General Certificate of Education (A/L) Examination
2004 - April
Biology I - II
Answers

2004 August - MCQ Answers

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

Part A - Structured Essay

(i) A (i) 1. All organisms are composed of one or more cells
2. The basic structural unit of organisms is the cell
3. The basic functional unit of organisms is the cell
4. All cells arise from pre - existing cells

4 x $1/\frac{1}{2}$ = 6 marks

(ii)

organelle	protein	Lipid	RNA	DNA	Function
1. Nucleus	+	+	+	+	storage/ transter of genetic information/ control of cellular activities/ (any activity)
2. Mitochondria	+	+	+	+	aerobic respiration / ATP production.
3. E. R.	+	+	-	-	Transport of proteins / lipids synthesis/ steroids synthesis/ synthesis of proterins/ Detoxification
4. Golgi Appa-ratus	+	+	-	-	collection/ packaging/ distribution of molecules synthesized in the cell/ formation of Lysosome
5. chloroplast	+	+	+	+	photosynthesis
6 Ribosome	+	+	+	-	protein
7 Lysosome	+	+	-	-	Digestion

Any 5
$5 \times 1/\frac{1}{2}$ = 2.5 marks

(B) (i) a. Protein/ globular protein
b. phospholipid molecules
c. phospholipid bilayer

$3 \times 1/\frac{1}{2}$ = 1.5 marks

(ii) 1. It acts as an outer boundary
2. Regulating entry of water & ions & certain organic molecules in to the cell
3. It regullates the exit of waste material
4. It maintains osmotic balance within the cell
5. It receives information generates sighals to co-ordinate activities between cells/ cell recognition

Any 3 x $1/\frac{1}{2}$ = 1.5 marks

(iii) 1. phospholipid molecules are movable giving fluidity
2. protein molecules are arranged in a manner giving a mosaic structure

2 x $1/\frac{1}{2}$ = 03 marks

(c) (i)

phase of mitosis	A Major change taking place in the cell
★ Prophase	★ Condensation of chromosomes ★ Nuclear envelope breaks down/ disappears ★ Spindle is formed ★ Nucleolus disappears
★ Metaphase	★ chromosomes become aligned at the middle of the cell
★ Anaphase	★ Centromere divide/ chromatids are drawn to opposite ploes of the cell.
★ Telophase	★ Nucleus is reconstruated ★ Nuclear membrane is recontructed/ reformed around each set of chromatides ★ Spindle disassembled ★ Nucleolus re - appears.
★ Cytokinesis	★ Cytoplasm divides (physically into two daughter cells)

10 x $1/\frac{1}{2}$ = 15 marks

(ii)

Mitosis	Meiosis
1. Chromosome number/ kept constant.	chromosome number is halved/ reduced
2. Genetic stability maitained/	Genetic constitution is changed.
3. Homologous chromosomes behave independently during prophase/ no pairing.	Homologous chromosomes do pairing / unite/ synapse during prophase.
4. 2 nuclei/ 2 cells formed from each mother nucleus.	4 nuclei / 4 cells are formed from each mother nucleus /
5. Crossing over does not take place/ chiasma not formed	crossing - over takes place/ chiasma formed
6. completes within a short time.	takes comparatively along time.
7. takes place in haploid and diploid cells /nuclei	takes place only in diploid (2n) nuclei/ cells.

8. single, division take place	Double division take place	

Any 5 x 1/½ = 7.5 marks

(D) (i)

	Process	Site	Number of ATP molecules produced
stage 1	Glycolysis	cytoplasm	2 ATP/4 ATP
stage 2	krebs cycle	Matrix of mitochondria	2 ATP
stage 3	Electron Transport	inner membrane/ cristae/ of Mitochondria	34 ATP

9 x 1/½ = 14.5 marks

(ii) a. seed - starch
b. Liver - Glycogen

2 x 1/½ =03 marks

(iii) Diastase/Amylase

1 x 1/½ marks = 1.5 marks
Total 69x 1/½ = 10.3/½ marks
Maximum = 100 marks

02. A (i) Transport 1 x 1/½ = 1.5 marks

(ii) a. Presence of a pumping device/ heart
b. Presence of blood vessels and
c. Presence of liquid medium/ transport medium.

3 x 1/½ = 4.5marks

(iii) A system where
1. Blood is pumped from heart
2. Through arteries,
3. Flows through capillaries and
4. Flows back to heart through veins

4 x 1/½ = 06 marks

(iv)

closed blood circulation	open blood circulation
(a) Blood flows through vessels/ blood contained in vessels	Blood passes through body cavity / organs are bathed in blood
(b) Exchange of material through capillary walls.	Exchange of material direct

2 x 1/½ = 03 marks

(v) Coelenterata/ platyhelmithes/ Nematodes.

1 x 1/½ = 03 marks

B. (i) 1. Mid dorsally,
2. Immediately below the body wall/ terga,
3. Long
4. Tubular structure,
5. Consists of 13 chambers,
6. With 2 (lateral) ostea,
7. Fitted with valves

7 x 1/½ = 10.5 marks

(ii)

Heart of cockroach	Heart of earth worm
13 chambers	1 chamber
Ostea present	No ostea,
Connected to blood vessels only at one end / anteriore end	connected to blood vessels at both ends

1 x 1/½ = 1.5 marks

(iii)

cardiac muscle fiber	skeletal muscle fibers
Involuntary,	voluntary,
Myogenic	Non myogenic/ neurogenic
Doesnot fatigue	Fatigues

Any 2 x 1/½ = 3 marks

(iv) Involuntary action 1 x 1/½ = 1.5 marks

(C) (i) Liquid portion of blood 1 x 1/½ = 1.5 marks

(ii) water 1 x 1/½ = 1.5 marks

(iii) a. Dissolved in plasma
b. In combination with haemoglobin/ as carbamino - haemoglobin
c. As HCO_3^- 3 x 1/½ = 4.5 marks

(iv) 1. It has high affinity for heamoglobin/ high affinity than that of O_2
2. Combines irreversibly with heamoglobin
3. Thus decreases oxygen binding ability of heamoglobin/ decreases the amount of haemoglobin oxyhemoglobin Produced

4 x 2.5 = 10 marks

(v) Haemoglobin, Haemorythrin

any 2 x 1/½ = 03marks

(D) (i)

Tissue	constituent cell type	substances transported
xylem	(xylem) vessels / vessel elements (xylem) tracheads Fibres parenchyma cells.	water minerals/ Ions
phloem	sieve tube companion cells parenchyma cells Fibers	sucrose Amino acids Hormones Minerals/ ions

Any 15 x 1/½ = 22.5 marks

(ii) 1. Diffusion
2. Osmosis
3. Inbibition
4. Massflow

4 x 1/½ = 06 marks

(iii) 1. In the root hair cell water potential is low when compared to that of soil,
2. Due to dissolved substances in the cell sap
3. Water moves from high water potential to lower water potential

4. Therefore water moves from soil to root hair cells.
5. When water enters the root hair cells ψ_s decreases

and

6. ψ_p increases
7. water enters the cell (until) $\psi_s - \psi_p$
8. ψ_s of root hair cell increases than that in the adjacent cortical cells.
9. And water moves from root hair cell into the cortical cell
10. Along water potential gradient.

10x $1/\frac{1}{2}$= 15 marks

(iii) 1. Cut equal strips of potato and measure leagth/ cut strips of colocasia measure curvature / obtain Rheo epidermal peels.
2. Prepare sucrose solutions of different molarities.
3. Place a strip of potato/ colocasia/ Rhoe epidermal peels in each solution for 20 - 30 min.
4. Measure the length of potato strips/ curvature of colocasia/ count the number of plasmolysed cells.
5. Draw agraph - change of length / change of curvature/ percentage of plasonolysed plasmolised cells on the y axis and molarity on x - axis
6. The point of intersection is the value equelent to cell saps concentration (ψ_s)/ point at which 50% cell are plasmolysed
7. using tables calculate the water potential.

7 x $1/\frac{1}{2}$=10.5marks

Total 68 x $1/\frac{1}{2}$ = 102

Maximum = 100 marks

3.(A) (i) a. Increases the number of organisms / produces new generation.

b. Tranfer genetic information / parental characters to the next generation / offspring

2 x 2= 04 marks

(ii)

Sexual reproduction	Asexual reproduetion
a. Fusion of gametes/ fertilization	No fusion of gametes /no fertilization
b. Meiosis occurs	Mitosis occurs
c. variations (high)	No variations
d. offspring genetically not identical to parents.	offsprings genetically identical to parents.

4 x 2= 08 marks

(iii) 1. Resutts in (greater) variation and therefore
2. evolution (potential) is high

2 x 2 = 04 marks

(vi) Development of an organism from the ovum without fertilization

1 x 2 = 02 marks

(vii) (Males of) Honey bee

1 x 2 = 02 marks

(B)(i) 1. Fragmentation
2. Budding
3. Binary fission
4. Multiple fission

4 x 2 = 08 marks

(ii) Fragmentation - *Planaria*/ Ribbon worms
Budding - *Hydra*
Binary fusion - *Amoeba*/ *Paramecium*
Multiple fission - *Plasmodium*

4 x 2 = 08 mark

(iii) Fragmentation - *spirogyra*
Budding - yeast/ *saccharomyces*
Binaryfission - Bacteria

(3+ 3) x 2 = 12 mark

(C)(i) a - Dorsal (hallow) nerve cord
b - Presence of notochord
c - Presence of pharyngeal/ visceral clefts
d - Post anal tail
e - Ventral heart

5 x 2 = 10 mark

(ii)

Chondrichthyes	Heterocercal caudal fin / placoid scales. No poer culum / gill s lits open separately/ 5 pairs of gill slits.
Osteichthyes	Operculum / cycloid scales/ ctenoid scales. Homocercal tail Homocercal caudal fin
Amphitia	Moist skin/ scale less skin
Reptilia	Dry skin/ scales
Aves	Beak / feathers/
Mammalia	Hair/ mammae/ external pinna.

6 x 2 = 12 mark

(iv) Male gametophyte

1 x 2.5 = 2.5 mark

(D)

a - 10	i - 13
b - 4	j - 7
c - 15	k - 16
d - 8	l - 5
e - 3	m - 11
f - 12	n - 14
g - 1	o - 6
h - 2	p - 9

15 x 2 = 30 marks
Tatal 50 x 2 = 100 marks

4.(A) (i) Natural materials obtain from environment that are used in everyday life for economic development.

1 x 2.5 = 2.5 marks

(ii) Resourse that are regenerated at a rate greater then or equal to the rate they are consumed. 1 x $2/\frac{1}{2}$=03 mark

(iii) Agricultural production/ livestock production/ fisheries forests/ grassland/ water/ air/ soil. 2 x $2/\frac{1}{2}$= 05mark

(iv) Petroleum/ fossil fuel. mineral resources (any example) 2 x $2/\frac{1}{2}$ = 05mark

(v) Use of natural resources while ensuring their benefits for future generations of people. 1 x $2/\frac{1}{2}$=2.5 mark

B. (i) a. Consist of living (biotic) and non living (abiotic) components.

b. These components interact with each other
c. It is an easily recognizable (functional) unit
d. There is an nutrient flow and
e. Energy flow through the system

5 x 2/$\frac{1}{2}$ = 12.5 mark

(ii) Grass ⟶ Grass hopper ⟶ frog ⟶ snake
or any appropriate food chain

1 x 2/$\frac{1}{2}$ = 2.5 marks

C. (i) ★ Results in erosion
★ Clearing of mangroves
★ Destruction of habitats.
★ and loss of biodiversity
★ Quality of water is effected in the natural water bodies due to/ Salinity increese.
★ Pollution / waste from prawn farms.
★ Blocking drainage resulting in
★ Flooding
★ Loss of grazing area for cattle. 7 x 2/$\frac{1}{2}$= 17.5mark

(ii) a. Tiger prawn
b. White prawn

2 x 2/$\frac{1}{2}$ = 5 mark

(iii) SEMBV
MBV

2 x 2/$\frac{1}{2}$ = 5 mark

(iv) ★ Maintaining the water quality at optimum range (required by shrimps)
★ Early detection of diseases.
★ Providing proper treatment for diseases.
★ Use of disease free seeds

3 x 2/$\frac{1}{2}$ = 7.5 mark

(v)

Extensive	Intensive
1. Depends on natural food/ no supplementary food/	Depends on supplemrntary food
2. Low stoking density	High stoking density
3. No need to maintain water quality	Water quality is maintained
4. Yield is low	Yield is high
5. Harvesting by nets.	Draining and collecting with nete

5 x 2/$\frac{1}{2}$ = 12.5 marks

D. (i) Economic injury/ level
The density of the pest population which causes an economic loss.

1 x 2/$\frac{1}{2}$ = 2.5 marks

Economic threshold
The density of pest population at which the control measures are applied

1 x 2/$\frac{1}{2}$ = 2.5 marks

(ii) 1. Part of the crop plant attacked
2. Economic value of the crop
3. Crop variety
4. Time
5. Place
6. Cost

Any 4 x 2/$\frac{1}{2}$ = 10 marks

(iii) 1. Organochlorines/ chlorinated hydrocarbons.
2. Organophosphates.
3. Carbamates
4. Pyrethroids

4 x 2/$\frac{1}{2}$ = 10 marks

Total 42 x 2/$\frac{1}{2}$ = 105

Maximum = 100

Part B - Essay

1. 1. Co_2 diffuses into the leaf.
2. Through stomata
3. Dissolves in water/ moisture of palisade cells/ mesophyll cells.
4. Diffuses through the cell membrane/ cytoplasm.
5. Into the stroma of
6. Chloroplast
7. Co_2 combines with 5c compound
8. Called RuBP
9. Which is catalyed by an enzyme ribilose bisphosphate carboxylase
10. To form a 6c compound.
11. Which is unstable
12. 6c compound immediately breaks down
13. Into 2 molecules of
14. 3c compound
15. P. G. A / glycerate 3 phosphate,
16. Which is the first stable product in photosynthesis
17. P.G. A / glycerate 3 phosphate is converted to PGAL/ triose phosphate.
18. Using some of the ATP
19. And all NADPH2
20. Produced during the light reaction
21. Part of PG A1 in used for
22. Regeneration of CO_2 acceptor.
23. Through a series of reactions.
24. Produce RuMP
25. RuMP combines with
26. Rest of ATP
27. And regenerate RuBP
28. Remaining PGAL/ triose phosphate
29. Undergose a series of reactions.
30. To produce hexose sugar
31. Hexose sugars are polymerized/ converts to from starch

Any 38 x 5 = 150 marks

2. (i) 1. Totaliy of organisms / in the biosphere and consists of
2. Species diversity
3. Genetic diversity
4. Ecosystem diversity

(ii) 5. Detorestation
6. Fragmentation of lands/ habitats
7. Introduction of alien species
8. Agricultural practices
9. Pollution
10. Over exploitation

(iii) 11. For the maintenance of balance in ecosytem.
12. Maintenance of food chains in the ecosystem
13. Maintenance of hatural biogeochemical cycles and
14. Hydrological cycle
15. For aesthetic value
16. Many plant species are used as food/ medicine other domestic products
17. By man and
18. To preserve variety of plants and animals which are products of (several billon years) of evolution

(iv) The 2 maijor bio diversity conservation methods are in - situ and ex - situ con servation
19. Insitu conservation

20. Conservation of any component of biodiversity (species/ genetic/ ecosystem) in ther natural habitat.
21. Reproduction is facilitated in the natural habitat.
22. Large enough populations for self sustenance should be ensured and
23. Adequate extent of habitats should be ensured.

Methods of in - situ conservation
24. Establising protected areas/ sanctuaries/ man and biosphere reserves.
25. Species reintrodutions
26. Ex - situ conservation is the
27. Conservation of any component of biodiversity outside their natural habitats.
28. Conditions similar to the natural habitats are provided.
29. Reproduction and surrival are ensured/ facilitated outside their natural habitats.

Methods of ex - situ conervation
29. Establishing gene banks/ seed banks/ germplasm centres.
30. Botanical / zoological gardens/ turtle hatcheries.
31. Captive breeding/ artifical breeding.

Any 30 x 5 = 150 marks

03. (i) 1. Mutations are changes in the genetic material/ DNA/ genome.
2. They are heritable/ can be transmitted to the future generations.

2 x 5 = 10 marks

(ii) 3. Mistakes taking place at the time of replication of DNA/ abnormal segregation of chromosomes during meiosis.
4. Mutagenic chemicals.
5. Radiations (uv rays and x rays)

3 x 5 = 15 marks

(iii) 6. Chromosomal mutations.
7. Mutations involving the change of chromosome number,
8. Mutants missing one chromosme - (Aneuploidy)
9. Individual with only one x chromosome (total 43),
10. Turner's syndrome
11. Individuals with extra chromosome (total 47)
12. Klinefelter 's syndrome/ Downs syndrome.
13. Increase/ change of entire seto of chromosomes/ (polyploidy)
14. Chromosome numbers - 3n, 4n, 5n etc.
15. Which is common in plants (flowering plants)
16. Change in the structure of chromosome.
17. Gene mutation
18. Mutation affecting single gene.
19. Albinism
20. Haemophillia
21. Colour blindness
22. Sickle cell anemia
23. Thalassemia
24. Mutated genes are (normally) ressesive.

(b)
25. Some mutantions are responsible for favovable characteristics.
26. That are advantages for the survival of organisms.
27. Therefore organisms with such variations have a higher chance to be selected (for reproduction)
28. Thus these mutations are successfully passed from generation to generation.
29. Such Mutant organisms can compete with non mutant organisms
30. This process is natural selection which
31. Leads to the evolution of the species
32. Some mutations are disadvantages (harmful or lethal) and
33. Such mutants are removed.

Any 30 x 5 = 150 marks

04. (i) Major physical changes
1. Softening of food
2. Pigmentation
3. Slime or gum formation
4. Toxin accumulation
5. Development of bad odour

Major chemical changes
1. Conversion of proteins into
2. Amino acids
3. Ammonia
4. Amines
5. H_2S
6. Fermentation of
7. Carbohydrates forming
8. Acids/ dicreasing P_H
9. Alcohol
10. Gases
11. Conversion of lipids into
12. Fatty acids
13. Glycerol

(ii) Internal factors
1. PH
2. Moisture content
3. Nutrient content
4. Biological structure

External factors
5. Temperature
6. Relative humidity
7. Presence or absence of O_2

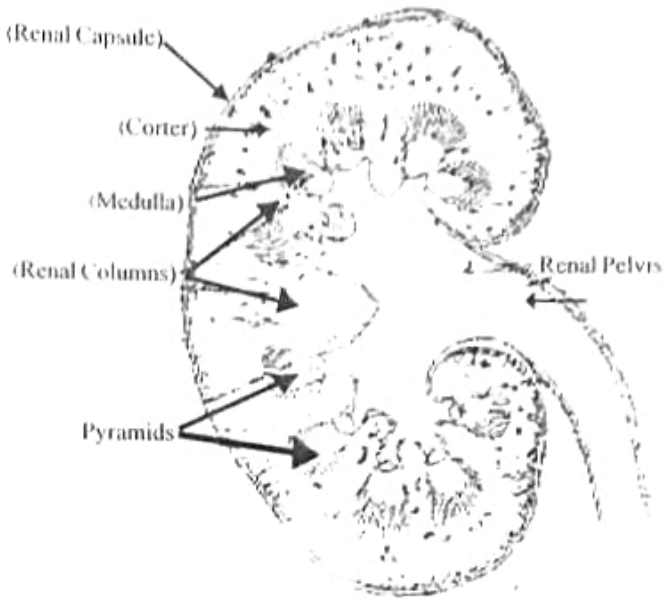
(iii) 1. PH affect microbial growth
2. Most micro organisms grow best at neutral PH
3. Only few microorgamisms grow at low/ acidic PH
4. Fungi and yeasts grow at low PH and spoil acidic foods/ fruits.
5. Bacteria grow at neutral PH (5 - 7) and spoil food such as meat / fish
6. Moisture / water affects growth of microorganisms.
7. High moisture containing food such as
8. Meat / fish/ milk spoil easily by
9. bacteria
10. Low moisture containing food such as
11. Bread/ biscuits
12. Spoil by molds/ fungi
13. Dried foods such as.
14. Milk powder/ flour
15. Are not easily spoiled
16. Suger/ salt containing food (high Concentration)
17. Where water availability is low are
18. Spoiled by xerophillic / halophillic
19. Molds/ yeosts.
20. Microbial growth is affected by variety of nutrients.
21. Nutrient rich food such as
22. Milk/ meat are

23. Easily spoiled by microorganismg/ Bacteria
24. Nature of the covering of some food/ hard cover/ epicrp
25. Fruits/ eggs
26. Prevents entry of microorganisms.
27. Prevents spoilage

Any 30 x 5 = 150 marks

05. (i) 1. Bean shaped/ concave medially and convex laterally
2. Surrounded by renal capsule.
3. Hillus on the medium surface
4. Trough the concave region blood vessels (lympvessels) and nerves pass.
5. Ureter leaves/ originates from the (concave) medial region.
6. Outermost region is the cortex
7. Inner medulla
8. Medulla consists of renal pyremids / cone shaped
9. Which have a striated appearance
10. Renal columns
11. Consisting of cortical tissue
12. Are present between pyramids
13. The apices of pyramids are directed towards the renal pelvis
14. Which is funnel like
15. And located closer to medulla
16. It opens to the ureter/ ureter starts for renal pelvis

(ii) 17. Takes place in the nephron
Three processes
18. Ultrafiltration
19. Selective resorption
20. (tubular) secretion
21. Ultra filtration is filtration of blood.
22. Under high pressure
23. Through capillary wall of glomerulus and inner wall of Bowman capsule/ in the Malpigman corpuscle.
24. 25 Filters water, salts/ ions, amino acids, glucose, urea, vitamins, some drugs etc. (mark each maxium 6 marks)
26. Plasma proteins, blood cells are not filtered
27. Selective resorption in resorption of certain substances from glomerular filterate in to blood/ preitubular capillaries.
28. In the proximal convoluted tubule
29. Active resorption of Na^+
30. Active resorption of amino acids
31. Active resorption of glucose
32. Obligatory resorption of water
33. Passive resorption of Cl^-
34. Passive resorption of urea
35. Passive resorption of HCO_3^- take place
36. In the descending limb of the loop of Henle.
37. Passive resorption of water/ resoption of water due to osmos take place.
38. In the ascending limb of the loop of Henle
39. Active resorption of Na^+
40. Passives resorption tubule
41. In the distal convoluted of tubule.
42. Active resorption of Na^+
43. Passive resorption of Cl^-
44. Passive resorption of HCO_3^-
45. Resorption of water if ADH is presnt take place
46. In the collecting duct
47. Resorption of water if ADH is present take place.
48. Secretion of K^+ H^+ NH_3^+ creatinine some drugs/ urea **(any 3 one mark each)**
49. take place in the convoluted tubules/ through the walls of onvoluted tubules
50. about 100 - 180 l of blood is filtered per day.
51. but only 1 - 2 l of urine is formed



Any 47 x 3 = 141 marks
correct diagram L.S Kidney = 9
(fully labeled 9, partly labeled 6, unlabeled 3)

Total marks = 150 marks

06. (i) Control of weeds
have to be controlled as they Methods of contral
1. Physical / manual/ mechanical
2. Chemical
3. Biological
4. In manual methods weeds are directly uprooted.
5. Destroyed by fire.
6. Removed by plaughing and
7. Flooding

In chemical methods
8. Weedicides and/ herbicies are applied

In biological methads
9. Anoter living organisms
10. Which feeds on the weed is used.
11. Example : insects/ salrenia/ Beetle / fish for aquatic weeds - any correct example

Advantages and Disadvantages
12. Manual methods are time consuming
13. Crop damage is low
14. Weeds are removed completely for a long time
15. Fire may affect soil structure/ soil orgamisms.

Chemical methods.

16. Very effective
17. Affects physiological functions of weeds.
18. Pollution of environment
19. May affect soil organisms.

Biological Methods

20. Very effective / specitic.
21. Low Pollution of environment.

Any 20 x 2 1/2 = 50 marks

(ii) Human cerebellum

1. Derived from the hind brain.
2. Situated behind the pons varoli/ below the posterior portion the cerebrum.
3. Has two hemispheres
4. Grey matter forms the surface of the cerebellum.
5. White matter lies in deeply areas.
6. Concerned with voluntary muscular movement/ skeletal muscle movement
7. Involved in maintenance of posture and
8. Balance

8 x 5 = 40 marks

(iii) Role of Microorganisms in the extrection of metals.

1. Metabolic activities of
2. Autotrophic bacteria such as
3. *Thiobacillus ferroxidans/ Thiobacillus thioxidans.*
4. Is used for the extraction of metals / Cu/ uranium
5. From low grade ore
6. They produce sulfuric acid and
7. Fe^{+3} (during metabolism)
8. Causes oxidation of
9. Iron/ sulfide containing ore/ $CuFeS_2$/ chalcopyrites.
10. Producing $cuso_4$
11. Bacteria obtains energy through this process.
12. $Cuso_4$ is electrolyzed to obtain Cu

12 x 5 = 60 marks
Total = 150 marks

• • • •