive system

[$\frac{1}{2} \times 10 = 5$ marks]

28. (i) Carboxylation ($\frac{1}{2}$) - $\text{CO}_2 + \text{Ribulose - 1,5 biphosphate} (\frac{1}{2}) \xrightarrow{\text{Rubisco}}$
 PGA ($\frac{1}{2}$) = ($\frac{1}{2} \times 3 = 1\frac{1}{2}$)
- (ii) Reduction ($\frac{1}{2}$) - PGA reduced to glyceraldehyde 3 phosphate ($\frac{1}{2}$) using
 ATP ($\frac{1}{2}$) and $\text{NADPH}_2 / \text{NADPH} (\frac{1}{2}) = (\frac{1}{2} \times 4 = 2)$
- (iii) Regeneration ($\frac{1}{2}$) - CO_2 acceptor ribulose - 1,5 bisphosphate ($\frac{1}{2}$) formed
 using ATP, starch / sucrose / glucose formed ($\frac{1}{2}$) = ($\frac{1}{2} \times 3 = 1\frac{1}{2}$)

Above points shown in a flow chart may be accepted.

[$1\frac{1}{2} + 2 + 1\frac{1}{2} = 5$ marks]

OR

Rhizobium bacteria come in contact with a root hair, divide near it , upon successful infection of root hair causes it to curl, infection thread with dividing bacteria, now modified and apparent as bacteroids , bacteroids cause inner cortical and pericycle cells to divide, this division leads to nodule formation , divisions promoted by cytokinins from bacteria and auxins from plant cells, = $\frac{1}{2} \times 8 = 4$

Leghaemoglobin = 1

[4 + 1 = 5 marks]

QUESTION PAPER CODE 57/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A

Q.Nos. 1 - 5 are to be answered in one word or one sentence each

1. Femur = 1 [1 mark]
2. UV - C = 1 1 mark]
3. Reduced level of estrogen. = 1 [1 mark]
4. To induce fusion between protoplasts. = 1 [1 mark]
5. To supplement nitrogen / protein requirement (element). = 1 [1 mark]

SECTION B

6. Volume of individual increases due to growth of individual cells, no division / proliferation of cells. $\frac{1}{2} + \frac{1}{2} = 1$
 Rotifers / Nematodes / some tunicates (any two). $\frac{1}{2} + \frac{1}{2} = 1$

[1 + 1 = 2 marks]

7. A crop that contains and expresses a gene transferred from another organism or a gene synthesised chemically. = 1

Brassica napus. = $\frac{1}{2}$

Hirudin. = $\frac{1}{2}$

[1 + $\frac{1}{2}$ + $\frac{1}{2}$ = 2 marks]

8. Solar radiation less, temperature low, soil moisture less, short snow free period
/ often covered with snow (any two). 1 + 1 = 2

[1 + 1 = 2 marks]

9. One of the carbon atoms of Pyruvate is oxidised to Carbon dioxide. = 1
Pyruvate oxidised to acetate / forms acetyl - CoA. = $\frac{1}{2}$
Pyruvate dehydrogenase. = $\frac{1}{2}$

[1 + $\frac{1}{2}$ + $\frac{1}{2}$ = 2 marks]

10. Cattle / cow/ buffalo. = $\frac{1}{2}$

Develops fever (40.0 to 42.2°C), loses appetite / develops constipation /
passes hard faeces often with blood (any two). $\frac{1}{2}$ + $\frac{1}{2}$ = 1

Direct contact with patient animal / contaminated feed / contaminated water /
workers / clothes / flies (any one) = $\frac{1}{2}$

[$\frac{1}{2}$ + 1 + $\frac{1}{2}$ = 2 marks]

11. (i) Restriction and prohibition on hunting of animals
(ii) Protection of specified plants
(iii) Setting up (and managing) sanctuaries and national parks
(iv) Empowering zoo authority with control of zoos and Captive breeding
(v) Control of trade and commerce in wild life, (wild life trophies / products)
(any four). $\frac{1}{2} \times 4 = 2$

[$\frac{1}{2} \times 4 = 2$ marks]

12. (Rh⁺) RBCs of the foetus enter the mother's blood during delivery,

They produce antibodies in the mother's blood,

These antibodies may reach the future foetuses (through placenta),

And react with its RBC causing haemolytic disease of new born / HDN /
erythroblastosis foetalis. = $\frac{1}{2} \times 4 = 2$

[$\frac{1}{2} \times 4 = 2$ marks]

13. Rhizobium bacteria reside in root nodule, fix N₂ as NH₃, in the presence of
leghaemoglobin, nitrogenase. $\frac{1}{2} \times 4 = 2$

[$\frac{1}{2} \times 4 = 2$ marks]

14. Stunted growth / Dwarfism with mental retardation in children. = 1

Hypothyroidism / primary failure of thyroid gland, hyposecretion of TRH / TSH
/ both // inadequate dietary supply of iodine . $\frac{1}{2}$ + $\frac{1}{2}$ = 1

[1 + 1 = 2 marks]

15. Pyruvic acid, cytoplasm, oxygen is limiting. $\frac{1}{2} + \frac{1}{2} + 1 = 2$ [$\frac{1}{2} + \frac{1}{2} + 1 = 2$ marks]

OR

Inner mitochondrial membrane. = $\frac{1}{2}$

Oxygen - Removes hydrogen from the system / hydrogen acceptor / accepts electrons. = $\frac{1}{2}$

$F_0 - F_1$ particle - protein complex - Catalytic production of ATP / ATP synthesis. = $\frac{1}{2}$

3ATP. = $\frac{1}{2}$

[$\frac{1}{2} \times 4 = 2$ marks]

SECTION C

16. Cholecystokinin / CCK. = 1

Through common bile duct / bile duct. = 1

Emulsification / breaking down a large drops of fats into small droplets, provides alkaline pH and helps in digestion of fats. $\frac{1}{2} + \frac{1}{2} = 1$

[$1 + 1 + 1 = 3$ marks]

17. $H_2PO_4^- / HPO_4^{2-}$ / phosphate ion = $\frac{1}{2}$

Any membrane bound organelle such as mitochondria / nucleus / chloroplast / Golgi complex / ER. = $\frac{1}{2}$

Purple or red spots on leaves / dark green leaves / premature leaf fall (any two). $1 + 1 = 2$

[$\frac{1}{2} + \frac{1}{2} + 2 = 3$ marks]

18. Myogenic, JGA mechanism. $\frac{1}{2} + \frac{1}{2} = 1$

(i) Myogenic - Increase in blood pressure stretches the afferent arteriole which responds to being stretched by contraction, reducing diameter of arteriole, increasing resistance to flow. = $1 + 1 = 2$

(ii) JGA - Modulates blood pressure, acts through RAAS (Renin - Angiotensin - Aldosterone System), leading to reabsorption of water and salts by PCT, and DCT, regulates glomerular filtrate. = $1 + 1 = 2$

Either (i) / (ii). = 2

[$1 + 2 = 3$ marks]

19. Quiescent seed - Suspension of growth due to unfavourable environment / exogenous factors. = $\frac{1}{2}$

Dormant seed - Suspension of growth even in favourable conditions / endogenous factors. = $\frac{1}{2}$

Reasons : Rudimentary embryos, impermeable seed coats, mechanically resistant seed coats, physiologically immature embryos, presence of germination inhibitors / ABA / phenolic acids / short chain fatty acids / coumarin (any four). $\frac{1}{2} \times 4 = 2$

[$\frac{1}{2} + \frac{1}{2} + 2 = 3$ marks]

20. Hot spots - Richest and most diverse and threatened reservoirs of plant and animal life on earth / priority areas for in-situ conservation. = 1

Criteria :

- (i) Number of endemic species / species which are found nowhere else
(ii) Degree of threat, which is measured in terms of habitat loss. $\frac{1}{2} + \frac{1}{2} = 1$
Western Ghats, Eastern Himalayas. $\frac{1}{2} + \frac{1}{2} = 1$

[1 + 1 + 1 = 3 marks]

OR

Reddish brown haze in the air containing oxides of Nitrogen / $\text{NO}_x = 1$
Heart problem, lung problem, carcinogenic (any two). $\frac{1}{2} + \frac{1}{2} = 1$
Incomplete smog formation is grey air. = 1

[1 + 1 + 1 = 3 marks]

21. Sonography is based on ultrasound (frequency above 20 KHz), ultrasound of frequency 1 -15 MHz is beamed into human body, returning echoes are detected, ultrasound waves pass through a homogenous tissue unimpeded, but when they meet any other tissue or organ a partial reflection takes place, coefficient of reflection depends upon difference in densities of two tissues / organs. $\frac{1}{2} \times 6 = 3$

[$\frac{1}{2} \times 6 = 3$ marks]

22. (Location may be described or shown in a diagram)

- (i) Cornea - At the front of eyeball. = $\frac{1}{2}$
Refract the light inwards (towards the retina). = $\frac{1}{2}$
(ii) Iris - (Coloured sheet) at the front of the lens. = $\frac{1}{2}$
Regulates the amount of light entering the eyes // regulates the size of pupil. = $\frac{1}{2}$
(iii) Vitreous humor - (chamber) behind the lens. = $\frac{1}{2}$
Supports eyeball / maintains internal pressure. = $\frac{1}{2}$

[$\frac{1}{2} \times 6 = 3$ marks]

23. To make plantlets capable of tolerating harsher environments outside culture vessel. = 1

It is carried out under the reduced light, high humidity (for a suitable period of time). 1 + 1 = 2

[1 + 2 = 3 marks]

24. (i) Mutualism / Obligate mutualism / Symbiosis. = $\frac{1}{2}$
Algae provides food to the fungus, fungi provide protection to algae. = $\frac{1}{2}$,
- (ii) Protocooperation / facultative mutualism / mutualism / symbiosis. = $\frac{1}{2}$
Sea anemone gets transport, hermit crab provides camouflage / protection.
= $\frac{1}{2}$
- (iii) Parasitism. = $\frac{1}{2}$
Head louse draws nourishment / blood (host suffers) and gets shelter from
the host. = $\frac{1}{2}$

[$\frac{1}{2} \times 6 = 3$ marks]

25. (i) Hallucinogen. = $\frac{1}{2}$
Alters thought / feelings / perceptions // creates hallucinations. = $\frac{1}{2}$
- (ii) (Opiate) narcotic. = $\frac{1}{2}$
Supresses brain function / relieves intense pain / produces temporary
euphoria . = $\frac{1}{2}$
- (iii) Sedative / tranquilisers / depressant. = $\frac{1}{2}$
Depress brain activity / produce feelings of calmness / relaxation / drowsiness
/ deep sleep. = $\frac{1}{2}$

[$\frac{1}{2} \times 6 = 3$]

SECTION D

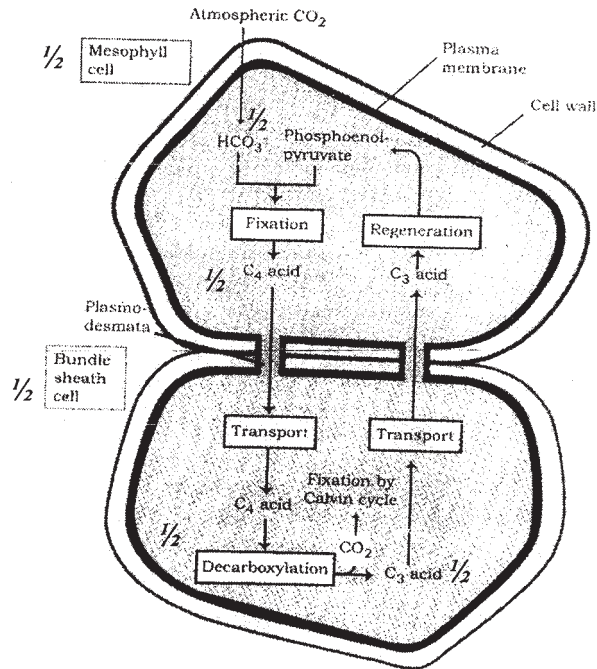
26. Uptake / increase in K^+ / solutes level of guard cells increases, lowered
water potential, and increased osmotic potential in / guard cells, water
moves from neighbouring cells into guard cells, guard cells turgid, stomata
open. $\frac{1}{2} \times 6 = 3$
- Release / decrease in K^+ / solutes level of guard cells increases water potential
and decreases osmotic potential of guard cells, water moves from guard cells
into neighbouring cells // reverse process leads to guard cells flaccid / less
turgid, stomata close. $\frac{1}{2} \times 2 = 1$
- CAM / Crassulacean acid metabolism plants = 1

[3+ 1 +1 = 5 marks]

OR

Fixation of carbon dioxide into C_4 acid / oxalic acid in mesophyll cells, transport
of C_4 acid from mesophyll to bundle sheath cells, decarboxylation of C_4 acid
in bundle sheath cells, increased concentration of CO_2 in bundle sheath , transport
of C_3 acid to mesophyll cells , with regeneration of initial CO_2 acceptor to
continue cycle. $\frac{1}{2} \times 6 = 3$

The above points if properly indicated in diagram / flowchart to be evaluated.



Maize / pearl millet / amaranth / sugarcane / any other correct example (any two). $\frac{1}{2} + \frac{1}{2} = 1$

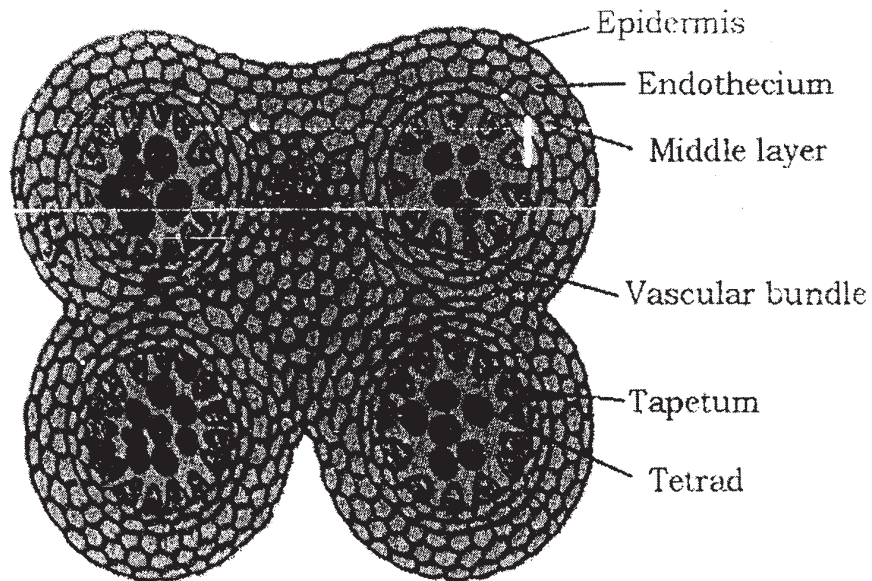
Difference in chloroplast :

Mesophyll cells - granal / light reaction occurs. = $\frac{1}{2}$

Bundle sheath cells- agranal / only CO_2 fixation occurs. $\frac{1}{2}$

[3 + 1 + $\frac{1}{2}$ + $\frac{1}{2}$ = 5 marks]

27 (i)



[T.S of bilobed anther of an angiosperm]

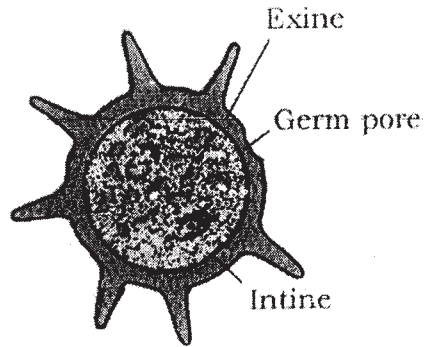
Epidermis, endothecium middle layer, pollen sacs, vascular bundle, tapetum, tetrad / pollen grain

Any five labellings. $\frac{1}{2} \times 5 = 2\frac{1}{2}$

Four pollen sacs shown = $\frac{1}{2}$

Diagram must depict bilobed condition.

(ii)



[Internal structure of a pollen grain of an angiosperm

Labels :

Exine, intine, germ pore

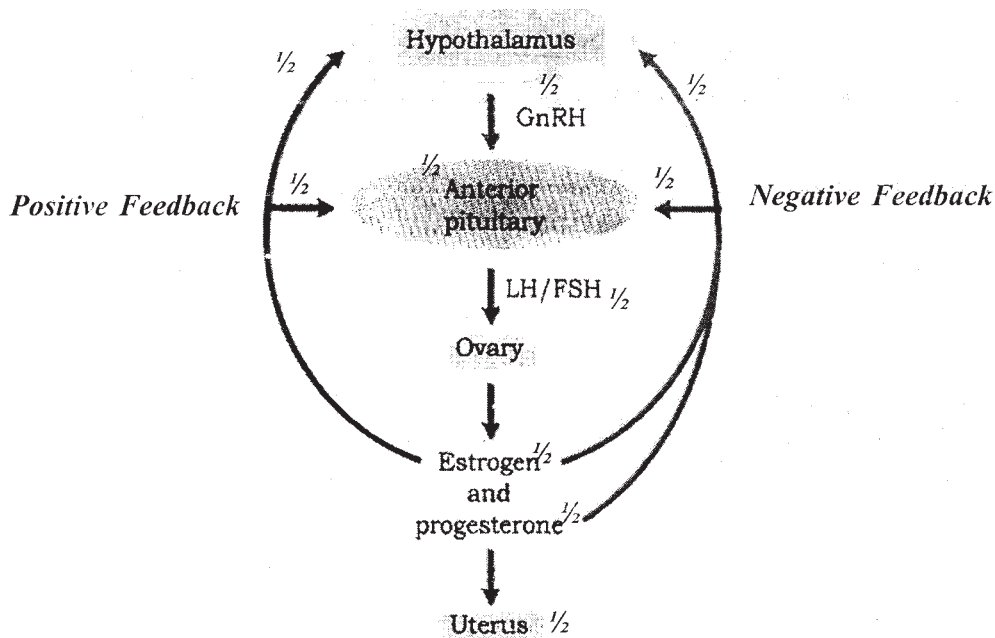
One correct labelling = $\frac{1}{2}$

Two correct labellings = 1

Three correct labellings = 2

[3 + 2 = 5 marks]

OR



Hormonal control of female reproductive system

- Each half mark on direction to be awarded only when arrows have been shown.
- If source organ / glands has not been named or wrongly named, no corresponding next mark / marks

[$\frac{1}{2} \times 10 = 5$ marks]

28. The sequence of events which occur from the beginning of one heart beat to the beginning of the next (completion of one heart beat) is called cardiac cycle. = 1

SA - node initiates atrial contraction, AV - valves open, blood flows from atria to ventricle, action potential from SA - node to AV - node, ventricular contraction causes semilunar valves to open and AV valves close, blood enters major arteries, ventricular diastole, semilunar valves closed and AV valves open. $\frac{1}{2} \times 8 = 4$

These points if properly indicated in diagram / flowchart to be evaluated.

[1 + 4 = 5 marks]

OR

- (i) Residual volume : Volume of air left in lungs even after forceful expiration, about 1200ml // 1500ml // 1500 ± 50 ml // 1200 - 50ml. $\frac{1}{2} + \frac{1}{2} = 1$
- (ii) Diaphragm - downward movement lengthens / enlarges chest cavity, lower surface of lungs pulled downwards / volume of lungs increases to facilitate inspiration and the air to be drawn in, upward movement shortens chest cavity, lungs compressed and air is forced out. $= \frac{1}{2} \times 4 = 2$

Ribcage - Elevation of ribcage increases capacity of chest cavity, air pressure falls in lungs and inspiration occurs, downward movement of ribcage decreases capacity of chest cavity, air pressure increases in lungs and expiration occurs. $\frac{1}{2} \times 4 = 2$

[1 + 2 + 2 = 5 marks]