THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

SCHEME OF WORK

TEACHER'S NAME:

SCHOOL NAME:

SUBJECT: BIOLOGY

FORM: FIVE

YEAR: 2024/25

TERM: 1ST & 2nd TERM

COMPETENCE	GENERAL OBJECTIVE	MONTH	WEEK	MAIN TOPIC	SUB TOPIC	No. PRD	TEACHERS ACTIVITIES	PUPILS ACTIVITIES	TEACHING AIDS	REF. BOOKS	ASSESMENT	REMARKS
The student should have ability to explain the meaning and importance of cytology	Student should be able to explain the meaning and importance of cytology			**CYTOLOGY**	**1.1 Concept of cytology.**		- To guide students to brainstorm on the meaning of cytology. - To lead plenary discussion on the meaning of cytology. - To guide students to discuss, in groups the importance of studying cytology and its relation with other fields.	- To brainstorm on the meaning of cytology. - To discuss on the meaning of cytology. - To discuss, in groups the importance of studying cytology and its relation with other fields.	- Diagrams - Photographs - Charts showing different types of cells and the importance of cytology.	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Checklist - Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to explain the idea of cell theory	Student should be able to explain the main ideas of cell theory				**1.2 Cell Theory.**		- To lead students to state the cell theory. - To guide students to discuss, in groups the main ideas of the cell theory.	- To state the cell theory. - To discuss, in groups the main ideas of the cell theory.	Chart outling the cell theory		- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to describe the characteristics features and functions of a plant and animal cells	Student should be able to describe the characteristics features and functions of a plant and animal cells				**1.3 Cell structure and function.**		- To guide students to conduct microscopic observations of plant and animal cells (using epidermal cells of onion leaf, membrane of buccal cavity). - To guide students in groups to observe diagrams/pictures/ microscopic slides/photographs of cells and identify characteristics and functions of plant and animal cells.	- Students to conduct microscopic observations of plant and animal cells (using epidermal cells of onion leaf, membrane of buccal cavity). - Students in groups to observe diagrams/ pictures/ microscopic slides/photographs of cells and identify characteristics and functions of plant and animal cells.	Microscope Slides Onion Membrane of buccal cavity Models of plant and animal cell Photographs Pictures.			

The student should have ability to explain functions of different parts of Eukaryotic cells	Student should be able to:- a) identify Eukaryotic cell. b) explain functions of different parts of Eukaryotic cells				- **Eukaryotic cells.**		- To guide students to prepare and observe slides of plant and animal cells. - To guide students to draw the plant and animal cells as observed under light microscope. - To guide students to describe the functions of sub-cellular units of eukaryotic cells. - To lead plenary discussion on functions and adaptations of sub-cellular units.	- Students to prepare and observe slides of plant and animal cells. - Students to draw the plant and animal cells as observed under light microscope. - To guide students to describe the functions of sub-cellular units of eukaryotic cells. - To discuss on functions and adaptations of sub-cellular units.	Light micro scope, Slides, Onion Commelina sp. Leaf Buccal cavity membrane.		- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to identify bacteria in its natural environment	Student should be able to:- a) identify prokaryotic cell. b) explain functions of different parts of prokaryotic cells				- **Prokaryotic cell.**		- To guide students (in groups) to observe charts/diagrams of bacterial cells (prokaryotic cells) and discuss the functions of different parts. - To guide students to compare structures of eukaryotic and prokaryotic cells	- Sstudents (in groups) to observe charts/diagrams of bacterial cells (prokaryotic cells) and discuss the functions of different parts. - Students to compare structures of eukaryotic and prokaryotic cells	Photographs/ Diagrams/ Pictures of bacterial cell. Microscope and slide of fixed Bacteria.		- Exercise - Homework - Group discussion - Test - Exams	
							- To guide students to observe bacterial, plant cell/animal cell and compare their structure and discuss on the similarities and differences between eukaryotic and prokaryotic cells	- Students to observe bacterial, plant cell/animal cell and compare their structure and discuss on the similarities and differences between eukaryotic and prokaryotic cells				

The student should have ability to elaborate how cell differentiation brings about growth	By the end of this sub-topic the student should be able to:- a) explain the concept of cell differentiation and its significance.			**CYTOLOGY**	- **Cell Differentiation**		- To guide students in groups to observe charts/preserved specimens of plant and animal tissues and discuss the meaning and significance of cell differentiation.	- Students in groups to observe charts/preserved specimens of plant and animal tissues and discuss the meaning and significance of cell differentiation.	Preserved specimens, Diagrams of plants and animal cells Charts of cells	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to carry out test for lipids	By the end of this subtopic the student should be able to:- a) identify constituents of carbohydrates. b)categorize carbohydrates. c)carry out investigation on properties of carbohydrates. d) carry out biochemical tests for reducing sugar, non reducing sugar and starch.				**1.4 Organic constituents of Cells.** - **Carbohydrates**		- To guide students to discuss in groups the constituents of carbohydrates and identify the elemental constituents of carbohydrates - To guide students to brainstorm on the functions of car bohydrates in organisms. - To lead a plenary discussion on functions of carbohydrates in organisms.	- Students to discuss in groups the constituents of carbohydrates and identify the elemental constituents of carbohydrates - To guide students to brainstorm on the functions of car bohydrates in organisms. - To lead a plenary discussion on functions of carbohydrates in organisms.	Samples food substances (sugar cane, carrot, ripened fruits, cassava, potato.			
The student should have ability to: carry out test for lipids using different chemicals	student should be able to:- a) outline the constituent of and categorize lipids.. b) explain the properties of lipids. c) carry out biochemical tests for lipids.				- **Lipids.**		- To lead plenary discussion on constituent of lipids and brainstorming on categories of lipids (simple, compound and derived) and give examples, physical properties of lipids. - To guide students to brainstorm the roles of lipids in organisms.	- To discuss on constituent of lipids and brainstorming on categories of lipids (simple, compound and derived) and give examples, physical properties of lipids. - Students to brainstorm the roles of lipids in organisms.	Diagrams, Charts showing the roles of lipids in organisms.		- Exercise - Homework - Group discussion - Test - Exams	

The student should have ability to carry out test for protein using different chemicals	Student should be able to: a) identify the constituents of proteins b) categorize proteins. c) explain the properties of proteins. d) carry out biochemical tests for proteins				- **Proteins.**		- To guide students to discuss in groups the constituents of proteins. - To guide students to brainstormn categories of proteins (based on structure, composition and functions) and giving examples. - The teacher to guide students to carry out experiments to investigate properties of proteins.	- To discuss in groups the constituents of proteins. - To brainstormn categories of proteins (based on structure, composition and functions) and giving examples. - Using guided questions, students in groups to discuss the properties of proteins. - To carry out experiments to investigate properties of proteins.	Charts, diagrams showing constituents of proteins.			
The student should have ability to Demonstrate lock and key hypothesis	student should be able to: a) investigate the factors governing enzyme activity. c) categorize enzymes on the basis of nature of substrate and type of reaction catalysed.				- **Enzymes**		- To guide students to carry out chemical tests on enzyme activities. - To guide students to carry out experiments to investigate properties of enzymes and discuss properties of enzymes - To lead plenary discussion on categories of enzymes.	- To guide students to carry out chemical tests on enzyme activities. - To carry out experiments to investigate properties of enzymes and discuss properties of enzymes - To discuss on categories of enzymes.	•Enzymes sources eg saliva, • Test tubes, • Starch, • NaHCO3 • Dilute HCl. • Source of heat • Thermometer • Water baths • Ice.		- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to describe how ATP is formed	The student should explain the role of ATP inorganisms and explain the properties of water and its role in organisms.				**1.5 Other constituents of the cell: water.**		- To guide students to carry out library search on properties of water. - To guide students in groups to discuss the role of water in organisms. -	- Students to carry out library search on properties of water. - Students in groups to discuss the role of water in organisms.	Water, charts, Salt/sugar Burner, Beaker, Illustrations, Diagrams.		- Exercise - Homework - Group discussion - Test - Exams	

The student should have ability to classify organisms using natural methods	Student should be able to: a) identify types of classification systems. b) outline the bases of classifying organisms under each system.			**PRINCIPLES OF CLASSIFICATION**	**Classification systems.**		- To guide students to classify living things using artificial and natural systems of classification. - To guide students to brainstorm on the merits and demerits of artificial and natural system of classification.	- The students to classify living things using artificial and natural systems of classification. - The students to brainstorm on the merits and demerits of artificial and natural system of classification.	Variety of living and non- living organisms.			
The student should have ability to arrange organisms into ranks	Student should be able to: a) explain the concept of ranks as used in b) explain the importance of ranks in classification				**Categories of classification**		- To guide students in groups using guided questions to discuss and present the meaning of ranks as used in classification. - Using questions and answers the to lead students to discuss the importance of ranks of classification.	- Students in groups using guided questions to discuss and present the meaning of ranks as used in classification. - Using questions and answers students to discuss the importance of ranks of classification.	Chart of classification ranks	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to: Name organisms scientifically	student should be able to: a)explain the term nomenclature and binomial nomenclature. b) outline the rules used in binomial nomenclature. c) explain the significance of scientific naming of organisms. d) apply the rules of binomial nomenclature.				**Nomenclature**		- To lead plenary discussion on the meaning of nomenclature and binomial nomenclature. - To guide students using question/answers to discuss the rules used in binomial nomenclature - To lead plenary discussion on the significance of naming organisms.	- Students to brainstorm the meaning of nomenclature and binomial nomenclature. - Students in groups to conduct library search on significance of scientific naming of organisms.	Charts, illustrations, different objects, samples			

The student should have ability to: Use taxonomic keys	student should be able to: a) explain the concept of taxonomic keys. b) distinguish between indented and bracketed keys. c) construct simple keys. d) use keys to identify organisms				**Taxonomic keys**		- To guide students to apply rules of binomial nomenclature in naming organisms. - Using questions and answers students to discuss in groups the meaning and importance of taxonomic keys in classifying organisms. - To lead students in exploring different types of keys (indented and bracketed). - To guide students in carrying out exercise of using keys to classify organisms. - Using guiding questions students to identify unknown organisms using keys.	- Students to carry out practical exercises to name organisms - Students to discuss in groups the differences between indented and bracketed keys. - Students in groups to construct simple keys using a list of selected organisms.	Charts, simple constructed keys, published keys for plants and animals. Charts displaying indented and bracketed keys,organisms (live or preserved).		- Exercise - Homework - Group discussion - Test - Exams	

The student should have ability to: Control viral disease	student should be able to: a) describe the characteristic features of viruses, b) draw the structure viruses. c) outline the main events of viral replication, d) identify problems associated with the classification of viruses, e) explain advantages and disadvantages of viruses			**COMPARATIVE STUDIES OF NATURAL GROUPS OF ORGANISMS**	Viruses		- To lead plenary discussion on the characteristic features of viruses. - To guide students to observe charts/diagrams/picture of bacteriophage and discuss the main events of viral replication. - To lead plenary discussion on the main events of viral replication. - To lead plenary discussion and conclusion. - Students to carry out library search and discuss in groups the advantages and disadvantages of virus drawing examples from daily life experiences. - To lead discussion on the effect of HIV.	- Students in groups to observe diagrams/charts/ photographs of virus and discuss its main characteristics feature, - Students in groups to observe charts/diagrams/ photographs of viruses and discuss the structures of plant and animal viruses. - Student to draw well labelled diagrams of selected plant and animal viruses, HIV and bacteriophage.	Prepared charts/ Diagrams of viruses. Charts showing events of viral replication. Videos Charts Diagrams Illustrations		- Exercise - Homework - Group discussion - Test - Exams	
MID TERM BREAK AND SHORT BREAK												

The student should have ability to: Stain and identify bacteria.	student should be able to: a) describe the general and distinctive features of the division b) classify bacteria on the basis of morphology and gram stain test c) draw the structure of a typical bacterium. d) explain the reproduction of bacteria e) account for advantages and disadvantages of members of Kingdom Monera			**COMPARATIVE STUDIES OF NATURAL GROUPS OF ORGANIS MS**			- To lead a plenary discussion of general and distinctive features of the division. - To lead plenary discussion on the theory behind gram stains test (gram positive and gram negative bacteria). - To lead plenary discussion on the reproduction of bacteria. - Students to brainstorm on the advantages and disadvantages of the Kingdom Monera. - To lead plenary discussion on the advantages and disadvantages of Kingdom Monera,	- Students in groups to visualize charts! micrographs of bacteria and blue- green algae to identify general and distinctive features of the division - Students to observe charts/diagrams/photos of bacteria and classify them on the basis of morphology and gram stain. - Students in groups to observe charts/models/ photographs and discuss the structure of bacteria. - Students to draw the structure of a typical bacterium. - Students to carry out library search on the reproduction of bacteria	Photographs of Bacteria Micrographs Charts Diagrams Models	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to: Control diseases caused by Amoeba	student should be able to: a) describe general and distinctive features of the phylum. b) draw structure of Entamoeba. c) explain the adaptations of Entamoeba to its mode of life.				Kingdom Protoctista 3.3.1 Phylum Rhizopoda		To lead a plenary discussion and conclusion.	Students in groups to observe charts/models/pictures/specimens of organisms belong to the phylum Rhizopoda and discuss the general and distinctive features of the phyla.	Charts Pictures Specimens Diagrams Charts Pictures Diagrams Specimens Models		- Exercise - Homework - Group discussion - Test - Exams	

The student should have ability to: identify trypanosoma in its natural environme nt	student should be able to: a) describe the general and distinctive features of the phylum. b) describe the structure of Trypanosoma. c) explain the adaptation of Trypanosoma to its mode of life				Phylum Zoomastigna		- To guide students to draw a well labelled diagram of Entamoeba. - To lead a plenary discussion basing on students responses, make clarification and conclusion. - To guide students to observe charts/models/pictures/specimens and discuss in groups the general and distinctive features organisms under the phylum Zoomastigma. - To guide students to draw a well labelled diagram of Trypanasoma. To guide students in a plenary session to discuss the adaptation of Trypanasoma to its life.	- Students in groups to observe charts/diagrams/models/spe ci mens of Entamoeba and describe its structure. - Students in groups to observe charts/diagrams/specimens of Entamoeba and discuss its adaptation. - Students in groups to observe charts/specimens/models/dia grams of Trypanasoma	Charts Pictures Specimens Diagrams Charts Pictures Diagrams Specimens Models			
The student should have ability to: Draw and identify euglena	Student should be able to: a) describe the general and distinctive features of the phylum. b) state the adaptation of Euglena to its mode of life.				Phylum Euglenophyta		- To lead a plenary discussion on the adaptation of Euglena to its mode of life. - To guide students to observe charts/diagrams/specimens of Phytophthora and discuss the general and distinctive features of the phylum. - To lead a plenary discussion on the general and distinctive features of the phylum.	- Students to observe charts and micrographs of Euglena and discuss the general and distinctive features of the phylum. - Students to draw a well labelled diagram of Euglena. - Students in groups to observe charts/ diagrams /specimen of Euglena and discuss its adaptation.	Specimens slides Microscope Charts		- Exercise - Homework - Group discussion - Test - Exams	

The student should have ability to:Identify the adaptations of spyrogira in life.	student should be able to: a) describe the general and distinctive features of the phylum. b) draw the structure of Spirogyra. c) state the adaptation.f the Spirogyra to its mode of life.				Phylum Chlorophyta		- To guide students to observe microscope slides/specimens/charts/ diagrams, and discuss the general and distinctive features of the phylum	- . Students in groups to visualize charts and diagrams of Spirogyra and discuss their structures. Students to draw a well labelled diagram of Spirogyra. - Students in groups to discuss the adaptation of Spirogyra to its mode of life.	Microscope Slides Pictures of spirogya			
The student should have ability to: Draw the structure of mucor and rhizopus	Student should be able to: a) explain with examples advantages and disadvantages of the kingdom Protoctista and a) describe the general and . distinctive features of the P hylum. b) draw the structure of Mucor/Rhizopus c) explain the adaptation of Mucor Rhizopus to its mode of life			**COMPARATIVE STUDIES OF NATURAL GROUPS OF ORGANIS MS**	Advantages and disadvantages of the Kingdom Protoctista 3.4 Kingdom Fungi 3.4.1 Phylum Zygomycota		- To lead plenary discussion on the adaptation of Spirogyra to its mode of life. - To guide students to discuss with examples the advantages and disadvantages of organisms belong to the kingdom Protoctista. - To lead a plenary discussion on the general and distinctive features of the .h lum. - To guide students to observe diagram/chart of Mucor/Rhizopus and draw its structure.	- Student to observe microscope slides/ charts/diagrams and discuss the general and distinctive features of the phylum. - Student to observe microscope slides/ charts/diagrams /specimen of Mucor/Rhizopus and discuss its ada nations.	Charts Diagrams Microscope slides Specimens of Rhizopus	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Exercise - Homework - Group discussion - Test - Exams	

The student should have ability to: Identify Saccharo myces in nature	Student should be able to: a) describe the general and distinctive features of the h lum. b) draw the structure of Saccharornyces. c) describe the adaptations of Saccharomyces to its mode of life.				Phylum Ascomycota		- Using guiding questions students to observe charts/ diagram/microscope slides of organisms under the Phylum Ascomycota and discuss their general and distinctive features. . - Using guiding questions, students to discuss in groups the adaptations of Saccharamyces to its mode of life. - The teacher to lead plenary discussion on the adaptations of Saccharomyces to its mode of life.	- Students to observe charts/ diagrams of Saccharomyces and draw their structures	Charts Diagrams Microscope slides Specimens		- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to: Draw the structure of Agaricus	Student should be able to: a) describe the general and distinctive features of the phylum. b) draw the structure of Agaricus. c) state the adaptation of Agaricus to its mode of life				Phylum Basidiomyc ota		- Using guiding questions students in groups to observe microscope slides/ charts/ diagrams of organisms under phylum lasidiomycota and discuss their general and distinctive features. - To guide students to discuss the adaptations of Agaricus to its mode of life.	- Students to observe diagrams/ charts/pictures of Agaricus and draw its structure.	Microscope slides Charts/diagr ams showing structures of mushroom Agaricus		- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to Identify edible fungi from nature	Student should be able to: a) explain the advantages and disadvantages of kingdom Fung				Advantages and disadvantag es of the kingdom Fungi		- To lead plenary discussion on advantages and disadvantages of kingdom Fungi. Students in groups to observe charts/pictures/ specimens and discuss the general and distinctive features of the phylum.	- Students to carry out library search on advantages and disadvantages of organisms belong to kingdom Fungi.	Variety of plants Charts Pictures Diagrams specimen of Funaria			

The student should have ability to Describe the structure of Funaria	Student should be able to: a) describe the general and distinctive feature of the division. b) describe the structure of Funaria. c) state the adaptation of Funaria to its mode of life.				Kingdom Plantae 3.5.1 Division Bryophyta		- To guide students to draw a well labelled diagram of Funaria. - - To guide students in a plenary session and live conclusion.	- Students in groups to observe charts/diagram/specimen of Funaria and discuss its structures. - Students in groups to discuss the adaptation of Funaria to its mode of life.	Variety of plants Charts Pictures Diagrams		- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to draw pinus	Student should be able to: a) describe the structure of Dryopteris. b) state the adaptations of Dryopteris to its mode of life. c) describe the structure and state the adaptation of Pinus to its mode of life.				Division Filicinophyta (Pteridophyta)		To lead a plenary session on the structure of Pinus. To lead a plenary discussion on the adaptation of Pinus to is mode of life	- Students in groups to observe pictures, diagrams, real plants (Pinus) and discuss its structure,	Plant specimens Pictures photographs			
The student should have ability to make use of members of kingdom plantae	Student should be able to: a) explain with examples theadvantages of the Kingdom Plantae to human. b) explain disadvantages of the Kingdom Plantae to human.				Advantages and disadvantages of Kingdom		- To lead plenary discussion on the advantages of the kingdom plantae to humans - Students in groups to discuss with examples disadvantages of the kingdom plantae to humans.	- Students to brainstorm on the advantages of the kingdom plantae to humans.	Charts Diagram Pictures Models			

The student should have ability to control the effects of taenia/fas c iola	Student should be able to: a) describe the structure of Taenia/Fasciola b) state the adaptation of Taenia to its parasitic mode of life, c) explain with examples the advantage s and disadvantages of the phylum platyhelminthes.			**COMPAR ATIVE STUDIES OF NATURA L GROUPS OF ORGANI S MS**	Kingdom Animalia 3.6.1 Phylum Platyhelmin thes		- To lead plenary discussion on the advantages and disadvantages of the phylum Platyhelminthes.	- Students in groups to observe charts/ diagram/ specimens of TaenialFasciola and describe its structure. - Students to draw a well labelled diagram of Taenia/Fasciola. Students in groups to observe charts/diagram/ specimens of Taenia and discuss its adaptation to its parasitic mode of life. - Students to brainstorm on the advantages and disadvantages of the phylum Platyhelminthes	Preserved specimens of Taenia Fasciola Hand lens Diagrams Charts Pictures	Green Biologic al Science, BY D. J Taylor & New Understa nding Biology By Glenn & Susan & A Level Biology Course Compani on By A.G Toole	- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to: propose ways of controllin g Ascaris	Student should be able to: a) describe the structure of Ascaris. b) state the adaptive features of Ascaris to its mode of life. c) explain the advantages and disadvantages of the phylum Aschelminthes.				Phylum Aschelmint hes (Nematoda		- To guide students to observe charts/diagrams/models/spe cimen of Ascaris and describe its structure. - To lead plenary discussion on adaptive features of Ascaris, i) To invite a health specialist to discuss on the disadvantages of Ascaris. - To guide students to discuss in groups the advantages and disadvantages of the phylum Aschelminthes.	- Students to draw a well labelled diagram of Ascaris. - Students to carry out library search on adaptive features of Ascaris.	Models Charts Pictures Diagrams specimens of Ascaris			

The student should have ability to Make use of earthwor m in Agricultur e	Student should be able to: a) describe the structure of earthworm. b) explain the adaptive features of Earthworm to its mode of life. c) explain with examples advantages and disadvantages of Annelida.				Phylum Annelida		- To guide students in groups to observe charts/diagram/ picture/ specimen of earthworm and discuss its structure - To lead a plenary discussion on the advantages and disadvantages of the phylum Annelida.	- Students to draw a well labelled diagram of the earthworm. - Students in groups to observe charts/diagrams/pictures/s p ec imens of earth worm and discuss its adaptation features. - Students to brainstorm the advantages and disadvantages of the phylum Annelida and give examples	Pictures Diagrams Specimens		- Exercise - Homework - Group discussion - Test - Exams	
The student should have ability to Describe the role of arthropod s in Agricultur e.	Student should be able to: a) state classes of the phylum Arthropoda. b) desribe distinctive features of each class of the phylum arthropoda c) describe the structure of crab, spider, millipedes, centipedes and cockroach. d) explain adaptive features of the mentioned Arthropoda.				Phylum arthropoda		- To guide students to state the classes of arthropods. - To guide students to discuss in groups the distinctive features of each class of the phylum arthropoda - To guide students to describe the structure of crab, spider, millipedes, centipedes and cockroach	- Students in groups to observe charts / pictures/specimens of arthropods and group them according to their similarities and differences. - Students to observe specimens of arthropods and describe the distinctive features of each class. - Students to draw well labelled diagrams of crab, spider, millipedes, centipedes and cockroach - Students in groups using guiding questions to observe charts/ pictures/ specimens of arthropods and discuss their adaptive features.	Varieties of Arthropods, crab, spider, millipedes, centipedes and cockroach, Hand lens Models		- Presentation - Exercise - Homework - Group discussion - Test - Exams	

The student should have ability to: Dissect a cockroach	Student should be able to: a) dissect and display the digestive and reproductive systems of cockroach. b). describe structures of digestive and reproductive systems of the cockroach, c) explain advantages and disadvantages of the phylum arthropoda				Systems of Arthropods		- To guide students to dissect cockroach to display its digestive and reproductive systems. - To lead plenary discussion on structures of digestive and reproductive systems of cockroach. - To lead plenary discussion on the advantages and disadvantages of the phylum arthropoda	- Students to draw well labelled diagrams of the dissected cockroach to show digestive and reproductive systems of cockroach. - Students to observe specimens of the dissected cockroach and describe the displayed structures	Fresh killed Cockroach Chloroform Dissecting dish Dissecting kit Beaker Dissected cockroach Hand lens			
The student should have ability to Dissect a toad and a frog.	Student should be able to: a) explain with examples classesof the phylum Chordata. b) describe the structure of Tilapia, Pigeon Toad/Frog, Lizard and Mouse or any other small mammal. c) dissect Toad/frog and Mouse or small mammal to display viscera, digestive, urinogenital and nervous system.			**COMPARATIVE STUDIES OF NATURAL GROUPS OF ORGANIS MS**			- To guide students to discuss in groups the classes of the phylum Chordata. - To guide students to carry out dissection of toad/frog and mouse or small mammal to display viscera, digestive, urinogenital and nervoussystems - Students to draw diagrams of the dissected toadlfrog, mouse or any small mammal to display viscera, digestive, urinogenital and nervous systems.	- Students in groups using guiding questions to observe charts/pictures/specimens of chordates and group them according to their similarities and differences. - Students n groups to observe charts/pictures /specimens of Tilapia, Pigeon Toad/Frog, Mouse or any other small mammal, Lizard and describe their structure - Students to draw well labelled diagrams of Tilapia, Pigeon Toad/Frog, Mouse or any other small mammal and Lizard.	organisms tinder phylum Chordata. Tilapia, Pigeon Toad/Frog, Mouse or any other small mammal and Lizard Fresh killed Toad/frog o Chloroform Dissecting dish Dissecting kit		- Presentation - Exercise - Homework - Group discussion - Test - Exams	
TERMINAL EXAMINATIONS AND LONG VACATION												

The student should have ability to: Describe how nervous system works	Student should be able to: a) describe the structure of the nervous tissue. b) explain the adaptive features of nervous tissues.			**COORDINATION**	**Nervous Coordination in Mammals**		- To guide student to observe charts/pictures/diagrams microscope slides of neurones (nerve cells) / Neuroglia cells, and discuss their structure - Guide Students to draw well labelled diagrams of nervous tissue. - Using guiding questions students to observe charts/ microscope slides, diagrams/ pictures and discuss the adaptive features of the nervous tissues to their roles.	- Students to draw well labelled diagrams of nervous tissue. - Using guiding questions students to observe charts/microscope slides, diagrams/pictures and discuss the adaptive features of the nervous tissues to their roles.	Charts Diagrams Pictures Models Microscope slides	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Exercise - Presentation - Quiz - Homework - Group discussion - Test - Exams	
The student should have ability to shoe how synaptic transmission	Student should be able to: a) explain the concept of resting potential, action potential, polarization depolarization and repolarization of nerve cells, b) describe the formation and conduction of nerve impulses c) outline the characteristics of nerve impulses. d) explain synaptic transmission of nerve impulses.				**Nerve Impulse**		- Using guiding questions students in groups to visualize charts/diagrams/pictures of nerve cells and discuss the concept of resting potential, action potential, polarization depolarization and repolarization of nerve cells. - To lead plenary discussion on the meaning of resting potential, action potential, depolarization and repolarization of nerve cells. - To lead plenary discussion on formation and conduction of nerve impulses.	- Students in groups to observe diagrams showing synaptic transmission of nerve impulses and discuss synaptic transmission of nerve impulses. - Students in groups to observe diagrams showing synaptic transmission of nerve impulses and discuss synaptic transmission of nerve impulses. - Using guiding questions students to visualize charts/diagrams of nerve cells and discuss the formation and conduction of nerve impulses.	Charts Pictures Photographs Diagrams Illustrations of nervous tissues of nervous tissues		- Quiz - Exercise - Presentation - Homework - Group discussion - Test	

Student should have ability to: describe the functioning of human eye	Student should able to: a) identify main types of receptors and their function in the mammalian body. b) explain how mammalian eye accommodates. c) describe the structure of retina and the physiology of seeing. d) describe the structure of Membranous labyrinth of the mammalian inner ear. f) elaborate mechanisms of hearing and body balance in mammals.				**Receptors**		- To lead a plenary discussion on main types of receptors, location and their roles. - To lead a plenary discussion onhow the mammalian eye accommodates. Students in groups to examine charts/diagram/ picture/model of the mammalian eye and discuss its structure. To lead plenary discussion on the physiology of seeing. and ear - To guide students to visualize charts/diagrams/pictures/models of membranous labyrinth of the mammalian inner ear and describe their structure.	- Students to brainstorm on the main types of receptors, location and their role in the mammalian body. - Students in groups to visualise charts/pictures/diagrams/mo d els of the mammalian eye and discuss the accommodation of the eye. - Students to brainstorm on mechanism of hearing and body balance in mammals. - Students to plenary discussion on mechanism of hearing and body balance basing on students responses.	Charts Pictures Photographs Diagrams Illustrations of nervous tissues		- Exercise - Presentation - Quiz - Homework - Group discussion - Test - Exams	
The student should have ability to: describe feedback mechanism	Student should be able to: a) explain the feedback co-ordination. b) describe the interaction between hormonal and nervous system.				Hormonal Coordination in Mammals		- To lead plenary discussion on feedback mechanism of hormonal coordination using specified examples. - Using guided questions students in groups to discuss the interaction between hormonal and nervous system.	- Students to brainstorm on the meaning of feedback mechanism of hormonal coordination	Charts Illustrations Models Charts Diagrams			

The student should have ability to Apply hormones in Agriculture	Student should be able to: a) explain the concept of tactic movements. identify types of tactic movements in plants By the end of this sub-topic the student should be able to: a) explain the concept of nastic movement. b) explain the application of natural and synthetic phytohormones in crop production and control of weeds.			**COORDINATION**	Co-ordination in Plants, Nastic Movement, Tactic Movements		- To guide students to perform practical exercises to investigate tactic movements in plants - To guide students to perform practical exercises to investigate tactic movements in plants. - To guide students to carry out experiments to investigate the role of auxin and gibberellins on plant growth. - To lead a plenary discussion on the application of phytohormones in crop production and weeds control.	- Students in groups to discuss the concept of tactic movements. - Students in groups to identify types of tactic movement in plants, - Students in groups to discuss and outline types and roles of Phytohormones in plants. - Students using guided questions to discuss on application of natural and synthetic phytohormones in daily life.	Picture Photographs . Charts Diagrams	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Presentation - Exercise - Quiz - Homework - Group discussion - Test - Exams	

The student should have ability to explain how photophosphorylation takes place.	Student should be able to: a) explain the concept of light reaction. b) explain the concept of photophosphorylation c) distinguish between cyclic and non-cyclic photophosphoryl ation d) explain the role of water as a source of			**NUTRITION**	Food Manufacturing in Plants (Photosynthesis) 5.1.1 Light Reaction		- To guide students to brainstorm on the meaning and importance of light reaction. - To guide students to discuss in groups the meaning and importance of photophosphorylation. - To guide students in groups to observe and discuss illustrations of cyclic and non-cyclic photophosphorylation. - Students to differentiate cyclic and non-cyclic photophosphorylation. - Students in groups to observe diagrams/charts and discuss the role of water as a source of hydrogen.	- Students in groups to visualize charts showing steps of photosynthesis and discuss the role of light in the formation of ATP and NADPH2.	Charts Illustrations Charts Diagrams Pictures			
The student should have ability to: Describe conversion of phosphos g lyceric acid	Student should be able to: a) explain the meaning of dark reaction and the events which take place during dark reaction. b) outline the roles of ribulose biphosphate (RubP) and NADPH2. c) describe the main steps involved in the conversion of phosphoglyceric acid into sugar.				Dark reaction		- To guide students to observe charts and discuss the meaning of dark reaction. - To guide students to observe charts/diagrams and discuss the events which takes place during dark reaction (i.e. Calvin cycle) - To guide students in groups to observe charts, discuss and the main steps involved in the conversion of phosphoglyceric acid to sugar.	- Students in groups using guiding questions to observe charts/ diagrams/illustrations of dark reaction and discuss the role of ribulose diphosphate as a carbon dioxide accepter and NADPH2.	Charts Diagrams Illustrations		- Quiz - Exercise - Presentation - Homework - Group discussion - Test	

The student should have ability to describe C3 and C4 Plants	Student should be able to: a) explain the meaning of C3 and C4 plants. b) describe the C4 pathway (Hatch Slack pathway)				C3 and C4 Plants		- Using questions and answers the teacher to guide students to discuss the meaning of C3 plants and C4 plants - To guide students in groups to discuss the C4 pathway (Hatch Slack Pathway) - Using charts and diagrams students to describe the C4 pathway. - To guide students to conduct experiment to investigate factors affecting the rate of photosynthesis.	- Students to differentiate between C3 and C4 plants. - Students to summarize findings and present experimental reports.	Microscope slides Charts Diagrams		- Exercise - Presentation - Quiz - Homework - Group discussion - Test - Exams	
The student should have ability to describe the plant tissue	Student should be able to: a) explain factors affecting rate of photosynthesis.				Factors Affecting rate of Photosynthesis		- To lead a plenary discussion on roles of different tissues in the digestive system of mammals. - To guide students to discuss in groups the types and sources of digestive juices produced from different parts of the mammalian gut.	- Students in groups to observe models/pictures /models of the mammalian gut and discuss the structure of epithelial tissues, glandular tissues and relate them to their digestive roles.	Microscope slides Charts Diagram			

The student should have ability to: Control Digestive disorders	Student should be able to: a) describe the structure of epithelial, tissues, glandular tissues and relate them to their digestive roles. b) identify types and sources of digestive juices. c) explain the composition of digestive juices. d) explain the sensory and/or hormonal control of the secretion of the digestive juices			**NUTRITION**	Digestion in Mammals		- Using guiding questions students in groups to observe charts/diagrams showing sensory and hormonal control of the secretions of the digestive juices. The teacher to lead plenary discussion on the sensory and hormonal control of digestive juices secretion	- Students in groups to discuss the composition of each type of digestive juices.	Diagrams Charts e Substrate of digestive juices Models Pictures	Green Biological Science, BY D. J Taylor	- Group discussion - Exercise - Presentation - Quiz - Homework - Test	
MID TERM BREAK AND SHORT BREAK												

The student should have ability to: Explain the mechanism of gaseous exchange	Student should be able to: a) describe the internal structure of mammalian lung. b) explain the factors which govern efficient gaseous exchange at respiratory surface. c) outline the ways in which oxygen and carbon dioxide are transported in the body of vertebrates d) describe the adaptation to oxygen up take shown by mountain climbers/ dwellers, divers and mammalian foetus in their respective environment.			**GASEOUS EXCHANG E AND RESPIRATION**	Gaseous Exchange in Mammals		- To lead plenary discussion on factors governing efficiency of gaseous exchange at the respiratory surface, - To guide students to conduct an experiment to investigate the presence of stomata on leaves. - Students in groups to observe charts/diagrams and discuss the mechanism of gaseous exchange in plants.	- Students in groups to observe charts/pictures/ diagrams/ photographs of internal structure of mammalian lung and discuss the roles of the alveoli. - Students in group to conduct a library search and discuss the adaptation to oxygen uptake (as shown by mountain climbers/ dwellers, divers and the mammalian foetus in their respective environment - Students in groups using guiding questions to observe charts/video/diagrams and discuss ways in which oxygen and carbon dioxide are transported in the body of vertebrates.	Charts Photographs Charts Commelina Microscope	New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Exercise - Presentation - Quiz - Homework - Group discussion - Test - Exams	

The student should have ability to: Describe how ATP is formed	Student should be able to: a) state types of respiratory substrates and their energy values. b) explain the concept of glycolysis. c) describe the fate of pyruvic acid under aerobic and anaerobi c respiration. d) explain the events of the electron transport chain in the formation of ATP. e) compute the total yield of ATP when glucose respired aerobically and anaerobically. 1) outline the respiratory pathway using lipids and protein.				Respiration 6.2.1 Glycolysis		- To lead plenary discussion on types of respiratory substrates and their energy values. - To guide students to conduct a study tour to breweries/local brews industry to investigate the process of fermentation. - To lead plenary session on total yield of ATP during aerobic and anaerobic respiration. - To lead plenary discussion on respiratory pathway using lipid and protein. - Teachers to guide students to search information on respiratory pathway using lipids and protein substrates.	- Students to brainstorm on the respiratory substrate. - Students in groups using guiding questions to discuss the meaning and main steps of glycolysis. - Students to illustrate main steps of glycolysis. - Students in groups to discuss the fate of pyruvic acid under aerobic and anaerobic respiration. - The teacher to guide students to observe a chart showing electron transport chain and discuss the formation of ATP. - Students in groups to observe chart showing electron transport chain and compute the total yield of ATP when glucose is respired aerobically and anaerobically.	Video Real object Charts Respiration Charts Video I nternet		- Group discussion - Quiz - Exercise - Presentation - Quiz - Homework - Test - Exams	
The student should have ability to: Describe the factors that affect metabolic rate.	Student should be able to: a) explain the meaning of BMR. b) describe the factors which cause variation of the BMR of an individual.				Basal Metabolic rate (BMR		- To guide students to brainstorm on the meaning of basal metabolic rate. - To lead plenary discussion on the meaning of basal metabolic rate. - Using guiding questions students to discuss factors which cause variation in Basal Metabolic Rate among organisms (individual)	- Students to discuss factors which cause variation in Basal Metabolic Rate among organisms (individual)	Charts Diagrams			

The student should have ability to carry out feedback mechanism	Student should be able to: a) explain the concept of (regulation) homeostasis. b) identify components of homeostatic mechanism. c) explain the feedback mechanism of homeostatic control.			**REGULATION (HOMEOSTASIS)**	Concept of Regulation		- To lead plenary discussion on the concept of homeostasis citing examples of their experiences (hot day and cold day). - To guide students in groups to discuss with examples the feedback mechanism of homeostatic control.	- Students in groups to discuss with examples the major components of homeostatic mechanism.	Charts Graphs Charts Models	Green Biological Science, BY D. J Taylor & New Understanding Biology By Glenn & Susan & A Level Biology Course Companion By A.G Toole	- Group discussion - Exercise - Presentation - Quiz - Homework - Test - Exams	
The student should have ability to: Control body temperature	Student should be able to: a) explain the concept of body temperature. b) describe the mechanism of temperature regulations in endotherms c) explain the role of the hypothalamus in temperature regulation, d) Explain adaption of mammals to cold and hot climatic conditions.			**REGULATION (HOMEOSTASIS)**	Temperature Regulation		- To lead plenary discussion on the mechanism of temperature regulation in endotherms - With reference to specific examples of endotherms students in groups to describe the mechanism of temperature regulation. - To lead a plenary discussion on the effects of overheating and overcooling of mammalian body. - To lead plenary discussion on adaptation of mammals to cold and hot climatic conditions.	- Students in groups to discuss the meaning and importance of body temperature.	Charts Graphs Charts Models			

The student should have ability to Propose ways of controllin g disorders of urinal system.	Student should be able to: a) identify major excretory products in vertebrates. b) describe the structure of the mammalian nephrone. c) outline the mechanism of formation and removal of urea in mammals. d) explain the common disorders of the urinary system in human.				Excretion		- Using questions and answers the teacher to guide students to identify excretory products and discuss their nature and source. Students in groups to observe diagrams/charts/ models and discuss the formation and removal of urea in mammals - To invite a guest speaker medical personnel to talk on common disorders of the urinal system in humans. - To guide students to discuss on the effect and prevention of common disorders of urinary systems in humans	- Students to search information from books/library/interne on structure and role of different parts of nephrone - Students to discuss structure and roles of different parts of the mammalian nephrone. - Students to draw a well labelled diagram of the mammalian nephrone.	Models basing on photographs Diagrams Charts 1 Photographs Resource person		- Quiz - Exercise - Presentation - Homework - Group discussion - Test - Exams	
The student should have ability to: Describe the role of hormones in osmoregu l ations.	Student should be able to: a) explain the mechanism of osmoregulation in marine elasmobranches. b) describe mechanism of osmoregulation in Mammals. d) describe hormonal control of osmoregulation e) outline various ways by which mammals are adapted to arid and semi- arid conditions				Osmoregula tion		- Using guiding questions, students in groups to discuss the mechanism and importance of osmoregulation in marine elasmobranches. - To lead plenary discussion on mechanism of osmoregulation in Mammals. - To guide students through questions and answers to discuss hormonal control of osmoregulation - To lead plenary discussion on adaptations of mammals to arid conditions.	- Students to search information on the mechanisms of osmoregulation in mammals. - Students to brainstorm on environmental challenges facing mammals (focusing on arid and semi- arid conditions) and how mammals have been able to cope with,	Diagrams Photographs Charts showing the mechanism of osmorogulati on in fish and mammals.		- Exercise - Presentation - Quiz - Homework - Group discussion - Test	

GENERAL REVISIONS & ANNUAL EXAMS

ANNUAL VACATION JUNE 2021