

Note: Theory of all the long questions has to be written and associated diagram or a graph should be drawn (Even if it is not indicated in the question).

Biodiversity:

Q. What is Biodiversity? What are the different levels of biodiversity?

A. Define Biodiversity and brief about it. Brief all the 3 levels.

Q. What are benefits of an ecosystem to humankind?

A. discuss all the points given in slides

Q. Write any four major threats to biodiversity.

A. Should discuss about each threat that you will be mentioning.

Microorganisms:

Q. What are microorganisms. Brief their properties.

A. Discussion should start with measurements. Then brief about every characteristic feature of microbe.

Q. Bacteria are necessary evil. Justify this statement.

A. There are several good and bad things that we had learnt about microbes. Discuss with appropriate examples.

Cell Structure and Function.

Q. What are the postulates of cell theory?

A. Mention the three postulates.

Q. What are the 5 different kingdoms? How are they different from one another.

A. Discuss as per the contents available in the textbook.

Q. Draw a well labelled diagram of Plant/ Animal Cell. Brief functions of any 5 parts.

A. Draw a neat diagram with pen. Label minimum of 10 parts. Should give info about the organelles that u will be mentioning in discussion.

Q. Write any 5 differences between a Plant and Animal Cell.

A. Plants have 3 parts in excess and animals and 2 additional parts which plants don't possess. Mention these parts.

Q. Write any 4 differences between a Prokaryote and Eukaryote.

Start with size, nucleus, organelles, chromosomes and more.

Cell Differentiation and Stem Cells.

Q: What is cell differentiation? Mention the properties of cells involved in cell differentiation.

A: Definition of differentiation. Explain about stem cell properties.

Q: What are the different types of stem cells based on their potential?

A: here you have to explain about the four different types of stem cells that have been mentioned in the textbook or the slides.

Q: Discuss about any two important applications of stem cells.

A: Discuss about usage of stem cells in various diseases, production of cell mass and even in research.

Q: what is metabolism and what are its two components?

A: give definition and then discuss about anabolism and catabolism.

Protein Synthesis

Q: explain about the different forms of RNA

A: brief about 3 types of RNA.

Q: discuss the important steps of transcription

A: 3 major step and conclude with RNA editing.

Enzymes

Q: what are enzymes and what are their properties?

A: start with catalysis and then mention the properties of a catalyst.

Q: explain about specificity of an enzyme

A: brief about the types of enzymes specificities and also brief about the hypothesis of enzymes and substrate interactions (please include the diagrams)

Q: what are the major factors affecting enzymes action

A: we have six factors. we should brief about each factor and draw the related graph to each factor.

Q: brief about the mechanism of enzymes action.

A: As per textbook we have three mechanisms, discuss them.

Q: how do you explain the catalytic power and thermodynamics of enzymes

A: give details about catalytic power of an enzyme and mention about the energy statistics of a non catalyzed and catalyzed reaction. (please include the graph).

Q: explain the mechanism of papain

A: completely discuss about the theoretical part diagrams and equations are not required

Q: how are restriction enzymes important. discuss their functioning mechanism.

A: begin with bacterial defenses. then talk about cofactors. We have two examples. give mechanisms of an example with the restriction sites indicated. diagrams are not required.

Photosynthesis

Q: What is photosynthesis, why is it so important on earth?

A: give definition, the brief all the global events connected to photosynthesis

Q: draw a well labeled diagram of a chloroplast. brief functions of any five parts.

A: you can draw diagram either from the textbook or from the slide. write two points about each part that you're going to discuss.

Q: what is chlorophyll? discuss the events of incident light on the chlorophyll.

A: mention about the availability of chlorophyll. discuss about absorption, reflection and transmission of the visible range of light.

Q: brief the events of light reactions.

A: begin with the absorption of light. and then discuss about harvesting and brief about hydrolysis reaction followed by ATP formation and NADPH production. A net reaction is required here.

Q: State the events of Calvin cycle.

A: Calvin cycle, light independent reactions, dark reactions are all same. discuss three important steps. carbon fixation, reduction and regeneration. give a net reaction.

Nervous system

Q: Draw a well labeled diagram of a neuron, discuss about any five parts

A: can draw from PPT or the textbook. write at least two points for each part.

Q: what are glia? brief the functioning of any four glia

A: discuss about each and every glia discussed in PT or the textbook. (diagram is not needed).

Q: how does neurotransmission happen at a synapse?

A: begin with what is a synapse. explain about the cells involved in the synapse. then talk about ejection and reception of the neurotransmitters add this synaptic cleft. diagram is mandatory.

Q: discuss the events of an action potential.

A: start with the resting voltage, then talk about the signals, then discuss about the the sodium and potassium pumps, the threshold values, depolarization, repolarization and hyperpolarization. include the graph.

Q: what are the four major parts of brain?

A: brief at least four points about each and every part of the brain. and outline of the brain is needed.

Q: how does peripheral nervous system function?

A: start with the types of peripheral nervous system. discuss how this peripheral nervous system is formed. then brief about each type of PNS. diagram is not needed

Q: what is a neurotransmitter? brief any four types of neurotransmitters.

A: define about a neurotransmitter and brief its significance during a neural communication. **we have 8 neurotransmitters on slides.** read all of them. mention minimum four points for every neurotransmitter.

Q: what is dementia? what are its symptoms?

A: discuss the points available on the slides.

Q: how does Alzheimer's disease occur? what are its symptoms?

A: start with forebrain. talk about Tau proteins and beta amyloid plaques. then talk about neurodegeneration. provide any six symptoms including dementia.

Q: why does Parkinson's disease happen? what are its symptoms?

A: discuss about substantia nigra. about lower dopamine production and malfunction synapses. then mention about any six symptoms.

Q: what are computer based neural networks? brief any four applications of computer based neural networks.

A: the answer for this is available on the textbook. and for the applications please refer to the Gray box in this section on the textbook.

Biosensors

Q: what is a biosensor? brief about working principle of biosensors.

A: begin with sensors. then talk about biological reactions. then define biosensors. followed by the principle.

Q: state the components of biosensors?

A: discuss about each and every component of the biosensor. draw the flow charts available on textbook or on the slides.

Q: brief about any two types of biosensors?

A: we have five types provided in the textbook. read all of them. except when writing about optical biosensors diagrams are not required.

Q: how does a glucose biosensor work?

A: explain the interactions that happens but when glucose oxidase reacts with the glucose, then discuss about the electron densities or the oxygen measurement or the hydrogen peroxide measurement. A schematic diagram is must.

Q: state the importance of DNA biosensors

A: Read the points available on the textbook. diagram is not required.

Q: how are biosensors useful in pollution detection

A: the theory has to be read from the textbook. diagram should be practiced from slides.

Q: discuss the importance of biosensors in food industry.

A: you can provide with the examples I have given in the classroom. About the detection pattern, look at the methods from the textbook.

Molecular Machines

Q: what are molecular machines?

A: we have various types of tiny motors available inside a cell. brief about all of them. Explain how they are important for cellular functioning.

Q: what are the various types of protein based molecular motors? state any four differences between Rotary and non Rotary motors?

A: two major types of protein based motors are Rotary motors- example ATP synthase, linear motors - example myosin.

Rotary motors are dependent on chemical gradient. they convert chemical energy into mechanical energy format. they majorly rely on positively charged ions. their mechanical outputs are very fast. they make energy molecules like ATP.

linear motors do not depend on chemical gradient. they rely on ATP for their mechanical action. they need support of cytoskeleton. they do not generate energy.

Q: explain the functioning of ATP synthase/ bacterial flagellum.

A: draw a diagram. explain how the rotational forces are developed due to membrane potential. discuss about the redox reactions with respect to hydrogen ion, discuss about angular displacements and the mechanical outputs in case of ATP mention the coupling reaction that is dependent upon torque. in the case of flagellum discuss about passing of rotational force onto the hook and the flagellum. discuss about clockwise and anticlockwise functions of the flagellum.

Q: discuss the functions of myosin and kinesin.

A: start with motor domains. then discuss about the respective cytoskeleton elements. brief about ATP hydrolysis and then the motor functions. Diagram is needed from the slides

Q: differentiate between myosin and dynein

A: myosins are the motor proteins with a long central stalk, and dynein has a short central stalk. Myosins work independently, dynein work in groups. myosin connects to actin, dynein connects to tubulin. myosin moves towards the positive end of a cytoskeleton and dynein move to the negative end. Dynein moves from periphery to center, myosins work at the center.