



SECTION A

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|------|-------|-------|-------|-------|
| 1. B | 7. B | 13. B | 19. B | 25. C |
| 2. D | 8. A | 14. C | 20. C | 26. D |
| 3. C | 9. B | 15. D | 21. D | 27. D |
| 4. A | 10. D | 16. C | 22. C | 28. C |
| 5. D | 11. D | 17. D | 23. A | 29. B |
| 6. C | 12. A | 18. A | 24. B | 30. A |

Accept; levels off, remains the same and constant.

SECTION B

Accept

Deny; sharp; steadily.

31. a) As on the graph at the back

— rapidly/exponentially/faster
— gradually/slowly/slightly.

b) From 0 to ^{20%} 30% oxygen concentration, the (absorption) of sodium ions increases rapidly; ✓ from 20 to 40% oxygen. Concentration, (absorption) of sodium ions increases gradually; ✓ and from 40% to 50% oxygen concentration the (absorption) of sodium is constant; ✓ ^(to maximum) Gross increase the learner insists on the graph other than parameters. 103 marks

Rejects wrong or no oxygen concentration range but mark 1/2 mark @ a correct Na⁺ absorption rate.

c) Absorption of sodium ions is an active process; that requires energy; so increase in oxygen concentration increases the rate of aerobic respiration; which produces the necessary energy for sodium absorption; increased aerobic respiration; to generate From 0 to ^{20%} 30% oxygen concentration the absorption of sodium ions increases rapidly because of a high sodium ion concentration gradient; from 30 to 40% of oxygen concentration, absorption of sodium ions increases gradually because of reduced sodium ion concentration gradient; and from 40 to 50% oxygen concentration, absorption of sodium ion is constant because the conc. Sodium ions in plant and soil are at equilibrium/same; because oxygen is no longer a limiting factor. ✓

d) Temperature / Respiratory inhibitors ^{suitable temperature; increased substrate concentration} Total = 8 marks.
^{increased enzyme concentration, suitable pH; enzyme cofactors.} = Max 7.

e) Active transport

f) - (Absorption of food nutrients in the) ileum. ^{neurons, muscles}
- (Reabsorption of nutrients along) Kidney nephron.

32. a) $= 20 + 06 + 13 = \frac{39}{3} = 13\%$; ½ mark 13%; ½ mark@ (01 mark) 04mark
- b) A = Sand/soil; (01 mark)
Reason = Because has the highest amount of air by volume; (01 mark)
- B = Clay soil; (01 mark)
Reason = Has the lowest amount of air by volume; (01 mark)
- C = Loam soil; (01 mark)
Reason = Has moderate / average amount of air by volume; (01 mark)
- Rej. Size of particles if mentioned; air spaces.*
- c) Soil sample A; (½ mark)
Reason = has the highest air spaces; (½ mark)
- d) Soil sample B; (01 mark)
Reason = It retains much water that is needed for rice growing; (01 mark)

Reject: size of particles if mentioned.

33. a) (i) (cellulose) cell wall;
(ii) (cell) vacuole; *Keep vacuole.*
(iii) cell membrane;
(iv) Cytoplasm; (02 marks)
- b) (i) Pallisade (mesophyll) layer; (01 mark)
- c) - Possession of (many) chloroplasts; that contain chlorophyll for trapping sunlight;
- Its elongated; to increase surface area for packing of chloroplasts and trapping sunlight; (4 marks)
- d) Doubling of carbohydrate intake increases the amount of glucose in the body;
Excess glucose is converted to glycogen and stored in liver cells and muscles;
During the race glycogen is converted to glucose; required for energy production for use during the race;

Max = 3.
(Any 3 @ 01 mark)

SECTION C

34.

a)

- ^{in and out} ~~Has~~ ^{intercostal / diaphragm} ~~muscles~~ ^{w/c contract & relax causing air to move}
- Suitability of structure of respiratory system to movement of air.
- ^{Nostriks / Nosal cavity / trachea} ~~Nostriks / Nosal cavity / trachea~~ ^{are hollow to allow entry / exit of air.}
- Nosal walls are lined with hair-like structures (cilia); which move and push germs and dirt in mucus to pharynx (where an individual can either spit or swallow it); preventing ^{them from blocking the trachea} mucus secretion from blocking the lungs;
- ^{Mucus} Goblet cells in between cilia in nose and trachea secrete mucus; which moisten air; / also traps dirt and germs inhaled along with air.
- ^{presence of superficial blood vessels with warm blood; that heat to inhaled air to increase the rate of diffusion of respiratory gases.} Higher temperature of blood in superficial blood vessels; supplies heat to inhaled air (before it reaches lungs);
- Tracheal walls and bronchi (made of c-shaped) rings of cartilage; which prevent walls from collapsing when pressure inside it falls;
- Bronchi divide repeatedly into a mass of fine tubes (bronchioles); to increase ventilation rate / amount of air entering / leaving;
- Alveolar walls are thin / made of thin layer of epithelial cells; to provide short distance for diffusion of gases;
- Outer surface of alveoli is covered with dense network of narrow blood capillaries (from pulmonary artery); to rapidly bring blood with more CO_2 to alveoli and quickly take away O_2 to maintain a high diffusion gradient;
- Moist inner surface of alveoli; easily dissolve oxygen;
- Lung covered by double-pleural membranes (separated by plural fluid); allow ^{free movement of lungs (inside thoracic cavity) during breathing;} ~~free movement of lungs (inside thoracic cavity) during breathing;~~
- Pleural fluid in between pleural membranes; lubricates inside thorax when they expand during inspiration;

b)

Mechanism of ventilation in man.

- During inspiration / OWTTE; external intercostal muscles contract, internal intercostal muscles relax; ribs move up and outwards; diaphragm muscles contract; diaphragm moves down (flattens); abdominal muscles relax; diaphragm compresses abdominal organs; thoracic volume increases; elastic lungs expand; internal pressure within lungs decreases (below atmospheric pressure); air from atmosphere rushes into lungs; (via nose or mouth, through trachea and bronchi)
- During expiration / OWTTE; external intercostal muscles relax; internal intercostal muscles contract; diaphragm muscles relax; diaphragm moves upwards to its dome shape; abdominal organs are compressed upwards against diaphragm; thoracic volume decreases; internal pressure increases (above atmospheric pressure); air is forced out of lungs; (into bronchi trachea to atmosphere through nostril or mouth)

Note; accept event even if not in the correct sequence. Total 15 Marks

35. a) i) Hypogeal germination cotyledons remain below the ground; due to rapid elongation of epicotyl; while Epigeal germination cotyledons are brought above the ground surface; due to rapid elongation of hypocotyl; (04 marks)

- ii)
- Suitable (optimum) temperature / warmth;
 - Presence of oxygen; (Air)
 - Moisture content / water;
 - Light.

Consider any 3. 03marks
reject; temperature alone.

- b) Events which lead to germination of seed
- Water is absorbed by imbibition; starch is converted to glucose (by diastase); Proteins converted to amino acids (by proteases); and lipids to fatty acids and glycerol (by lipase); Glucose is respired to provide energy for cell division; Amino acids are used for growth of the embryo; fatty acids and glycerol for energy formation; for cell division.
 - Water dissolves food nutrients; and as a medium transports them to the growing areas; Epicotyl elongates faster than hypocotyl; resulting into hypogeal germination; The cotyledons swells; and testa ruptures; allowing the radicle to emerge first; followed by plumule;

1/2 @ 2marks

36. a) Soil degradation is the lowering of the quality of soil; (fertility). (01 mark)

- b) (i) Deforestation leaves the land bare; hence exposing soil to soil erosion; (02 marks)
- (ii) Over application of inorganic fertilizers leads to accumulation of salts in soil; which alters soil PH; (01 mark)

c) Soil conservation on bare land

- Afforestation; - application of organic fertilisers. (01 mark)
- Re-afforestation; - Agroforestry. (01 mark)
- Mulching; - Crop rotation. (01 mark)
- Planting of grass; max 5 (01 mark)
- Planting cover crops; (01 mark)

Reject Terracing, contour ploughing.

- d) Effects of soil erosion
- It causes eutrophication; while alters the quality of water; - accept the effect alone. - reject explanation alone.
 - Reduces crop yield because it damages crops;
 - Makes soil become infertile for plant growth because plant nutrients are carried away; carries away top
 - It makes soil unfit for use because it leads to the development of gulleys; 1/2 @
 - Makes soil develop a hard pan when top soil is eroded;
 - Makes soil infertile for plant growth because micro-organisms which are decomposers are carried away; resulting to flooding.
 - Silting of water bodies; reducing the depth water
 - Reduces depth of the soil; causing exposure of plant roots.
 - Causes air pollution due to displacement of soil particles as dust into the air.

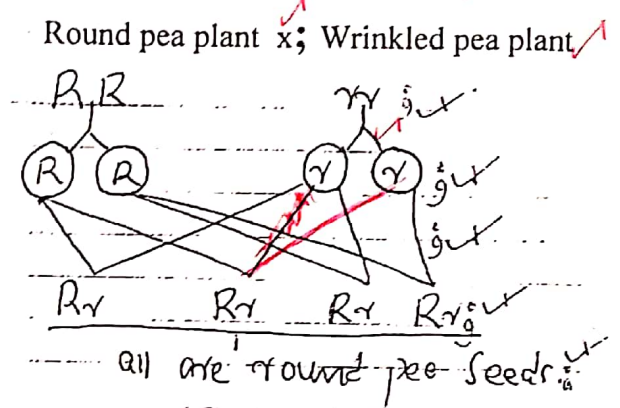
01 mark @ (5 marks)

37. a) (i) An allele is an alternative form of a gene; (that controls a character) (01 mark)

i) Let allele for round pea seed be represented by R; let allele for wrinkled pea seed be represented by r;

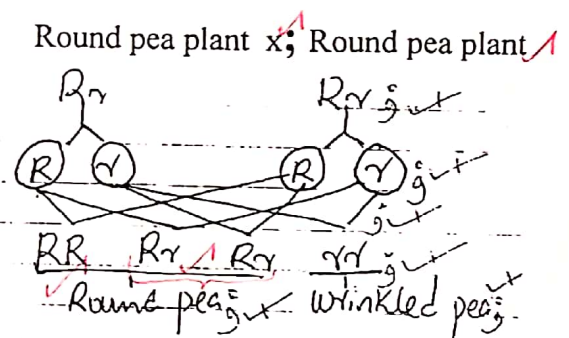
Accept any other letters provided one is capital and another is small

Parent phenotype
Parent Genotype
Meiosis;
Gametes
Random fertilization



(ii) A cross between 2 F₁ offsprings

Parent phenotype
Parent Genotype
Meiosis
Random-Fertilization



F₂ Genotype
F₂ phenotype

Genotypic ratio 1RR: 2Rr: 1rr;

Phenotypic ratio = 3 Round pea seeds : 1 wrinkled pea;

- c) is applied in crop and animal husbandry;
is applied in choosing a partner for marriage;
is applied in determining parent hood; of a child / DNA testing.
is used in determining crime by police through finger prints;

- In gene therapy (medicine)

- Blood transfusion

- Used in determination of blood groups.

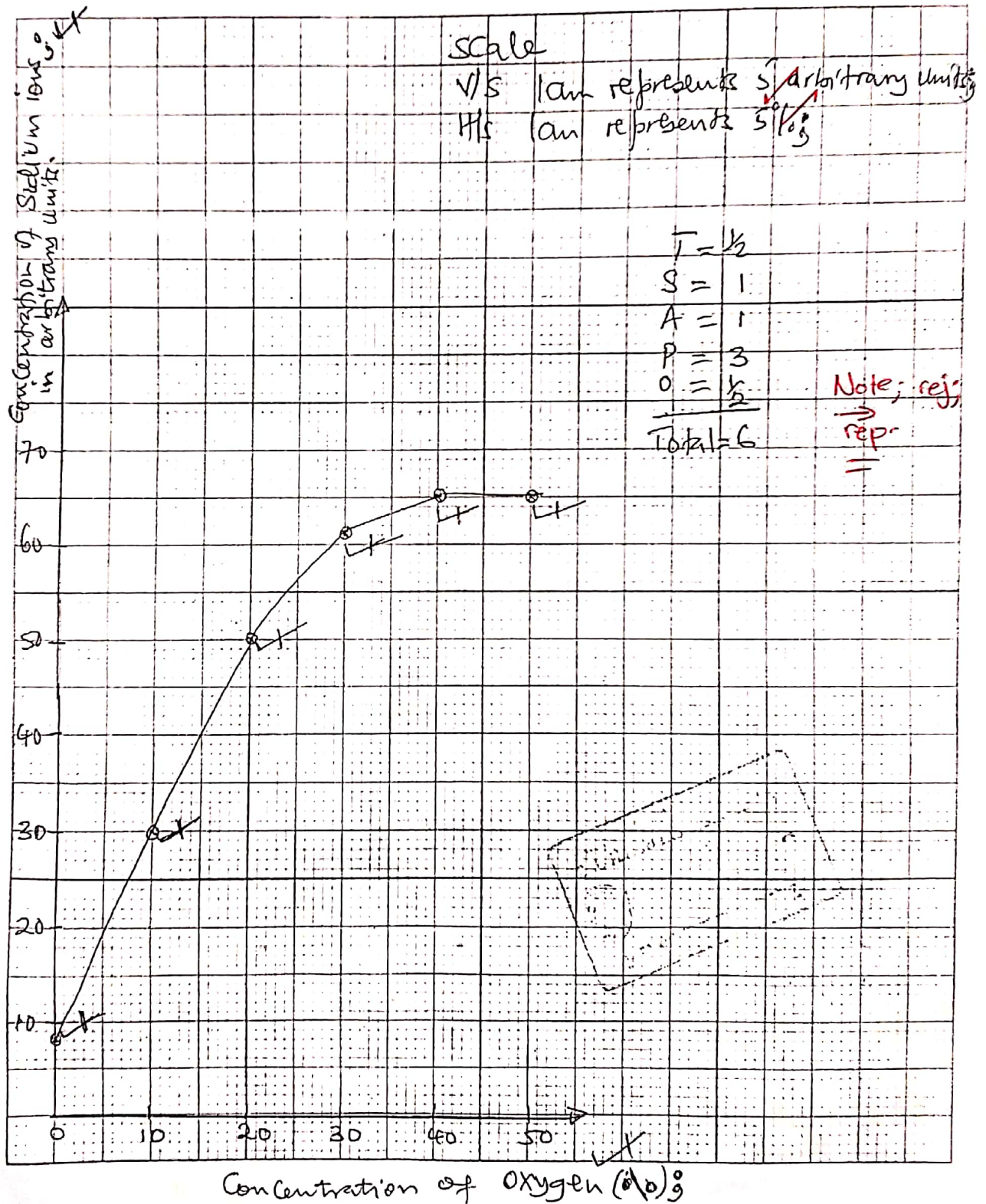
any three @ (01 mark)

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(To be fastened together with other answers to paper)

Name: _____ Index Number: _____
Signature: _____

A graph showing the effect of oxygen concentration on the (absorption) of sodium ions by a plant.



END