[redacted]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව

ජාතික ඇගයීම් හා පරීක්ෂණ සේවාව

இலங்கைப் பரீட்சைத் திணைக்களம்

தேசிய மதிப்பீட்டிற்கும் பரீட்சித்தலுக்குமான சேவை

අ.පො.ස.(උ.පෙළ) විභාගය - 2017

க.பொ.த (உயர் தர)ப் பரீட்சை - 2017

විෂය අංකය } 09 විෂය } Biology

ලකුණු දීමේ පරිපාටිය/புள்ளி வழங்கும் திட்டம் - I පත්‍රය/பத்திரம் I

ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.
01.	1	11.	3	21.	5	31.	3	41.	3
02.	2	12.	1 or 2	22.	2	32.	1	42.	2
03.	1	13.	3	23.	1	33.	5	43.	1
04.	4	14.	5	24.	5	34.	5	44.	2
05.	2 or 5	15.	3	25.	5	35.	2	45.	2
06.	2	16.	4	26.	5	36.	1	46.	1
07.	3	17.	3	27.	1	37.	3	47.	3
08.	1	18.	5	28.	3	38.	2	48.	1
09.	4	19.	5	29.	1	39.	3	49.	3/5
10.	1	20.	1	30.	1/4	40	3	50	1

විශේෂ උපදෙස් விசேட அறிவுறுத்தல் } එක් පිළිතුරකට ඉලකු ஒரு சரியான விடைக்கு ලකුණු 01 බැගින් புள்ளி வீதம் 50

මුළු ලකුණු 01×50 = 50
மொத்தப் புள்ளிகள்

Part A - Structured Essay

1. (A) (i) What are the main functions of water in living organisms other than being a solvent?

- Component of protoplasm / cytoplasm
- Reactant
- Maintaining turgidity

3 x 2 ½

(ii) There are many properties of water that are important for life. Of these, some are especially important for aquatic organisms. State three such properties and indicate the role of each of these properties with a suitable example.

(a) Property : • High surface tension

Role : • Provides habitats for some aquatic insects.

Example : • Water skaters.

(b) Property : • High latent heat of fusion

Role : • A lot of heat should be dissipated for water bodies to freeze.

Example : • Water will not freeze easily in water bodies.

(c) Property : • Anomalous expansion of volume on freezing.

Role : • Ice forms on top and liquid water remains at the bottom / Water bodies will not freeze solid entirely

Example : • Aquatic organisms are capable of surviving during winter.

❖ Property : • Transparency

Role : • Allowing penetration of light

Example : • Allows to grow aquatic plants and algae in a considerable depth in water bodies / Submerged plants and algae are present

Any (3 x 3) x 2 ½

(B) (i) State the three concepts of cell theory.

- All organisms are composed of one or more cells.
- The basic structural and functional unit of organism is the cell.
- All cells arise from pre-existing cells.

3 x 2 ½

(ii) What are the internal structural features of eukaryotic cells that are different from those of prokaryotic cells?

- Presence of an organized nucleus.
- Presence of membrane bound organelles / Golgi body / chloroplasts / mitochondria / lysosomes / peroxisomes / glyoxysomes / microbodies / ER
- Presence of 80 S ribosomes.
- Presence of cytoskeleton.

4 x 2 ½

(iii) A student was provided with an epidermal peel of onion mounted on a glass slide and a light microscope. State in correct sequence, the steps that should be followed to observe the shape of onion epidermal cells under the light microscope.

- Place the slide on the stage of the microscope.
- Move the low power objective into position.
- Move the slide to bring the object into position for study.
- Looking through the eye piece.
- Adjust the mirror to give optimum illumination to the object (for clear viewing)
- Get the image as clear as possible.
- Using the coarse focus knob.

7 x 2 ½

(C) (i) Some structures that can be seen in molluscs are given below.

(a) Head (b) Suckers (c) Two pairs of tentacles
(d) Shell (e) Laterally flattened body

Using the relevant letters, indicate which of the above structures are present in each of the following animals.

Slug : a, c

Mussel : d, e

Chiton : a, d

Octopus : a, b

(4) Marks
8 x 2 ½

(ii) State two features seen in a heterocercal caudal fin that could be used to distinguish it from a homocercal caudal fin.

- Upper lobe is larger than the lower lobe.
- Vertebral column extends to the upper lobe.

2 x 2 ½

(iii) What is a nictitating membrane?

- Transparent thin membrane / 3rd eye lid which covers / moves over the eye.

1 x 2 ½

(iv) (a) Name an amphibian which has a long tail during the adult stage.

- Salamander

1 x 2 ½

(b) State a major external feature of the animal named in (a) above which can be used to distinguish it from a lizard.

- Soft skin / Moist skin / Absence of scales / No external ear (opening) / external gills

1 x 2 ½

(v) State a genus of an amphibian which does not have legs during the adult stage.

- *Ichthyophis*

correct Spelling underlining
1 x 2 ½

Total 40 x 2 ½ = 100 marks

2. (A) (i) State three main features that can be seen in a cross section of the human large intestine that can be used to distinguish it from a cross section of the human small intestine, when observed under the low power of a light microscope.

- Presence of three (longitudinal) muscle bands / Taeniae coli
- Presence of patches of lymphoid tissue
- Absence of villi / Circular folds

3 x 2 ½

(ii) State two major functions of HCl in the gastric juice.

- Kills microbes
- Inactivates salivary amylase / ptyalin
- Provides acidic environment needed for the action of pepsin
- Activates pepsinogen / Converts pepsinogen to pepsin

Any 2 x 2 ½

(iii) Name three hormones that influence selective reabsorption of ions in the human kidney.

- Calcitonin
- Parathyroid Hormone / Parahormone
- Aldosterone

3 x 2 ½

(iv) (a) Name an ion which is both reabsorbed and secreted in the human nephron.

- Na^+ / K^+

1 x 2 ½

(b) Name an ion which is reabsorbed in the human nephron both by active and passive mechanisms.

- Na^+ / Cl^-

1 x 2 ½

(v) What is the major constituent of renal calculi?

- Calcium Oxalate

1 x 2 ½

(B) (i) (a) What is the overall function of the nervous system?

- Co-ordination

1 x 2 ½

(b) State three features of dendrites that are different from those of axons.

- Conduct impulse towards cell body
- Short
- Branched
- ~~Non-myelinated~~ • Tapering / diameter is not uniform

Any 3 x 2 ½

(ii) (a) What is a nerve impulse?

- Propagating / Moving action potential

1 x 2 ½

(b) State two factors that affect the speed of conduction of a nerve impulse along an axon.

- Diameter
- (Presence of) myelin sheath

2 x 2½

(iii) (a) Name two inhibitory hormones secreted by human hypothalamus.

- PIH / Prolactin inhibitory hormone
- GHRIH / Growth hormone release inhibitory hormone / Somatotropin / Stomatostarin / GHIH / Growth Hormone Inhibiting Hormone

2 x 2½

(b) What are the functions carried out by human hypothalamus other than the secretion of hormones?

- Control of autonomic nervous system
- Control of appetite / hunger
- Control of satiety
- Control of thirst
- Control of water balance / Regulation of osmotic pressure
- Regulation of body temperature
- Control of emotional reactions / pleasure / fear / rage
- Control of sexual behavior
- Control of sleeping and waking cycles

Control / Regulation

Any 5 x 2½

(iv) In which lobe of the human cerebrum, is the auditory sensory area located?

- Temporal lobe

1 x 2½

(v) (a) What is a trophic hormone?

- A hormone which acts on another endocrine gland

1 x 2½

(b) Name the hormone that stimulates the secretion of gastric juice.

- Gastrin

1 x 2½

(C) (i) (a) What is the overall function of the human blood circulatory system?

- Transport

1 x 2½

(b) What is the most abundant plasma protein in man?

- Albumin

1 x 2 ½

(ii) (a) What is meant by cardiac cycle?

- Sequence of events that takes place during completion of one heartbeat

1 x 2 ½

(b) State three factors responsible for maintaining blood pressure of humans within the normal range.

- Cardiac output
- Blood volume
- Dialation and constriction of arterioles
- Elasticity of artery walls
- Amount of blood returning to the heart through veins

Any 3 x 2 ½

(iii) Name a phylum having triploblastic animals without a blood circulatory system.

- Platyhelminthes / Nematoda

1 x 2 ½

(iv) (a) What happens to the water potential when solutes dissolve in water?

- Decreases

1 x 2 ½

(b) What is turgor pressure?

- The pressure exerted by the cytoplasm / protoplast on the cell wall when the cell is in a turgid condition

1 x 2 ½

(v) (a) What is plasmolysis?

- Contraction of cytoplasm / protoplast away from the cell wall due to loss of water

1 x 2 ½

(b) How much is the pressure potential of a plant cell at incipient plasmolysis?

- 0 kPa / 0 Pa / 0 Atm / 0 MPa (Unit must be given)

1 x 2 ½

(c) State whether the water potential is higher than, lower than or equal to solute potential at incipient plasmolysis of a plant cell.

- Equal

1 x 2 ½

Total 40 x 2 ½ = 100 marks

3. (A) (i) (a) State the two ways by which the most amount of carbon dioxide is transported in human blood.

- as bicarbonate ions / HCO_3^-
- as carbamino- haemoglobin / combined with protein / haemoglobin

2 x 2 ½

(b) Where is the respiration control centre located in the human brain?

- Medulla Oblongata

1 x 2 ½

(ii) What is locomotion?

- Movement of the whole organism from place to place

1 x 2 ½

(iii) (a) State two features that are common to all three types of muscle fibres.

- Extensibility
- Elasticity
- Excitability / Irritability
- Contractility

Any 2 x 2 ½

(b) State two features of skeletal muscle fibres which are absent in cardiac and smooth muscle fibres.

- Long cylindrical fibers
- Multinucleate
- Voluntary

Any 2 x 2 ½

(iv) (a) What structural arrangement permits the movement of the human upper arm over a wide range?

- Ball and socket type of joint in the glenoid fossa between scapula and humerus/ Head of the humerus forms incomplete ball socket joint in shallow glenoid cavity/ fossa

1 x 2 ½

(b) State two features seen in the human upper limb that help in weight lifting.

- Strong humerus
- Supination and pronation
- Opposability / Opposable thumb
- Broad palm

Any 2 x 2 ½

(c) State two features seen in the human lower limb that contribute to erect posture.

- Strong femur
- Broad sole/ curvature of foot
- Knees are located closer to the line where center of gravity is present
- Knee joint is large and strong
- Location of knee joint, tibia, ankle joint and heel in the same line

Any 2 x 2 ½

(v) State a disadvantage of hydrostatic skeleton.

- Size limitation ∅ Slow locomotion

any 1 x 2 ½

(B) (i) Name a living plant tissue that provides support.

- Collenchyma

1 x 2 ½

(ii) State two main substances that are present in the cell walls of the tissue named in (i) above other than cellulose.

- Hemicellulose
- Pectin

2 x 2 ½

(iii) What is parthenocarpy?

- Development of fruit from the ovary without fertilization

1 x 2 ½

(iv) What is parthenogenesis in plants?

- Development of (infertile) seeds without fertilization

1 x 2 ½

(v) Briefly describe seed germination.

- Absorption/adsorption of water
- Activation of enzymes
- Mobilization of food resources/ stored food.
- Rapid growth of embryo
- Extension of radicle through seed coat

5 x 2 ½

(C) (i) (a) What are the life spans of the human sperm and human ovum?

Sperm: 48 - 72 hours after ejaculation Ovum: 24 hours after ovulation

2 x 2 ½

(b) At what stage of human spermatogenesis and oogenesis the second meiotic division occurs?

Spermatogenesis: (Between) secondary spermatocyte (and spermatid)

Oogenesis: (Between) secondary oocyte (and fertilization)

2 x 2 ½

(ii) (a) What is the role of inhibin in human spermatogenesis?

- Slows down the rate of spermatogenesis

1 x 2 ½

(b) What is acrosome reaction of a sperm?

- The release of hyaluronidase and
- proteases / trypsin from the acrosome

2 x 2 ½

(iii) (a) What is ovulation?

- The release of egg / ovum / secondary oocyte from the ovary (after rupturing of Graffian follicle)

1 x 2 ½

(b) What hormone triggers ovulation?

- LH ' Luteinizing Hormone.

1 x 2 ½

(iv) Where are the sperm receptors of the human ovum located?

- Zona Pellucida

1 x 2 ½

(v) (a) State two functions of oestrogen.

- Maintenance of pregnancy
- Development of secondary sexual characteristics
- Thickening of uterine epithelium / Uterine wall / Regulate proliferative phase of endometrium
- Stimulates ovulation / Stimulates maturation of oocytes
- Stimulates formation of oxytocin receptors in myometrium
- Stimulates secretion of LH / Triggers LH surge
- Inhibits FSH secretion
- Development of ducts of milk glands during pregnancy
- Maintenance of bone structure

Any 2 x 2 ½

(b) Name a hormone secreted by the human placenta which suppresses myometrial contractions.

- Progesterone

1 x 2 ½

(c) What is the role of oxytocin in parturition?

- initiation and
- maintance of myometrial / womb / uterine contractions
- to expell foetus

3x 2 ½

Total 40 x 2 ½ = 100 marks

4. (A) (i) (a) What is a test cross?

- Crossing of an organism with a homozygous recessive organism

1 x 2 ½

(b) What is the purpose of carrying out a test cross?

- To determine the genotype of a dominant phenotype

1 x 2 ½

(ii) (a) What is a back cross?

- Crossing of an organism with any of the parental genotype / parentS

1 x 2 ½

(b) What is the purpose of carrying out a back cross?

- To obtain offspring with a genetic identity which is closer to the parent /
  To obtain new improved varieties of plants / animals

1 x 2 ½

(iii) At what condition, a back cross becomes similar to a test cross?

- When the parent used in the back cross is homozygous recessive (for that character)

1x 2 ½

(iv) What is denoted by each of the following symbols in a human pedigree chart?

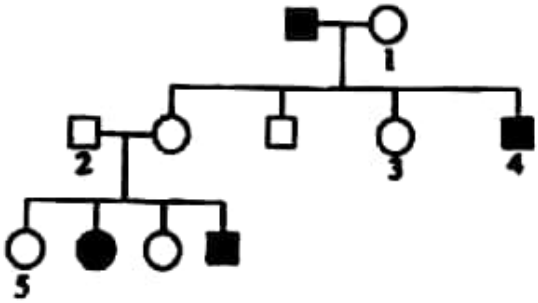
□ : Normal / unaffected male

● : Affected female

□—○ : Marriage / Mating / Cross

3 x 2 ½ marks

(v) A pedigree chart of a human family where some members show a genetic disorder is given below.



(a) State whether the following statement regarding the above inheritance is correct (✓) or incorrect (×).

"The above character is inherited in an autosomal dominant manner." X 1 x 2 ½

(b) Using 'A' for the dominant allele and 'a' for the recessive allele, state the possible genotype of each of the individuals labelled as 1 – 5 in the above pedigree chart.

1: Aa 2: Aa 3: Aa 4: aa 5: AA / Aa

5 x 2 ½

(B) (i) State the organizational levels of the environment in correct order.

- Individual / organism ⟶ Population ⟶ Community ⟶

Ecosystem ⟶ Biosphere

Decimal ⇒ no marks

1 x 2 ½

(ii) (a) What is an extinct species?

- A species where it is concluded without any reasonable doubt that the last individual has died

1 x 2 ½

(b) Give an example for an extinct bird.

- Dodo

1 x 2 ½

(iii) What are the major objectives of Biodiversity Convention?

- Conservation of biodiversity
- Sustainable use of the components of biodiversity
- Fair and equitable sharing of benefits arising from the use of genetic resources

3 x 2 ½

(iv) (a) State four main human activities that contribute to desertification.

- Deforestation
- Over cultivation / Improper agriculture
- Poor irrigation practices / Ground water extraction
- Overgrazing due to livestock farming

4 x 2 ½

(b) State three major impacts of desertification on humans.

- Reduction in agricultural yield / Reduction of arable land / food insecurity
- Unavailability of water
- Economics losses
- Death of people
- Collapse of civilizations

Any 3 x 2 ½

(C) (i) State the source of carbon and source of energy of each of the following nutritional types seen among microorganisms.

Nutritional type	Source of carbon	Source of energy
Chemoautotrophic	Inorganic C / CO_2	Inorganic chemicals / compounds
Chemoheterotrophic	Organic chemicals / compounds	Organic chemicals / compounds
Photoautotrophic	Inorganic C / CO_2	Sunlight
Photoheterotrophic	Organic chemicals / compounds	Sunlight

8 x 2 ½

(ii) A student was provided with a clean dry Petri dish. How should it be sterilized to be used in a microbiological experiment?

- Wrap in aluminum foil / paper and
- keep in hot air oven for 1 - 2 hours at 160 °C

2 x 2½

(iii) State two features of the toxin produced by *Clostridium tetani*.

- Thermo-labile / Inactivated by heat
- interferes with transmission of nerve impulse
- Proteinaceous.

any 2 x 2½

(iv) Name an enzyme which is industrially produced using *Aspergillus oryzae*.

- Amylase / Protease

1 x 2½

Total 40 x 2½ = 100 marks

Part B - Essay

5 .(a). Explain the mechanism of action of enzymes.

1. Enzyme reactions are reversible /catalyse both forward and reverse reactions.
2. Enzyme is not used up / does not participate in the reaction / remains unchanged after the reaction
3. Available for next reaction. / can be reused. / small amount is needed.
4. Increases the rate of reaction by reducing the activation energy.
5. Substrate combines with enzyme
6. to form enzyme-substrate complex,
7. which is short lived.
8. Only a part of the enzyme molecule binds to the substrate.
9. This (part) is called active site.
10. The substrate fits to the active site by matching the shape of active site and substrate.
11. The enzyme-substrate complex falls apart / dissociates
12. releasing products and enzymes.
13. In lock and key mechanism
14. The shape of the active site matches (perfectly) with the shape of the substrate/ active site acts as the lock and substrate acts as the key.
15. In induced fit mechanism
16. when the substrate and active site are close together
17. the substrate binds temporarily to the enzyme (to a place other than active site) and
18. changes configuration of enzyme active site slightly,
19. because of the flexibility of active site.
20. This change allows the substrate to fit in to the active site (due to matching shapes).

b) Describe the enzymatic reactions of making the first stable product in C_3 and C_4 plants during CO_2 fixation.

CO_2 fixation in C_3 plants

1. Carboxylation / CO_2 fixation is catalyzed by the enzyme RuBP carboxylase.
2. CO_2 combines with RuBP (5C)
3. to form unstable 6C intermediate / compound,
4. which splits to two molecules of PGA / glycerate-3- phosphate.

CO_2 fixation in C_4 plants

5. Carboxylation / CO_2 fixation is catalyzed by the enzyme PEP carboxylase.
6. CO_2 combines with PEP (3C)
7. to produce oxaloacetate.

c) Explain how C_4 plants are more efficient than C_3 plants in CO_2 fixation.

1. In C_4 plants, there is no photorespiration, but photorespiration occurs in C_3 plants./ In C_4 plants there is no loss of GP
2. Active site of the enzyme RuBP carboxylase is not specific to CO_2.
3. O_2 can act as competitive inhibitor competing with CO_2 for the active site (of the enzyme),
4. at high O_2 concentration,
5. producing phosphoglycolate (2C compound) and PGA.
6. (Two) phosphoglycolate molecules undergo a series of reactions to produce PGA
7. with the release of CO_2.
8. Photorespiration can reduce the photosynthesis yield,
9. when light intensity is high.
10. In C_4 plants, an enzyme for carboxylation (present in mesophyll cells) is PEP carboxylase (which carboxylate PEP to Oxaloacetic acid).
11. PEP carboxylase has high affinity for CO_2 (at low concentration)/ CO_2 is not a limiting factor.
12. O_2 is not a substrate for PEP carboxylase.
13. In C_4 plants CO_2 fixation occurs twice (in two different cells).
14. C_4 pathway of carboxylation increases CO_2 concentration (in bundle sheath cells),
15. increasing efficiency of carboxylation (catalized by RUBP carboxylase.)

20 + 07+ 15 = 42
Any 38 x 04 = 152 marks
Maximum 150 marks

06. (a) What is transpiration?

1. Loss of water vapour from the plant
2. (mainly) through stomata and
3. (to some extent) through lenticels and
4. cuticle.

(b) State how different external factors affect the rate of transpiration ?

1. Humidity.
2. When high, the rate of transpiration is low / When low, the rate of transpiration is high.
3. Wind.
4. When high, the rate of transpiration is high / When low, the rate of transpiration is low.
5. Temperature.
6. When high, the rate of transpiration is high / When low, the rate of transpiration is low.
7. Available water in soil.
8. ~~When high, the rate of transpiration is high~~ / When low, the rate of transpiration is low.
9. Light intensity.
10. When high, the rate of transpiration is high / When low, the rate of transpiration is low
11. CO_2 concentration.
12. When high, the rate of transpiration is low / When low, the rate of transpiration is high.

(c) Describe how an experimental set-up is arranged to determine the rate of transpiration using a potometer

1. Filling the potometer with water
2. This is done by allowing water to flow through the tap of potometer / immersing the potometer in water
3. Close the tap of the potometer when completely filled.
4. Bend a branch of a plant into water (in a large mouth container)/ Immerse the plant in water
5. Cut the branch / shoot
6. under water and
7. do not take the branch / shoot out of water.
8. Remove the stopper from potometer.
9. Fix the shoot into it

10. under water.

11. Tilt the end of the pototmeter (to which the shoot will be fixed) into water and / While potometer is in the water,

12. plug the stopper (with shoot) to potometer (under water).

13. Untilt the potometer/ Take the potometer out of water

14. Apply vaseline on the stopper

15. to make it air tight.

16. Insert the other end (of the potometer) in to water (in a beaker / container).

17. Open the tap of the potometer and

18. remove air bubbles (if any).

19 Lift the free end of the potometer and

20. allow an air bubble to enter into capillary tube.

21. Fix the potometer

22. to keep the capillary tube horizontally.

04 + 12 + 22 = 38

38 x 04 = 152 marks

Maximum =150 marks

07. (a) **Describe the location of the human testes.**

1. Outside body / abdominal cavity
2. Within scrotal sacs / scrotum.

(b) **Briefly describe the structure of the human testes.**

1. Paired.
2. Oval shaped.
3. Enclosed by the three layers of tissue.
4. Consists of several lobules.
5. (Contain) coiled
6. seminiferous tubules.
7. Wall of seminiferous tubule consists of basement membrane
8. on which germinal epithelium and
9. Sertoli cells are found.
10. Cells of different stages of spermatogenesis found attach to it
11. Outermost (diploid) spermatogonia (followed by)
12. (diploid) primary spermatocytes (followed by)
13. (haploid) secondary spermatocytes (followed by)
14. spermatids (followed by)
15. spermatozoa.
16. Between seminiferous tubules are
17. Leydig cells and
18. blood capillaries.

(C) **Briefly explain the process of spermatogenesis in man**

1. (Spermatogenesis is) the process by which sperms are produced in testes./seminiferous tubules.
2. It starts at puberty and
3. continuous to old age.
4. Duration is about 72 days.
5. It is controlled by hypothalamus and
6. pituitary.
7. Hypothalamus releases GnRH which
8. stimulates pituitary to release
9. FSH and
10. LH.
11. FSH initiates spermatogenesis.
12. Maintained / stimulated by testosterone
13. secreted by Leydig cells.
14. Speed is reduced by inhibin.
15. Inhibin suppresses FSH release.

Steps of Spermatogenesis

16. Spermatogonia divide mitotically
17. to form primary Spermatocytes
18. which undergo first meiotic division to form
19. secondary spermatocytes.
20. Secondary spermatocytes undergo second meiotic division to form
21. spermatids.
22. Spermatids differentiate to form spermatozoa.

02 + 18+ 22 = 42
Any 38 x 04 = 152 marks
Maximum 150 marks

8. **Describe the traditional selective breeding techniques that are used by man in agriculture.**

1. Improving crops had been started by ancient man, with the start of agriculture.
2. The cultivated plants / crop plants initially came from the wild.
3. The productivity of individual plants was different, due to natural variation.
4. Artificial selection/ selective breeding:
5. Man selected plants having desirable characters for cultivation in the next season.
6. Breeding among these resulted in more productive plant varieties.
7. Crop plants are now very different from the initial wild plants.
8. Inbreeding :
9. Breeding among genetically similar individuals / plants or
10. production of offspring by self-fertilization
11. No new genetic variation.
12. Maintains favourable characters.
13. Inbreeding increases unfavourable characters also
14. It reduces genetic vigour of population.
15. Resulting in loss of fertility,
16. increase genetic disorders,
17. reduced growth.
18. Crossing/ hybridization :
19. Breeding among genetically different varieties of the same species
20. Helps to maintain useful characters and
21. production of new varieties with (several) useful characters,
22. increases hybrid vigour of a population,
23. increases fertility of plants / increases rate of reproduction,
24. increases growth,
25. increases tolerance to diseases,
26. increases tolerance to pests,
27. increases tolerance to adverse environmental conditions / drought
28. decreases rate of death,
29. Improves yield.
30. Interspecies crosses/ interbreeding :
31. Species have genetic barriers for interbreeding

32. Offspring (resulting from these crosses) are usually sterile.

33. New species have been made by interbreeding.

34. Polyploids: (use of)

35. Presence of more than a pair of homologous chromosomes

~~36. Problems occur in meiosis/ when producing gametes.~~

~~37. Offspring are not produced,~~

38. propagated by asexual reproduction.

~~39~~. Some polyploid plants occur naturally.

~~40~~. Can increase ploidy level artificially.

41. eg . 3n seedless melon/ 6n wheat/ 10n strawberry / 8n Strawberry

Any 38 x 04 = 152 marks
Maximum 150 marks

9. (a) Giving suitable examples. describe the different types of natural resources.

Natural resources are

1. sources of material and
2. energy
3. which are found naturally and
4. are used in everyday life and
5. for economic development.

Different types

6. Living :
7. eg. fisheries / forests.
8. Non -living :
9. eg . petroleum / mineral resources / fossil fuel/ coal / calcite / gems/ dolomite / limestone / appetite / bauxite / granite / graphite/ clean air / soil / fresh water
10. Renewable :
11. which can be renewed within a short time interval,
12. but when overused they become non- renewable.
13. Can be living or non- living.
14. Living eg. fisheries / forests.
15. Non -living eg . soil / fresh water / clean air

6. Can cause economic harm.

7. Invasive species maybe introduced intentionally or

8. accidently.

9. Any one example of the followings

- Lantana / Gandapana / Nayunni / *Lantana camara*
- Giant sleeping plant / Yoda nidikumba / Radshatha thottalsurungi / *Mimosa pigra*
- Water hyacinth / Japan Jabara / Kula valai / *Eichhornia crassipes*
- Clown knife fish / Mannawa / *Chitala chitala*
- Congress weed / Parthenium / Kangres kalai / *Parthenium hysterophorus*

if Scientific name spelling & underline.

(c) **Cyanobacteria**

1. Blue green in colour.
2. Live in soil, fresh water and marine environments.
3. Some are associated with fungi / higher plants.
4. Some can fix atmospheric nitrogen.
5. Prokaryotic.
6. Photosynthetic.
7. Unicellular or
8. filamentous.
9. Contain chlorophyll a and
10. phycocyanin.
11. Eg . *Lyngbya* / *Anabaena* / *Nostoc*

20 + 19 +11 = 41

Any 38 x 04 = 152 marks

Maximum 150 marks

10. Write short note on the followings.

(a) Human vertebral column

1. Strong flexible rod
2. extending from occipital bone of skull to end of coccyx.
3. Consists of 33 vertebrae,
4. 24 movable and 9 fused.
5. Divided into cervical, thoracic, lumbar, sacrum and coccyx.
6. Cervical consisting of 7 vertebrae.
7. Thoracic consisting of 12 vertebrae.
8. Lumbar consisting of 5 vertebrae.
9. Sacrum consisting of 5 fused vertebrae.
10. Coccyx consisting of 4 fused vertebrae.
11. Between movable vertebrae
12. there are intervertebral discs.
13. Has two primary curvatures and two secondary curvatures.
14. Primary curvatures are thoracic and sacral.
15. Secondary curvatures are cervical and lumbar .

Functions

16. Protection to the spinal cord.
17. Supports skull.
18. Intervertebral discs function as shock absorbers.
19. Attachment of muscles / ribs.
20. Maintenance of erect posture

(b) Invasive species

1. Non -native species.
2. Has the ability to spread beyond the introduction site.
4. Can establish in new locations.
3. It may cause deleterious effect / adverse effect on local biodiversity.
4. They can change the ecosystem.
5. They can upset the ecological balance.

16. Non- renewable :
17. resources take a long time to renew.
18. eg . petroleum / coal / fossil fuel/ gems / minerals.
19. Recyclable :
20. resources that can be used several times.
21. eg. mineral resources / copper / iron / gold / any suitable example
22. Non-recyclable :
23. when used once cannot be used again.
24. eg . fossil fuel / calcite / gems / dolomite / limestone / appetite / bauxite / graphite / granite / coal
25. Exhaustible :
26. diminish when used.
27. eg . fossil fuel / petroleum / coal
28. Inexhaustible / Non-exhaustible :
29. do not diminish when used.
30. eg . solar energy / waves / tide / wind/ salt

(b) Explain the sustainable use of natural resources.

1. Use of resources without adversely affecting / diminishing the ability of future generations to use these resources.
2. This is needed because resources (except non- exhaustible resources) are limited.
3. This is important to utilize resources without over exploitation;
4. to use them for a longer time;
5. to allow the future generations to utilize them.
6. eg. catching fish that are grown to larger size / not catching young fish / leaving some mature fish in the population to reproduce.
7. eg . cutting only the well grown trees / not cutting young trees,
8. eg . conserving soil by controlling erosion.

30+ 8 = 38

Total = 38 x 04 = 152 marks

Maximum = 150 marks