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Part A - Structured Essay
Answer all questions on this paper itself.
(Each question carries 10 marks.)

1. (A) (i) Indicate in the table given below the five major biochemical processes involved in the natural decomposition and cycling of nitropenous compotnds in column X, corresponding biochemical transformation of each of them in column Y and one microorganism responsible for each of the transformations in column Z.

	X	Y	Z
(a)	.....	.....	.....
(b)	.....	.....	.....
(c)	.....	.....	.....
(d)	.....	.....	.....
(e)	.....	.....	.....

(ii) In what chemical form do plants generally obtain nitrogen from soil?

.....

(iii) What is the major compound which supplies nitrogen to humans?

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(B) (i) What are the adverse effects of discharging large amounts of waste water into natural water bodies?

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(ii) Many industrial waste water treatment plants use two stages of treatment, primary treatment and secondary treatment to purify waste water.

(*a*) What happens during the primary treatment stage?

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(*b*) Name the two methods generally employed in the secondary treatment stage.

.....

.....

(*c*) What is the major function of the secondary treatment stage?

.....

(iii) Some industrial waste water treatment plants employ an anaerobic sludge digestion system. Name two additional uses of such a system.

.....

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(iv) Name the three major techniques currently used in the management of solid waste.

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(C) (i) What are the major portals of entry of pathogenic microorganisms into human body?

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(ii) Name the four major nonspecific defence mechanisms seen in the human body.

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(iii) Occurrence of infectious diseases in humans depend on invasiveness and toxigenicity of pathogens.

(*a*) What is invasiveness?

.....

.....

.....

(*b*) Name two enzymes that contribute to invasiveness and indicate the role of each of these.

Enzyme	Role
.....	.....
.....	.....

(*c*) State two differences between exotoxins and endotoxins.

.....

.....

(*d*) Name the two major exotoxins contributing to pathogenicity and a pathogen producing each of them.

Exotoxin	Pathogen
.....	.....
.....	.....

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2. (A) (i) Presence of flower is a major distinguishing characteristic of angiosperms. Indicate five other major distinguishing characteristics of angiosperms.

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(ii) The following are reproductive structures seen in gymnosperms. Name the corresponding structure for each of them in the angiosperm flower.

Megasporophyll .....

Microsporophyll .....

(iii) State the major characteristic features seen in the life cycle of *Selaginella*.

.....

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(iv) State the difference between cross-pollination and self-pollination.

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(v) What is the significance of cross-pollination in nature?

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(vi) What are the adaptations seen in plants for cross-pollination?

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(B) (i) What is a seed?

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(ii) What features of seeds have enabled seed plants to colonize land?

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(iii) What is parthenocarpy?

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(iv) Name a crop where parthenocarpy occurs naturally.

.....

(v) What is parthenogenesis?

.....

(vi) State how parthenocarpy is induced in horticulture and give an example of a crop where it is practised.

.....

Example: .....

(C) (i) The major events/processes that take place in a nucleus of an eukaryotic cell during mitosis are given below. Put a ✕ mark in the appropriate column in the table to indicate in which phase of mitosis each of the following events/processes occur.

	Interphase	Prophase	Metaphase	Anaphase	Telophase
○ Chromosome condensation	.....	.....	.....	.....	.....
○ DNA replication	.....	.....	.....	.....	.....
○ Attachment of chromosomes to the spindle	.....	.....	.....	.....	.....
○ Movement of chromosomes towards the spindle poles	.....	.....	.....	.....	.....
○ Breakdown of nuclear membrane	.....	.....	.....	.....	.....
○ Alignment of chromosomes at the centre of the cell	.....	.....	.....	.....	.....
○ Centromere separation	.....	.....	.....	.....	.....
○ Reformation of nuclear membrane	.....	.....	.....	.....	.....

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(ii) Name the enzyme that participates in the synthesis of m-RNA molecule from a DNA molecule during protein synthesis.

.....

(iii) What is the sequence of nitrogenous bases in the m-RNA strand that would be synthesized from a strand of DNA with the sequence of nitrogenous bases TGAGCGCCTAAAATT?

.....

(iv) What is the natural role of the following enzymes?

DNA polymerase .....

DNA helicase .....

Restriction endonuclease .....

Ligase .....

3. (A) (i) Some structures found in invertebrates are as follows:

(a) Spines (b) Antennae
(c) Suckers (d) Tentacles
(e) Hooks (f) Radula
(g) Internal skeleton (h) Pedicellaria

Which of the above structures is/are found in each of the animal groups given below?

Cephalopoda .....

Asteroidea .....

Cestoda .....

Diplopoda .....

Gastropoda .....

Trematoda .....

Crustacea .....

Scyphozoa .....

(ii) Complete the following dichotomous key to identify chiton, snail, octopus, oyster and slug.

1. Shell is absent 2
   Shell is present 3
2. Siphon is present .....
   Siphon is absent .....
3. Tentacles are present .....
   Tentacles are absent .....
4. Head is present .....
   Head is absent .....

(iii) Which of the animals given in (A) (ii) above is/are immediately affected due to pollution caused by ships?

.....

(iv) What is the international convention/protocol which helps to control the pollution caused by ships?

.....

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(B) (i) Name five greenhouse gases.

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(ii) Explain how greenhouse gases contribute to sea level rise.

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(iii) In addition to sea level rise, what are the other consequences of the emission of greenhouse gases?

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(iv) What is the international convention/protocol which helps to control the emission of greenhouse gases?

.....

(C) (i) What is meant by a natural resource?

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.....

(ii) Give one example for each of the following.

(a) Non-living renewable resources .....

(b) Living renewable resources .....

(c) Non-living recyclable resources .....

(d) Non-living non-recyclable resources .....

(iii) What is meant by sustainable utilization of natural resources?

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4. (A) (i) What is the basic physiological feature of muscles?

.....

(ii) What is a muscle fibre?

.....

(iii) State three physiological differences between human cardiac muscle fibres and skeletal muscle fibres.

	Cardiac muscle fibres	Skeletal muscle fibres
(a)	.....	.....
(b)	.....	.....
(c)	.....	.....

(iv) State three structural differences between human cardiac muscle fibres and smooth muscle fibres.

	Cardiac muscle fibres	Smooth muscle fibres
(a)	.....	.....
(b)	.....	.....
(c)	.....	.....

(v) According to the sliding filament theory what happens to the length of A-band, H-zone and I-band during skeletal muscle contraction?

		Length
(a)	A-band	.....
(b)	H-zone	.....
(c)	I-band	.....

(vi) What is the by-product of muscle contraction used in homoeostasis?

.....

(vii) Name two hormones which act on human skeletal muscles.

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(B) (i) What is an animal hormone?

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(ii) Why is acetylcholine considered as a neurotransmitter and adrenaline as a hormone?

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(iii) State three differences between hormonal and nervous coordination in humans.

.....

.....

.....

(iv) Name three trophic hormones which influence the menstrual cycle of women.

.....

(v) Name three hormones secreted from a common structure formed from two individuals.

.....

(vi) For each of the hormones of man given below state the site of production and one main function.

Hormone	Site of production	Main function
(*a*) Growth hormone	.....	.....
(*b*) Oxytocin	.....	.....
(*c*) Cortisol	.....	.....
(*d*) Glucagon	.....	.....
(*e*) Thymosin	.....	.....

(C) (i) What are the essential components of a blood circulatory system?

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.....

(ii) Name the three components of the conducting system of human heart.

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(iii) State three functions of human lymphatic system.

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(iv) Name two human diseases that could be diagnosed using blood antibody testing.

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உயிரியல் III
Biology III

09 E III

Instructions:

Part B - Essay

* *Answer four questions only.*
Give clearly labelled diagrams where necessary.
(Each question carries 15 marks.)

5. (a) Describe the basic chemical nature and functions of proteins.
   (b) Explain briefly the role of RNA in protein synthesis.

6. Write an account on blood pressure of man.

7. (a) Describe briefly the global importance of photosynthesis.
   (b) Explain the role of light in photosynthesis.

8. (a) Explain what is meant by biodiversity.
   (b) List the causes of loss of biodiversity.
   (c) Briefly describe the measures taken to conserve biodiversity at the national and global level.

9. (a) What is recombinant DNA technology?
   (b) Describe the major steps involved in the production of a recombinant bacterium that can produce a useful animal protein.

10. Write short notes on
   (a) Salivary glands of man
   (b) Methods of sterilization used in microbiology
   (c) Montane forests in Sri Lanka

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