General Certificate of Education (A/L) Examination
2005 - April
Biology I - II
Answers

2005 April - MCQ Answers

1 - 5	16 - 2	31 - 3	46 - 4
2 - 2	17 - 3	32 - 3	47 - 3
3 - 2	18 - 4	33 - 4	48 - 2
4 - 3	19 - 2	34 - 3	49 - 4
5 - 2	20 - 2	35 - 2	50 - 2
6 - 1	21 - 3	36 - 2	51 - 4
7 - 2	22 - 4	37 - 2,3	52 - 4
8 - 4	23 - 4	38 - 5	53 - 1
9 - 4	24 - 3	39 - 4	54 - 5
10 - 3	25 - all	40 - 5	55 - 4
11 - 4,5	26 - 3	41 - 5	56 - 1
12 - 2	27 - 3	42 - 4	57 - 5
13 - 5	28 - 2	43 - 2	58 - 2
14 - 4	29 - 4	44 - 2	59 - 3
15 - 1	30 - 4	45 - 2	60 - 4

Part A - Structured Essay

(1) A (i) 1. Light absorbed by the photosynthetic pigments
2. In the Blue (430 - 500nm) and Red (650 - 700nm) regions of the Sepctrum
3. Is used in photosynthetic

or

1. Rate of photosynthesis is highest in the Blue (430 - 500nm) and Red (650 - 700nm) regions of the spectrum.
2. Photosynthetic pigments absorb light in the same regions of the spectrum.
3. Therefore light absorbed by the pigments is used in photosynthesis

3x2 = 06 marks

B (i)

Major stage of photosynthesis	Site at Which takes place in the chloromoplast	Major events taking place at each stage.
(i) Light reaction	(3) Grana Thylokoid membranes.	• Absorption of light by pigments • Photolysis of water/ production of O_2 • Production of ATP • Production of $NADPH_2$

(any 3)

(2) Dark reaction | (4) Stroma | • Carboxylation
• Reduction of PGA/ Formation of PGAL
• Regeneration of CO_2 acceptor
• Synthesis of carbohydrates

(any)

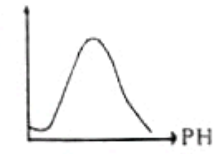
10x 02 = 20 marks

(ii)

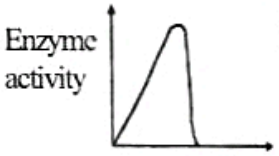
Phisiological	Anatomical
Orientation of leaves towards light/ Phototropism	• Large surface area of leaf/ leaves are thin and flat
Opening of stomata in response to light	• Transparent epidermis and culicle
Movement of chloroplasts in Pallisade cells towards light	• Pallisade cell layer arranged length wise
	• Pallisade layer packed with chloroplast Spongy parenchyma containing intercellular spaces.
	• System of extensive vascular tissues.
(any two)	(any two)

4 x 02 = 08 marks

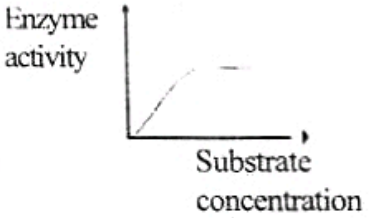
(C) (i)



(a)
4/0



(b)
4/0



(c)
4/0

(ii) Denaturation of enzymes due to
Loss of / breakdown of three dimensional structure of protein/ enzyme molecule.

2 x 2 = 04 marks

(D)

(i) Organic compound	Elemental composition	Major function
Carbohydrates	C H, O	Storage Structural Energy Source (Any)
Lipids	C,H,O	Structural Storage Energy Source (Any)
Proteins	C,H,O,N,S	Storage / energy source Structural Enzymes Hormones

Nucleic Acid	C,H,O,N,P	Antibodies Transport Toxins Contractile (Any 2) Transfer of genetic information/ storage of gene protrin synthesis (Any2)

16 x 2 = 32 marks

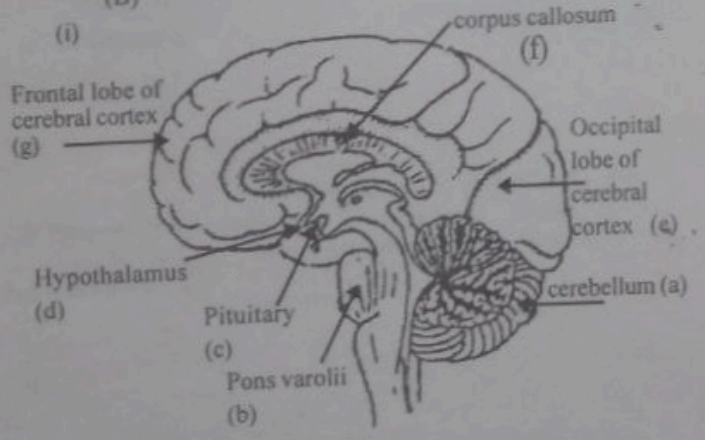
(ii) 1. Add dilute iodine to samples of each (A,B,C)
2. One which does not give blue colour is amylase
3. Add equal amounts of the other two solutions to equal amounts of the enzyme (amylase)
4. mix well
5. take a drop of the mixture at
6. intervals of 2 minutes
7. test with iodine
8. on the white tile
9. Observe and note the time taken to complete the reaction
10. more time will be taken for 0.5% starch solution than for 0.1 starch solution.

10 x 2 = 20 marks
Total 102 marks
Max - 100 marks

2 (A)
(i) Co - ordination
(ii) Reflex arc
(iii) Cnidaria/ Coelenterata/Echinodermata
(iv) deleted
(v) (a) increases
(b) decreases
(c) increases
(d) increases/ dialates

7 x 3 = 21 marks

(B)
(i)



(ii) (a) (associated with) vision
(b) regulates respiration
(c) Co - ordination of skeletal muscles / Co - ordination of valuntary muscular movements
(iii) Chemicals that are responsible in transmitting messages across the synapse
(iv) (a) acetylcholoine (b) noradrinalin
(v) Not released into blood/ transported through blood/ not secreted by an endocrine gland.

7 x 3 = 21 marks

(C)
(i) Reversal of polarity
(ii) Na^+
(iii) Moving action potential / electrically transmitted message
(iv) insulation/ increase speed of conduction
(v) Schwann cell

5 x 3 = 15 marks

(D)
(i) (a) - phototropism
(b) - thigmonasty
(c) - nictinasty
(d) - phototaxis
(e) - thigmotrorpism

(ii) (a) Auxin / IAA
(b) Gibrellin
(c) Cytokinin
(d) Enthylene

9 x 9 = 27 marks
Total 103.5 marks
Maximus 100 marks

03. (A)
(i) (a) cellular organization/ prokaryotic and eukaroiotic
(b) arrangement of cells / unicellular or multicellular and differentiated in to true tissue
(c) type of nutrition

3 x 2 = 06 marks

(ii) Platyhelminthes

1 x 2 = 02 marks

(iii) (a) - Cnidaria/ coelenterata
(b) - Deleted
(c) - Echinodermata
(d) - chordata
(e) - cnidaria/ coelenterata
(f) - Mollusca
(g) - Zygomycota/ zygomycetes
(h) - Bryophyta
(i) - Cycadophyta
(j) - Anthophyta

9 + 1 = 10 marks

(B)
(i) • A functional unit/ a system in the enviroment where abiotic/ nonliving components and biotic components/ living organisms interact.

2 x 2 = 04 marks

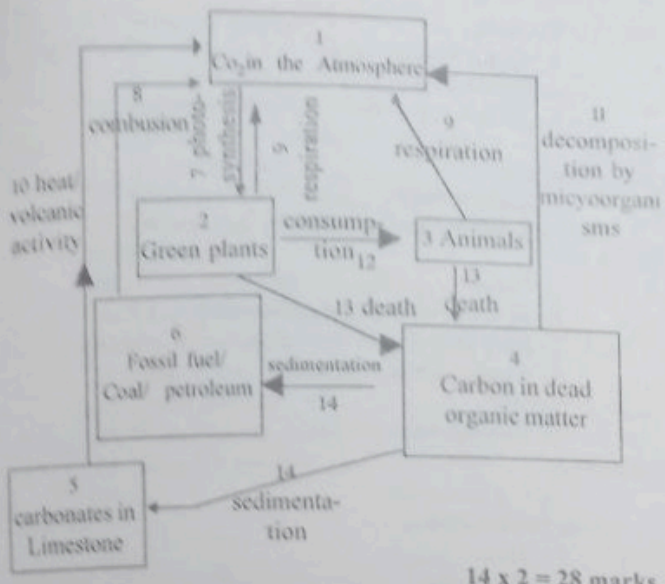
(ii) (1) Producers
(2) consumers
(3) decomposers

3 x 2 = 06 marks

(iii) • Knee roots
• Pneumatophores
• Viviparous germination

(Any two)
2 x 2 = 04 marks

(iv) • Carbon cycle



14 x 2 = 28 marks

(C) (i) Troposphere, stratosphere, mesosphere, thermosphere (If all 4 are given in sequence 2 points. if 3 are given in sequence 1 point)

2 x 2 = 04 marks

(ii) CFC **1 x 2 = 02 marks**

(iii) (1) Ocean - oil (spills)

(2) Air - Vehicular emissions/ industrial emissions/ burning of fossil fuel

(3) soil - Solid waste/ agrochemicals

3 x 2 = 06 marks

(iv) Eutrophication **1 x 2 = 02 marks**

(v)
- Increase in cyanobacteria/ alagal bloom
- Depletion of oxygen
- Death of biota/ (fish)
- Decomposition of biota
- Producrtion of noxious gasses (H_2S)
- Production of toxins
- increase in BOD **(any six)**

6 x 2 = 12 marks

(D)

(i)
- Requirements of man was low/
- No accumlation of waste (as they move from place to place in small groups)
- Human population was small. **(any two)**

2 x 2 = 04 marks

(ii) Industrial revolution/ industrialization

1 x 2 = 02 marks

(iii) Existence of biochemical cycles/
Cycling of matter between biotic and abiotic components

1 x 2 = 02 marks

(iv) National Enviroment Act
central Enviromental Authority **2 x 2 = 04 marks**

(v) Control of trans boundary movement of hazardous waste

1 x 2 = 02 marks

(Total 45 x 2 + 10 = 100 marks)

04 (A)
(i)

	Pogonatum	*Neprolepis*	*Selaginella*
(a) Heterospory	absent	absent	Present
(b) Dispersal of spores by wind	deleted		
(c) Photosynthetic gametophyte	Present	Present	Present
(d) Bisexual gameto phyte	absent	Present	absent

9 x 2 1/2 = 22 1/2 marks

(ii) (a) - Presence of morphologically similar different strains (+ and -) which takes part in sexual reproduction

(b) - A thick walled spore resulting from the fusion of isogametangia

(c) - Deleted

(d) - A fruit body formed after sexual reproduction of ascomycetes

3 x 2 1/2 = 7 1/2 marks

(B) Part in Angiosperms

(i) (a) - Stamen
(b) - Carpel
(c) - Pollen sac
(d) - Flower
(e) - Embryo sac

5 x 21/2 = 12 1/2 marks

(ii) (a) - *Pogonatum*
(b) - *Pogonatum/ selaginella*
(c) - *Agaricus*
(d) - *Nephrolepis/ Cycas*

4 x 2 1/2 = 10 marks

(C) Floral Part

(i) (a) - Egg cell
(b) - Secondary endosper nueleus
(c) - Integument
(d) - Hilum / site of attachment of funiculus
(e) - Overy wall

5 x 2 1/2 = 12 1/2 marks

(ii) cycas female gametophyte	Angiosperm female gametophyte
(a) Archegonia present	Arehegonia absent
(b) Large in size	small in size
(c) Many cells	only seven cells/ 8 nuclei
(d) Archegonial chamber present	Archegonial chamber absent
(e) Food stored	No food stored
(f) Many egg cells	One egg cell

(Any four pairs)
4 x 2 1/2 = 10 marks

(D)

(i) Process by which the continuity of a species is ensured through production of offsprings/
Production of new organisms of the same species

1 x 2 1/2 = 2 1/2 marks

(ii) Allow mixing of heritable characters/ allow combination of heritable characters **1 x 2 1/2 = 2 1/2 marks**

(iii) To overcome desiccation of gametes/ reproductive cells

1 x 2 1/2 = 2 1/2 marks

(iv) Distal/ upper part of the fallopian tube

1 x 2 1/2 = 2 1/2 marks

(v) Acrosome reaction/ release of enzymes

1 x 2 1/2 = 2 1/2 marks

(vi) Chorion, allentois (2 points) 2 x 2 1/2 = 05 marks

(vii) HCG
Oestrogen
Progesterone
Somastomammotrophin/ HCS
Human placental lactogenic hormone/HPLH
(Any three)

3 x 2 1/2 = 7 1/2 marks
(Total 40 x 2 1/2 = 100 marks)

Part B - Essay

1. (a) Water moves from soil xylam through three partways
1. "Apoplast" (is the interconnected web) consists of
2. Spaces within cell walls
3. Intercellular spaces
4. Filiferous Layer and cortical cells of root
5. Weter moves freely by "diffusion" and
6. By mass flow
7. "Simplast" consists of (is the web of)
8. Protoplast of cells
9. Interconnected through plasmodesmata of cell walls
10. Water movement is by "diffusion"
11. After water has enterd the cell throug "plasma mambrane" of root hair cells by
12. "Osmosis"
13. "Vacuolar pathway"
14. Movement of water from vacuole to vacuole
15. Water passes through "tono plast"
16. Cytoplasm and
17. Plasmalemma by
18. "Osmosis"
19. Water then passes through endodermis
20. Casparian strips block apoplast movement
21. Allowing water to enter pericycle
22. Through simplast,
23. Vacuolar pathway in to the xylem
24. Water potential of root hair cell is less then that of soil water due to
25. Dissolved substances in root hair cells
26. Soil solution has a higher water potential than root hair cell
27. Therefore water moves from soil to root hair cells
28. Along water potential gradent
29. Water movement from soil sulution into xylem takes place along a water potential gradient

(b)
1. Transpiration pull/ transpiration from leaves
2. Reduce water potential of mesophyll cells
3. Creating a water potential gradient between xylem and mesophyll cells
4. As a result water moves from xylem to mesophyll cells
5. Cohesion and
6. Adhesion of water molecules
7. Maintain a continuous column of water in the xylem/ prevents breaking of water columns
8. A continous gradient of water potential exists from soil to mesophyll cells through cortical cells of root.
9. Which results in pulling / morement of water into leaf mesophyll cell

29 + 9 = 38x4 = 152 marks
(Max = 150 marks)

(02) (a) Location -
1. In the thoracic cavity
2. Between lungs
3. More towards the left of bodies mid line

Gross structure :
4. Cone shaped
5. Enclosed in a pericardium

Wall -
6. Outer
7. Epicardium/ visceral pericardium
8. Middle
9. Myocadium
10. Inner
11. Endocardium

Epicardium -
12. Is a mambrane

Endo cardium -
13. Thin
14. Mambrane

Myocardium -
15. Thick layer
16. Of cardiac muscles
17. Has 4 cavities/ 4 chambers
18. 2 auricles and 2 ventricles
19. Auricles located superior to ventricles
20. Spetum divides heart in to 2 halves
21. Right and left
22. Each half with an auricle and a ventricle
23. Tricuspid valve between RA and RV
24. Bicuspid/ Mitral valve between LA and LV
25. Wall of ventricles has cone shaped projections
26. Known as papillary muscles
27. Tendinous cords (cordae tendincae) connects valves to papillary muscles
28. Pulmonary artery arises from RV
29. Opening is guarded by (pulmonary) semilunar valves
30. Aortic arch/ aorta arises from LV
31. Guarded by semilunar valves
32. Semilunar valves have 3 cusps
33. LA with 4 openings
34. For the entry of pulmonary veins
35. RA with 2 Openings
36. For the entry of superior vena cava
37. And inferior vena cava
38. Wall of ventricles thicker than the auricles
39. Wall of LV is thicker than the RV
40. Presence of coronary arteries

40 x 2 marks = 80 marks

(b) Cardiac cycle
1. Is the series of events that take place within a single heart beat
2. Consists of contraction and relaxation of the auricles and ventricles
3. Consists (of 3 stages) Atrial systole, ventricular systole and cardiac diastole
4. Last for 0.8 seconds

Atrial syatole -
5. Superior vena cava and inferior vena cava pour blood in to RA
6. 4 pulmonaty veins pour blood in to LA
7. AV Valves open
8. Both atria contracts simultaneously
9. Caused by stimulation of SA node
10. Forcing blood into ventricles

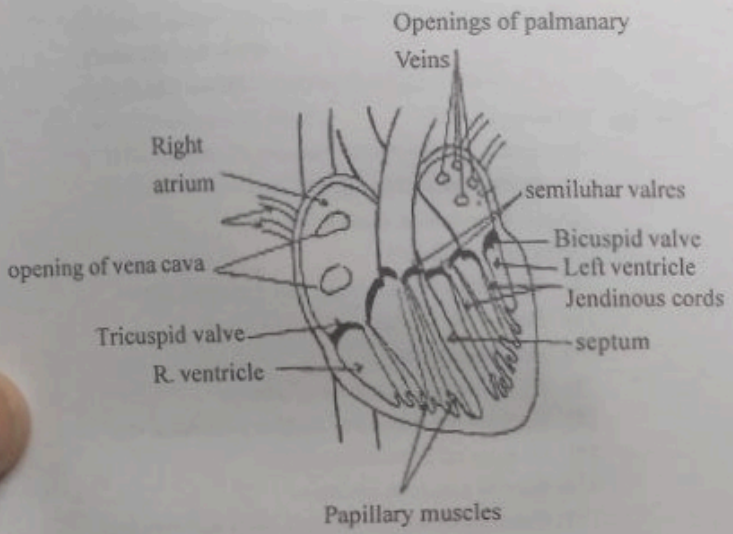
11. Takes 0.1 seconds

Ventricular systole -

12. Both ventricles contracts stimultaneously
13. Caused by stimulation of AV node
14. And spread of impulse Via AV bundle
15. And Perkinji fibres
16. Semilunar valves open
17. Forcing blood out through pulmonary artery
18. And aorta
19. AV Valves closed
20. Takes 0.3 seconds

Atrial and ventricular diastole/ complete cardiac diastole-

21. Both atria and venticles relax to gether
22. Blood flows into atria
23. From vena cavae and pulmonary veins
24. Takes 0.4 seconds



25 x 02 marks = 50 marks

Fully labeled correct diagram - 20 marks
Partially labeled correct diagram - 10 marks
Unlabeled corred diagram - 5 marks
80 + 50 + 20 = 150
Total = 150 marks

03. (a) Incomplete dominance
(1) Dominance of alleles of a gene is partial/ incomplete
(2) Two homozygotes have different characters
(3) Heterozygote has intermediate character between two homozygotes
(4) In mendelian crosses F_2 progeny segregate in 1:2:1 ratio
(5) Cause of deviation from Mendal 's 1st law
(6) Example *Mirabilis* flower colour
(7) Correct diagramattic representation

(a) Incomplete dominance

P RR X rr

Red White

G Ⓡ ⓡ

F1 Rr - light red

F1 X F1 Rr x Rr

G Ⓡ ⓡ Ⓡ ⓡ

F2 RR Rr Rr rr

Red Light Red white

1 : 2 : 1

Example :- *Mirabilis* flower colour

(b) Humansex linked inheritance
(1) Shown by genes carried in X - chromosome
(2) Shown by recessive mutations/ recessive gene/ recessive allele
(3) Expressed in males because thay carry only one x - chromosme
(4) Not expressed in females because they carry two x - chromosme
(5) Heterozygous females are carriers/ inherited from mother to son
(6) Rare in population/ not common
(7) Examples colour blindness/ Haemophilia
(8) Correct diagramattic representation

Sex tinked inheritance of Man

Perents - $I^H I^h$ x I^H
$X\ X$ $X\ y$
♀ ♂
carrierfemale Notmal male

G - I_x^H I_x^h I_x^H $\hat{}_y$

F - $I_x^H I_x^H$ $I_x^H I_x^h$ $I_x^H \hat{}_y$ $I_x^h \hat{}_y$

Normal female carrier female Normal female Affected male

Perents - $I_x^H I_x^H$ x $I_x^h \hat{}_y$
Normal female Affected male

G - I_x^H I_x^H I_x^h $\hat{}_y$

F - $I_x^H I_x^h$ $I_x^H \hat{}_y$
carrier female Normal male

Example Haemophilia

(c) Poloyallelism
(1) More than two forms of alleles of a gene (in population)
(2) Different alleles produce different features
(3) Alleles may show dominance or codominance
(4) Example human ABO blood grouping
(5) Progeny may or may notbe similar to parents.
(6) Deviation from Mendal' s Pattern
(7) Correct diagramatic representation

I^AI^A, I^Ai - Blood group A
I^BI^B, I^Bi - Blood group B
I^AI^B - Blood group AB
ii - Blood group O

Rerents - I^Ai x I^Bi
Blood group A Blood group B

F (Children) I^AI^B I^Ai I^Bi ii
B.G. AB B.G.A B.G.B B.G.O

Example Human ABO Blood groups

(d) Polygenic Inheritance
(1) Many genes determine the same character
(2) Alleles may show dominance
(3) Genes show independent segregration
(4) Genes have additive/ cooperative effect
(5) Character produced is quantitative
(6) Distribution of the character in population is normal/ extremes of character are rare, intermediates are common

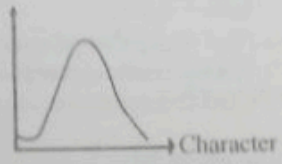
(7) Examples, any quantitative character of humans, plants or animals, Height, weight, skin colour, IQ number of flowers, fruits, eggs, ammount of milk in cows etc.

(8) Correct diagramattic representation

$T_1T_1T_2T_2T_3T_3T_4T_4 \times t_1t_1t_2t_2t_3t_3t_4t_4$

Iindividuals with extream characters

Large number of intermediates



30 x 5 = 150 marks

Total = 150 marks

04. Soil contains a diversity of microorganisms

(1) Bacteria/ actinomyceties
(2) Cyanobacteria
(3) Fungi
(4) Algae
(5) Viruses
(6) Protozoa
(7) They may be pathogens/ Parasites
(8) Autotrophic microorganism/ photosynthetic
(9) Chemosynthetic
(10) Hetertrophic/ Saprophytic
(11) Aerobic
(12) Anaerobic
(13) Biomass/ number is different in different enviroments
(14) Distribution of microorganisms vary with depth / more microorganisms are found on surface layers
(15) Microorganisms make plant nutrients available in soil
(16) By decomposing
(17) Dead plant and animal organic matter
(18) And recycling minerals
(19) Such as carbon/ nitrogen / phosphorus
(20) Some free living microorganisms
(21) Such as *Azotobactor/ Nostoc/ Anabaena*
(22) Some symbiotic microorganisms
(23) Such as *Rhizobium/ Anabaena*
(24) Fix atmospheric nitrogen
(25) Microorganisms in the rhiozosphere
(26) Produce plant growth substances such as
(27) IAA/ Giberellic Acid
(28) Inhibitory substances
(29) For pathogenic organisms
(30) Some contribute to formation of soil aggregates/ improvement of soil structure
(31) By producing slime/ gum or fungal filaments
(32) Mycorrhizal association with roots of higher plants
(33) Make availble soluble nutrients/ phosphates
(34) Some microorganisms which are pathogenic cause diseases in plants/ affect plant growth adversely.

any 30 x 5 = 150 marks

05. Agiicutural practices

(1) Removing natural vegetation for agriculture
(2) Burning vegetation
(3) Tilling soil
(4) Use of fertilizer
(5) Use of pesticides
(6) Irrigation
(7) Removing harvest

Impacts

(8) Decrease biodiversity
(9) Remove balance in ecosystem activities
(10) Increase CO_2
(11) Expose soil to heat and rain
(12) Cause erosion of soil
(13) Leaching of nutrients
(14) Decrease of soil fertility
(15) Pollution of ground water
(16) Pesticides removes useful/ harmless organisms
(17) Irrigation causes increase of salinity
(18) Invasion by exotic weeds
(19) Monocultures cause epidemic damages to crops

19 x 8 = 152 marks

(Max 150 marks)

06. (a) Human pancreas

Location :

(1) In the abdominal cavity
(2) In the curve of the duodenum

Structure and function :

(4) Consists of head, body and (narrow) tail
(5) Both exocrine and
(6) Endocrine gland
(7) Exocrine part made up of lobules
(8) Each lobule formed of number of small alveoli
(9) Of acini cells/ secretary cells
(10) Secrets pancreatic juice
(11) Consists of water, mineral, salts and enzymes
(12) Enzymes are amylase
(13) Lipase
(14) Trypsinogen
(15) Chymotripsinogen
(16) Nucleases
(17) Caboxypeptidase/ peptidase
(18) Lobules drained by small ducts
(19) Unites to form pancreatic duct
(20) Endocrine part is the Islets of Langerhans
(21) Formed of α and β cells
(22) α cells secretes glucagons
(23) β cells seretes insulin

22 x 3 = 66 marks

(b) DNA Fingerprinting

(1) Use of DNA to establish identity of individuals involves
(2) Extraction / perfication of DNA from a tissue sample
(3) Restriction enzyme digestion
(4) Electrophoresis in gel-
(5) Blotting / bound into filter paper
(6) Hybridisation
(7) With probe DNA
(8) Elecrtophoresis gives a characteristic pattern of bands
(9) Used to identify criminals
(10) Parents and other family members

10 x 3 = 30 marks

(C) Non photosynthetic modes of nutrition in plants.

(1) Symbiotic relationships such as
(2) Mutualism
(3) Example *Rhizobium* bacterium
(4) Providing nitrogen to legumes
(5) Fungi in Mycorrhiza of plant roots
(6) Providing mineral and water
(7) Commensalism
(8) Orchides growing as epiphytes
(9) Getting mineral nutrition from barks of trees
(10) Semiparasites examples
(11) *Loranthes*
(12) Getting mineral nutrition
(13) From host trees
(14) Total parasites example
(15) *Cuscuta*
(16) Getting carbon
(17) And mineral nutrition from host plant
(18) Insectivorous plants
(19) Examples, *Nepenthes* or *Drosera* or *Utricularia*
(20) Getting nitrogen nutrition from inseet traps

18 x 3 = 54 marks

Total 50 x 3 = 150 marks

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