

APPENDIX B

Lesson Plans : UNIT - Beneficial and Nuiscance Micro-organisms.

Sub-unit * Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Introduction of Period - I Microbial Fermentation.	Introduction of Carbohydrates, proteins, Vitamins, fats and minerals Breakdown of the above food materials into simpler material during digestion.	He classifies the various food-stuffs into Carbohydrates, proteins, vitamins, fats and minerals. He understands the process of fermentation.	The teacher introduces the sub-unit by asking some differences between living and non-living things. - Stresses the need of food for living things. - Classified the foodstuffs into Carbohydrates, vitamins, proteins, fats and minerals by using pictures. - Explains the process of digestion and breakdown of complex food into simpler material with help of transperencies and microbial fermentation. - States variety of uses of microbial fermentation.	He listens. Answers questions. Follows instructions. Understands Observes He participates in the discussion. He notes down important points in his note-book.	Pictures and Transperencies.	Name the various food-stuffs which are important for a balanced diet. Carbohydrates are converted into after digestion Proteins are converted into Amino acids after digestion. Define fermentation. States two uses of microbial fermentation.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Preparation of food-stuffs. (2nd period)	Foodstuffs like curd, bread, idlis, dosas, cakes are prepared to microbial fermentation	<ul style="list-style-type: none"> - He understands that the process of microbial fermentation is actually involved in making of curd, bread, & dosas. - Understands and states the changes that take in the milk when it transforms to curd. - States the bacteria which brings about curd formation. - Understands process of bread-making and states the beneficial micro-organisms. - Differentiation between Natural and artificial fermentation. 	<p>Explains the preparation of curd and shows the lactobacillus bacteria under the microscope.</p> <p>States the various steps in breadmaking and draws a parallel between fermentation in curd & bread</p> <p>Demonstrates an activity to show the yeast fungus under the microscope.</p> <p>Explains the fermentation in idlies and dosa.</p> <p>Gives an explanation about differences in fermentation in curd, bread and idlies and dosa with the help of transparencies.</p>	<p>---Listens</p> <p>Answers Questions.</p> <p>Follow instructions.</p> <p>Handles the microscopes.</p> <p>Observes</p> <p>Understands</p> <p>Participates in the discussion.</p> <p>Notes down important points in his note-book.</p>	<p>Microscope slides.</p> <p>Observation of lactobacillus bacteria.</p> <p>and the yeast fungus.</p> <p>Transparencies.</p>	<p>Which bacteria is responsible for the preparation of curd ?</p> <p>The presence of lactic acid makes it sour in taste.</p> <p>Which gas is formed in cakes and bread as a result of fermentation.</p> <p>Fermentation in idlies and dosa is artificial / natural fermentation.</p>

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Preparation of Chemicals and Medicines. (3rd period.)	The antibiotics which are used in the cure of many diseases are prepared from micro-organisms. Broad spectrum antibiotics. Chemicals like ethyl alcohol are produced by fermentation. Citric acid, glutonic acid, acetic acid are also produced by the action of micro-organism.	Understands how antibiotics are prepared. States the different broad spectrum antibiotics. Names the various chemicals produced due to fermentation. Writes the reaction of fermentation reaction, resulting in production of ethyl alcohol and CO_2 correctly.	The teacher explains the use of antibiotics and their method of production. Uses the blackboard to jot down few important points. Uses transparencies to list the various antibiotic used for different diseases. Writes down the fermentation reaction on the blackboard. Uses flashcards to state the different chemicals produced by micro-organisms.	He listens. He understands. Observes. Follows instruction. He participates in the discussion. Answers the questions. He notes down important points in his note-book.	Transparenc- nces. Flashcards. Group < discussion. Define antibiotics. Name the different chemicals produced by the action of micro-organisms	Who discovered penicillin ? spectrum antibiotics ? What are broad spectrum antibiotics ?

Sub-unit : Microbial fixing of Nitrogen.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Introduction (4th period)	Components of air. Use of micro-organisms in Nitrogen fixation. Activity - observation of Nitrogen fixing bacteria present in the root nodules of peanuts i.e. bacteria from family rhizobaeaceae	He states the various gases present in air. Understands the uses of the components of air. Understands the process of nitrogen fixation and contribution of micro-organisms. Handles the apparatus i.e. use of micro-scope and slides efficiently.	States the components of air, with the help of flashcards. Tells the uses of the various components. Notes down important point on the blackboard. Explains the process of nitrogen fixation and shows the rhizobium bacteria present in the peanut plant to the students.	Listens. Follows instructions. Answers Questions. Observes. Handles apparatus. Participation in the group discussion. Notes down important points.	Flashcards. Microscope, slides of Rhizobium and azatobacter bacteria. Group discussion. Name the bacteria present in the roots of leguminous plants. Which bacteria is present in soil ?	Which are the various components of air ? What is percen -tage of nitrogen in the air ? Name the bacteria present in the roots of leguminous plants. Which bacteria is present in soil ?
	Description of the Azotobacter bacteria which lives in the soil.	Differentiates between the Rhizobaeacea family and azatobacter family.	Gives a real learning experience by showing the azato-bacter present in the soil under the microscope.	Shows interest.		State the different uses of nitrogen.

Sub-unit : Nuisance Micro-organisms.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Production of Humus. (5th period.)	Production of Humus. Use of Humus.	States the formation of Humus and also states its use.	Explains the formation of humus and helps the students understand its use as a manure.	He listens. He understands	Transparencies.	What is humus?
Nuisance Micro-organisms. (5th period.)	What are nuisance micro-organisms ? Spoilage of food due to the action of harmful micro-organisms.	Understands that micro-organisms are both beneficial and harmful. Defines nuisance micro-organisms.	Explains the nuisance created by micro-organisms i.e. spoilage of and vegetables dal, etc. by use of transparencies.	He prepares transparencies. Initiates and participates in the group discussion.	Group discussion	Which bacteria is responsible for food poisoning ? What are the symptoms of food poisoning Why does curd turn bitter ?
Effects of eating and consuming spoiled food.	Tells the various harmful effects of micro-organisms and states the cause of food poisoning.	States and describes how food poisoning occurs.	He answers questions. Clears his doubts.			Which acid makes curd bitter ?
Growth of harmful Staphylococcus and Clostridium bacteria.	Application of knowledge in daily life. States the symptoms of food poisoning.	Explains why tanned food is bad for consumption and important points. Initiates and supervises the group discussion and observes.	Takes notes and important points.			

Sub-unit : Protection and Preservation of Food.

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Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Protection and Preservation of Food. (7th period.)	Food can be protected from microbial growth in a number of ways. Use of refrigeration as a method of protection and preservation of food. Sugar and Salt are used as natural preservatives. Chemicals like sodium benzoate, Vinegar are used as preservatives. Boiling and heating are also used for the protection of food.	He can state the different ways in which food can be protected and preserved. He can differentiate between artificial and natural preservatives. He uses the knowledge gained and applies it to his day to day life. Can tell the chemicals added to Jams, sauces for preservation.	Uses transparencies and flashcards to state the various ways in which food can be preserved and protected. Explains the difference in natural and artificial preservatives. Prepares transparencies for explanation. Uses flashcards for better recall of chemicals used as artificial preservatives.	He listens. He understands He answers questions. - He follows instructions. - He observes. - He notes down important points. Participates in the group discussion. Answers a variety of questions. Takes interests.	Transparencies. Flashcards.	States two ways in which pickles can be protected. Name two natural preservatives How are the jams and sauces preserved ? At what temperature do micro-organisms grow best ? Takes interests.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Microbial spoilage of other articles. (6th period.)	Microbes have ability to decompose cellulose.	Understands the havoc played by micro-organisms in the spoilage of various articles.	Quotes the various illustrations where micro-organisms spoil articles like wood, leather.	He listens. He answers questions.	Tape recorder. Group discussion	What happens to wood and leather during the rainy season ?
	Fungal growth on leather and clothes in the rainy season.	States a variety of examples from daily life which involve the nuisance created by micro-organisms.	States the various precautionary measures to save the articles from spoilage.	Follows instruction. He observes.		What measures should be taken to prevent wood from decay during the rains ?
	Decay of wood in the rains due to microbial growth.		Acts as a leader and supervisor and initiates and directs group discussion.	Clears doubts. Takes down notes.		
	Leather articles can be protected by polishing.	Takes precaution against spoilage of articles.		Participates in the group discussion.		
	Wooden articles susceptible to decaying can be sprayed and coated with paints and varnishes.			Takes interest.		

Unit 2 - Natural Resources and their Conservation

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Introduction (9th period.) and 10th period)	Comparison between primitive man and modern man.	- He understands the changes that have taken place in transformation of primitive man into modern man.	*The teacher draws a parallel between life in a cave and life with all the modern amenities with the help of pictures and charts.	He listens.	Posters.	Give some examples of natural resources which you use
Use of Natural resources.	Meaning and Definition of Natural resources	- He acknowledges the importance of these resources in man's life.	*Explain the various uses of natural resources with the help of flashcards.	He observes.	Charts.	Which is the chief source of energy ?
	'Sun' the chief source of energy.	- He states the three sources of natural resources	*Uses the flannel board while explaining how sun is the chief natural resource.	Answers Questions.	Flashcards.	Who is the biggest consumer of natural resources.
	Three types of resources : those obtained from the earth, air and water.	- He tells the various uses of natural resources.	board while explaining how sun is the chief natural resource.	Follow instruction.	Flannel boards.	Which are the three types of natural resources ?
	Various uses of natural resources by man and animals.	- He understands and realises that how man has used these resources to the maximum and has become the largest consumer of these resources.	*Differentiates between the use of natural materials by animals and man.	Takes active participation.	Discussion.	Who is the biggest consumer of natural resources.
	Man has exported natural resources and is the largest consumer of resources.	Man has exported largest consumer of these resources.	Makes use of the computer disc during explanation of extraction of fuels, metals, minerals from the earths crust.	Uses the computer.	Computer.	Which are the three types of natural resources ?
			*Supervises and initiates the Group discussion.			

Sub-unit 2 - Types of Natural Resources.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Types of Natural Resources. (11th period)	Natural resources are obtained from land, air and water. Resources obtained from land.	Understand that the natural resources are obtained from air, water and land.	Explains about the availability of Natural resources in Land, air and water.	He listens	Transparencies.	Petrol is the resource obtained from
	Resources obtained from land.	Classify the resources according to their source.	Uses transparencies and classifies a variety of resources under Land, air and water.	He understands	Posters.	
	Resources obtained from water.			He takes interest.	Slides.	
	Resources obtained from air.	He can state why plants and animals are natural resources.	Shows posters and explains why plants and animals can be called as natural resources.	Observes		Classify the following resources.
	Plants and animals as Natural resources			Notes down observations.		- Oxygen - Coal - Ash - Petrol - Diesel - Cooking gas
	Founa and flora of a certain place becomes integrated into the cultural life of that place.	Can tell why Kangaroos represent Australia, tiger - India and elephants - Thailand.	Uses the slide projector and shows the national animal bird of India so that students understand that flora and fauna reflect the culture of country.	Clears his doubts.		
				Participates in the group discussion.		Which is the national animal of India ?

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Sub-unit 3 - Renewable and Non-renewable Resources.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Renewable and Non-renewable resources. 12th period	Definition of renewable resources. Definition of non-renewable resources.	Understand the meaning of renewable resources. Understands the meaning of non-renewable resources.	Uses a tape recorder to explain the meaning of renewable and non-renewable resources. Operates the tape recorder.	Listens. Understands. Follows instructions.	Charts. Tape recorder.	Define renewable resources. Define non-renewable resources.
	Types of renewable and non-renewable resources.	Can classify resources into renewable and non-renewable.	Prepares charts and uses them for explaining classification of various resources	Answers questions. notes down points.		Differentiate between renewable and non-renewable resources.
	Classification of resources according to renewable and non-renewable resources.	Can state the various resources i.e. renewable and non-renewable.	Also instructs the students to prepare the charts.	prepares charts. Takes interest.		Classify the following into renewable and non-renewable - Petrol - Diesel - plants and animals. - Sun, wind energy etc.
	Difference between renewable and non-renewable resources.	Can differentiate between renewable and non-renewable resources.		Clears doubts and takes part in discussion.		
		Uses the various resources with care.				

Sub-unit 4 - Proper Use of Natural Resources.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Proper use of Natural resources (Period 13)	Retention between vast growing population and growing use of natural resources.	- He understands that the population explosion is a major problem. The country will have to face in recent years.	- Induces the use of transparencies which are self-made while explaining use of natural resources.	He listens. He understands. He goes through various printed material like Newspapers and Magazines and collects various articles.	Transparencies. Tape recorder. Printed material appearing in magazines and newspapers.	What will happen if the population keeps growing at a fast rate ?
	Growing use of resources has led to the crisis of scarcity.	- Acknowledges and understands the direct relationship between increasing population and use of natural resources.	- Instructing the students to read and collect the printed material in relation to proper use and wastage of natural resources which appears in newspapers and magazines.	He answers questions. He takes interest and applies the knowledge in daily life.		Enlist two ways which you can help in the conservation of natural resources.
	Careless use of natural resources causes wastage.	- States the reason which have lead to crisis of scarcity	- Encourages the students to use these natural resources properly and contribute and play their part well in saving the environment.	He takes down important notes. He follows instructions.		
	Causes of wastage of natural resources.	- Understands the need for proper use of natural resources.	- Encourages the students to use these natural resources properly and contribute and play their part well in saving the environment.	He follows instructions.		

Sub-unit 5 - Illeffects of Wastage of Natural Resources.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Illeffects of Wastage of Natural Resources. Period - 14	<p>Rapid Deforestation</p> <p>Consumption of fuel has led to increase in percentage of CO₂</p> <p>As a result ice in the polar region will melt and cause floods.</p> <p>Ozone layer is getting depletion.</p> <p>Reasons for depletion of Ozone layer.</p> <p>Uses of Ozone layer</p> <p>Human life to get affected as a result of ozone depletion.</p> <p>Timely steps need to be taken to avert these calamities.</p>	<ul style="list-style-type: none"> - Understands the illeffects of wastage of natural resources. - Realises the danger to human life as its result - Understands the meaning of terms like ' global warning ' and their cause when they appear in print. - Helps in the conservation and preservation of natural resources whenever and wherever possible. - Creates an awareness about the same among family and friends. 	<p>Reads out articles which appear in print related to wastage of natural resources, their explanation and illeffects of wastage.</p> <p>Explains the presence of Ozone layer in the atmosphere by preparing transparencies of problems human life would face due to its depletion.</p> <p>Instructs the students to contribute in preservation and conservation by playing their part.</p> <p>Tells them to collect articles based on the above topic.</p>	<p>Listens.</p> <p>Understands.</p> <p>Follows instructions.</p> <p>Reads and collects printed material.</p> <p>Takes steps for their conservation and preservation whenever and wherever it can.</p> <p>Influences family and friends.</p> <p>Answers questions.</p>	<p>Transparencies and printed material from Newspapers and magazines.</p>	<p>Which gas is produced on burning fuel ?</p> <p>Which gas causes heating of the atmosphere ?</p> <p>Write two uses of the Ozone layer</p> <p>What will happen if the ozone layer of the atmosphere gets depleted ?</p>

Sub-unit 6 - Planned Use of Natural Resources.

Subunit & Period.	Content	Objectives.	Teachers Activity	Student Activity	Teaching Aids.	Evaluation.
Planned use of Natural Resources Period - 15	Every person should resolve to use the resources properly. Plantation and conservation of trees to be done by individuals and schools. Steps should be taken by the government. Efforts to use the resources in a planned way. Nations should pledge prevention of wars. How can one as an individual contribute in conservation and preservation.	Resolves to help the nation and society in tackling the crisis of scarcity by conserving the natural resources. He influences family and friends and takes active participation in tree plantation programme. Takes efforts to use the resources in a planned manner. Understands that wars are dangerous for human species and should be prevented. Contributes and understands his role in the society.	Arouses the feeling of nationality in the student and tells them that they are the protection of the environment. Uses and operates the tape recorder whenever required. Gives instructions. Uses transparencies while explaining how natural resources should be used in a planned way. Tells the students to be good citizens of the country and build a new alert society, who are more careful and particular about the environment.	He listens. He understands. He answers questions. He follows instructions. and influences. informs family and friends. He observes. Does project work given to him ? Notes down important points. Takes active part in the group discussion. Clears doubts.	Transparencies. Tape recorder. Group Discussion Project work.	Why should we use the natural resources in a planned way ? How do you help in conservation and preservation of resources ? What are the illeffects of wars ?