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Q1 Write short note on biology and Human welfare.

Answer: Biology and Human welfare :- Biology has gained popularity for human welfare. For example -

- 1: Biology has helped the humans in providing abundant, - affordable, tasty, nutritious and safe food for enjoying - good quality of life.
- 2: Biology built better men and women, better society and abolition of poverty.
- 3: Our daily usable home articles are derived from plants or animals or biology.
- 4: Biological researches or Biology has help in the development of improved high yielding varieties of plants and animals.

Q2 Discuss integrated disease management - IDM.

Answer :- Integrated disease management :

Definition :- The management which ensures the participation of community to control all or certain diseases is called IDM.

Explanation :- Every disease has a specific economic - threshold value. with the passage of time certain diseases create alarming issues for the community and so that need to be control IDM is actually the collection of all the available strategies to maintain diseases pressure below

an economic threshold level. such management provides special management training. It informs the community - about the spread, cause, symptoms, Dangerous aspects and prevention of diseases. This also include the public awareness about the control measures for diseases, use of hygienic food and drinking of water.

Aims of IDM :- The main aim of IDM is awareness of the community about the —

- 1: Awareness of the community about the causes, symptoms and remedies of the diseases.
- 2: use of preventive measures, drug treatment and vaccination.
- 3: using of print and electronic media for public awareness.
- 4: Arranging seminars in schools and colleges.
- 5: Main objective is to stop the further spread of diseases and to prevent its new onset.
- 6: Final elimination of diseases from community.
- 7: Researches like genetic engineering and gene therapy should be encouraged.

Q3 what is vaccines. write its mode of action and its types.

Answer : Vaccination :

Definition :- Vaccination is the administration of vaccine to stimulate the immune system of an individual to develop — artificially induced active immunity against an infectious disease.

Explanation :- Vaccination is a way of creating immunity

to certain diseases by using small amount of a killed or -
weakened microorganism that causes the particular disease.
microorganisms can be viruses or they can be bacteria.
Vaccines stimulate the immune system to react as if there
were a real infection or pathogen.

Vaccine:

Meaning :- The word vaccine has been evolved from "vacca"
(Latin word) which means - Cowpus, which contain virus
for cowpox. the cowpox virus is just like smallpox virus in
structure.

Definition :- It is the harmless substance which is -
prepared from microbes that stimulate the immun-system
to develop defence against the actual pathogens.

Explanation :- A vaccine may be intact but inactivated
or an attenuated form the causative pathogen or purified
components of the pathogen that have been found to be
highly immunogenic. Vaccines can also be produced by -
processing toxins of bacteria called toxoid vaccines.

How does vaccine work:

1: When the body is exposed to vaccine, the body is stimulated
to produce antibodies. Since the injected agents (i.e vaccines)
are weak or dead, the body does not actually suffer from
disease but an immune response is initiated i.e - produce
antibodies. As a result the body become immunized against
that pathogen. For example - for measles for year.

2: Due to stimulation of immune system the body is full - equipped to fight against the causative agent like virus or bacteria that attack the body later in life. It means that vaccine increases the immunogenic response against - pathogen.

History of vaccine : (ETEA-2016)

1: Edward Jenner contribution :- Edward Jenner was the first scientist who developed a vaccine against smallpox in 1796.

Experimental work :- Edward Jenner conducted an experiment on 8-years old boy - James Philip. He scratched the skin of the boy and introduced into the area a liquid of cowpox - obtained from the hand of milk-maid who contracted it from cows. later when boy was exposed to small pox he did not suffer from the disease. James-Philip thus immunized - against smallpox.

Conclusion :- Cowpox is much similar to smallpox so it - stimulates child's immune system and prepares antibodies, this stimulated immune system of child will consider smallpox as cowpox and attack on it. Now the body contains antibodies for both cowpox as well as smallpox as both are similar in structure.

2: Louis Pasteur contribution :-

1: Later on, Louis Pasteur discovered that aging or attenuated (with reduced infectivity) culture of bacteria that cause fowl cholera when introduced to chickens, instead of developing disease, it can immunize chicken.

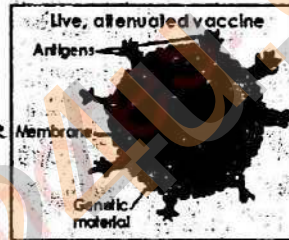
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2: Similarly, he also discovered vaccines for rabies-virus and anthrax bacteria. 3: The term vaccine was proposed by Louis Pasteur for the 1st time and honored Edward Jenner who actually made - vaccines for the first time. <u>Types of vaccines :-</u> Some important types of vaccines are - <u>1: Live, attenuated vaccines:</u> (ETEA-2010, 2012) <u>Definition :-</u> Those vaccines which are obtained from living modified microorganisms is known as live, attenuated vaccines. <u>Explanation :-</u> 1. - live, attenuated vaccines contain a - version of the living microbes that has been weakened in the lab so it can't cause disease, But they activate the immune system just like - virulent pathogens. The body - considers them as virulent and produces antibodies against these vaccines and in this way the body is immunized - against the actual pathogens. 2: The live, attenuated vaccines are good techers of the - immune system because a live, attenuated vaccine is the closest thing to a natural infection. 3: Live - vaccines produce long term immunity with only - one or two doses. <u>Disadvantages :-</u> Although live, attenuated vaccine contains weakly infective pathogen but it can undergo mutation to change into virulent form and can cause disease.		

Example: Viral live vaccine :- e.g- oral polio, yellow fever, measles, mumps, influenza, Rubella.

Bacterial live vaccine :- e.g- BCG, Typhoid, oral-plague.

2: Inactivated or Killed vaccines:

Definition :- Those vaccines which are prepared from microorganisms that have been killed by heat or chemicals are called inactivated or killed vaccines.



Explanation :- 1:- Inactivated vaccines are produced by killing the disease causing microbes with heat or chemicals or radiation.

2: These vaccines are stable and safer than live vaccines because the microbes in inactive vaccine can not mutate back to their disease causing state. ← (ETEA-2017)

3: It do not require refrigeration and they can be easily stored and transported.

4: Inactivated or killed vaccines produce short term immunity so it needs additional doses (i.e - more than 1 or 2) or booster shots to maintain immunity.

Example :- Viral Killed vaccine :- e.g- Rabies, polio, influenza, Hep-B.

Bacterial killed vaccine :- e.g- Typhoid, cholera, whooping cough, plague, meningitis.

3: Messenger RNA vaccines:

Definition :- Those vaccines which contains mRNA which contains an instruction to make a protein or even just a piece of a protein that triggers an immune response inside

our bodies are called messenger (MRNA) vaccines.

Explanation :- 1:- mRNA vaccines are a new type of vaccine to protect against infectious diseases.

2: mRNA vaccines take advantage of the process that cells use to make proteins in order to trigger an immune response and build immunity.

3: It is packaged inside a very small fatty particle and enter the muscle cell at the injection site.

Advantages :- <Benefits> mRNA vaccines have several - benefits compared to other types of vaccines, including shorter manufacturing times and, because they do not contain a live virus, no risk of causing disease in the getting vaccinated.

Example :- This technology was used to make some of the COVID-19 vaccines i.e - Astrazeneca, pfizer, Sinovac, Sino-pharm.

4: subunit vaccines:

Definition :- Those vaccines which consist of only antigenic part, not the whole microbe, that stimulate the immune system is called subunit vaccines.

Explanation :- Subunit vaccine is the type of vaccine in which first of all the whole - virus inactivated by heat or chemicals. such inactivated microbe break open or a specific protein (antigenic site) is get to form subunit vaccine. antigenic site or epitope is the very



Specific antigenic part of pathogen to which antibodies or T-cells bind and destroy the antigen. In subunit vaccine the chance of negative reaction (side effects) to the vaccine are lowers, because it contains only the essential antigenic site and not the whole microbe.

Example :- Example include the subunit vaccine against Hepatitis-B-virus that consists only the surface proteins of the virus.

5: Toxoid Vaccines: (ETEA-2017, 2019)

Definition :- A chemically modified toxin from a pathogenic microorganism which is no longer toxic but is still antigenic and can be used as a vaccine is called Toxoid vaccine.

Explanation :- A toxoid vaccine is used when a bacterial toxin or harmful chemical is the main cause of illness.

These toxins may be exotoxins or endotoxins. exotoxins are usually processed to prepare toxoid vaccines. In order to prepare toxoid vaccines, toxins are usually treated - with formalin. These toxoids are now ready to be used as vaccines.

Example :- vaccines against diphtheria and Tetanus are - examples of toxoid vaccines.

6: Viral vector vaccines :-

Definition :- Viral vector vaccines are those vaccines which used a modified version of a different virus as a vector to deliver protection.

Explanation :- 1 :- First, the vector will enter a cell in our

body and then use the cells machinery to produce a - harmless piece of the virus that causes infection.

2: Next, the cell displays the piece or spike-protein on its surface, and our immune system recognizes it as a foreign antigen. This triggers our immune system to begin producing antibodies and activating other immune-cells to fight off what it thinks is an infection.

Example :- several different viruses have been used as vectors, including influenza, vesicular stomatitis virus, measles virus, and adenovirus, which cause the common cold. adenovirus is one of the viral vectors used in some COVID-19 vaccines.

General schedule of vaccination :- see the following table for use

Disease	Vaccine	Type	Age group
Polio	OPV (Oral Polio Vaccine)	Live vaccine	From birth to 5 years of age
Tuberculosis	BCG (Bacillus Calmette Guerin)	Live vaccine	At birth
Typhoid	Typhoid vaccine TAB vaccine (Typhoid Paratyphoid A & Paratyphoid B)	Killed vaccine	At 2 years of age
Hepatitis	Hepatitis-B Vaccine	Subunit vaccine	At any age
Diphtheria + Tetanus	Diphtheria toxoid vaccine Tetanus toxoid vaccine	Toxoid vaccine	Generally in childhood

Q4 what is Animal Husbandry. Describe its types.

Answer: Animal Husbandry:

Meaning :- Husband mean - "who take care."

Definition :- The branch of science which deals with the study of various breeds of domesticated animals and their management for obtaining more qualitative products and - services from them is called animal husbandry.

Explanation :- The development of desirable qualities like - milk, meat, egg, hide or wools, pulling, carrying load and security are important human achievements through animal husbandary. Human tries to improve the breeds of - domesticated animals to make them more useful for them.

Livestock management :-

Definition :- Livestock management is the proper - utilization of economically important domestic animals.

Explanation :- Pakistan is an agricultural country. Its economy mostly dependent on agriculture and livestock. Round about there are 30-35 million peoples in Pakistan related to livestock and animal husbandry practices. When animal - Husbandary incorporates the study of proper utilization of of economically important domestic animals it is called - livestock management, which not only plays key role in - economy of Pakistan but also act as a major source of livelihood for many Pakistani farmer.

Different categories of animal : livestock :- This discipline include various categories of animals as following -

1: wild :- Those animals which breed better when they are

free in ecosystem as compare to captive life. They have no common use for humans.

Example :- Lion, Tiger, deer, Rhinocero, etc.

2: Tamed :- Animals which are caught from the wild habitats and then trained to become useful to humans in some ways.

Example :- Elephant, chimpanzee, gorilla, yak, etc.

3: Domesticated :- Those animals which are useful to humans at home and are easily bred and looked after by humans.

Example :- Dog, Horse, cow, sheep, fowl, buffalo, etc.

Importance of domestic animals :- on the basis of utility, domestic animals are categorized into the following functional groups.

1: Milk yielding animals. e.g- Cattles, Buffalos, sheep.

2: Drought animals used for loading bearing. e.g- Bullocks, Horses, Donkeys, mules, camels, Elephants.

3: Fibers, Hide and skin yielding animals. e.g- sheep, Goats, cattle, Buffalos, camels, etc.

4: Meat and egg yielding animals. eg- Hens, Ducks, Goats. etc

5: livestock contribute to food supply by converting low value materials into milk, meat and eggs.

6: milk, meat and eggs are one of the best sources of high quality protein and micronutrients that are essential for normal development and good health.

Types of animal Husbandry :-

The following are the types of animal Husbandry.

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<u>1: Milk and meat Animals :-</u> Different animals are used for the purpose of yielding milk and meat depending upon their availability and regional condition. Cattles are one - using for the purpose of yielding milk and meat. <u>Cattles :-</u> cattle are the first animal domesticated by - humans for agriculture purpose. This include cow, bull, goat and oxen. The female of these species provide milk. milk itself is taken in many forms like - ghee, curd (دही), butter, and cheese. Now adays some exotic breeds of both cows and buffalos have been introduced which give few times - more milk than the native breeds. while male species of - these cattle play an important role in the agricultural - economy by providing - labours, meat and Hide. <u>Importance of Milk and Meat producing animals :-</u> i.e - <u>i: Dairy products :-</u> As milk is obtain from animal, it is - called cream milk. when cream is separated the remaining milk is called toned milk. This milk contains no fats and is called as Skimmed milk. <u>Milk products :-</u> on the basis of fat - contents there are - various milk products which are called as dairy products such as - cream, curd, Butter, Ghee, cheese, condensed milk. <u>ii: Cattle Dung :</u> (جائروں کی گوبر) 1- cattle dung is mainly used to make dung - cakes for burning as fuel. 2- They are also used by peoples as fertilizer to improve plant growth.		

3- cattle dung is also used in biogas plant. Biogas plant contains a tight biogas chamber which contains animal excrete or waste and bacteria. These bacteria decompose dung - obtain their energy and release methane gas as a byproduct. Such methane gas is then used for cooking, lighting, etc. and the remaining excreta are used as manure.

2: Draught animals: (چراغ برداشت کرنے والے جانور) (ETBA-2018)

Introduction :- These are strong and powerful animals used for carrying loads and for heavy working purpose.

Explanation :- Farmers use these animals for working and carrying of heavy loads. These animals are therefore powerful and strong. These draught animals are fed by herbs, shrubs and tree leaves, etc. However, they are also fed with grains of maize, bean gram and cotton seeds.

Example :- 1:- Horse is used for riding and swift running.

2- Elephant is used for riding, strength and heavy load lifting.

3- Camel is used for riding in sandy desert and ability to - survive without water for long duration.

4- Donkey and mule (a hybrid of male donkey and female horse) is used for carrying load.

3: Fiber, Hide and skin yielding animals :- Livestock also - provide - skin, Hides and Fibers. For example sheep and - goat provide fibers for making of products like - woolen, carpets, etc.

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<u>4: Egg yielding animals :-</u> These animals produce eggs and meats which are used by humans as food to provide proteins. <u>For example :-</u> Fowl (Hens) and poultry produce eggs and meats which are good source of protein and nutrients. poultry not only gives eggs and meats but also provide best economy to country. Besides this poultry is one of the profitable business.		
<u>Q5</u> Describe the genetic improvement in animals.		
<u>Answers :- Genetic improvement :-</u>		
<u>Introduction :-</u> Scientists are able to bring some positive - genetic changes in animals due to which their productivity of meat, milk and egg increases than normal. The increase in production of eggs has brought about silver revolution in - area of animal husbandry.		
<u>Methods of genetic improvement in animals :-</u> There are two common methods for the genetic improvement in animals. i.e -		
<u>1: Artificial insemination :-</u> In this technique the collection of semen from healthy bull of desirable breed take place. They are then stored at very low temperature and then it is introduce to the female cattle of other breed for bringing about fertilization. In this way hybrid of two desired breeds is produced which will be economically better than its parents.		
<u>Advantages :-</u> 1:- Semen can be stored for long period.		
2- 3000 female can be fertilize from semen from a single bull.		

3- Semen can be transported over long distance.

4- This process have high success rate.

5- It is economical and has high success rate of fertilization.

2: Embryo transplantation :- In this technique the embryo from superior breed are removed during early stage of development and then transfer to other female of inferior breed in order to complete gestation period there. through this technique quality of livestock can be improved. unlike artificial insemination, this method has less success rate due to greater chance of contamination.

Example :- This method is more successful in the sheep and goats.

Q6 Explain diff; latest techniques for improvement of plants.

Answer: Latest techniques :- Farmers from ancient time try for improvement of crops and other plants. In this article we will study about some latest techniques that approaches for improvement in crops and agriculture products.

Incorporated traits :- Traits that breeders have tried to incorporated into crop plants by using various techniques in the last 100-years include -

- 1: Increased quality and yield of the crop.
- 2: Increased tolerance of environmental pressures. (i.e temp, etc)
- 3: Increased resistance to viruses, fungi and bacteria.
- 4: Increased tolerance to insect pests.

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5: Increased tolerance of herbicides and insecticides. <u>Latest techniques :-</u> Some new techniques which are include- <u>1: Acclimatization :-</u> <u>Definition :-</u> acclimatization is the adjustment of organism with its changing environment, which always occurs in a short period of time or within the organism's lifetime. <u>Explanation :-</u> plants usually survive in optimum conditions, however, plants can be made so to survive even in drastic and unfavourable conditions. This is done when conditions are changed slowly and gradually so that the plant gets adapted to these slowly occurring changes. In this way the plant will get adapted to drastic conditions. such adjustment of plants with slow changes is called acclimatization or acclimation. <u>Acclimatization :-</u> when the above process is carried out in field then it is known as acclimatization. <u>Acclimation :-</u> when the above process is carried out in lab then it is known as acclimation. <u>Example :-</u> 1:- many plants such as maple trees, lilies and tomatoes can survive at freezing temperature when decreased slowly and gradually, but the same drop in temperature suddenly, can kill them. 2: Tomato plants that were acclimated to higher temperature were several days more efficient at photosynthesis at relatively high temperature than were plants that -		

were not allowed to acclimate.

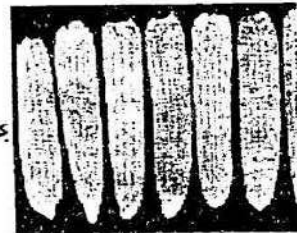
2: Selective breeding :-

Definition :- It is the art of science of changing of genetics of plants in order to produce the desired characteristics.

Explanation :- The term selective breeding refers to the process of choosing breeding stock on certain traits that the breeders desires to reproduce in the offspring. many different genes can influence a desirable trait in plant - breeding. By the process of molecular markers population of plants can be easily screen out for best trait or gene of interest. They then cross plants of desired characters to produce such offspring which will have the desired characters of both parents.

Importance :- International development agencies believed that new crop are important for ensuring food security by developing new variety that are -

- 1: more yielding and productive.
- 2: more resistant to pests and pathogens.
- 3: Drought resistant.
- 4: Regionally adapted to different environments and growing seasons.



Hybrid maize

Q7 write a detail account on Home Gardening.

Answers : Home Gardening :

Definition :- cultivation of plants or vegetations in home

gardens in order to get vegetables, fruits, flowers and for anesthetic purposes is called as home Gardening.

planning of a garden :- Regardless of motive, gardening can be as simple or as complex a project as we make it. As the interest in all aspects of gardening has increased, so has the need for more information and education. careful planning can make gardening easier, more productive and more enjoyable.

Importance of Home Gardening:

Gardening is a popular hobby for a number of reasons. i.e -

- 1: Some people grow gardens just for enjoyment.
- 2: Some people grow gardens to get fresh vegetables & fruits
- 3: Some people grow gardens to have vegetables in their local grocery store and save money.
- 4: Some people grow garden for ornamental and aesthetic purposes such as flower garden.
- 5: Gardening is useful hobby because it provides opportunity for children to play, Learning and for having fun.
- 6: Gardening are a perfect way to get sunshine which in turn help in production of vitamin-D and increase Ca^{+2} levels, which benefits bones and immune system.
- 7: The gardening activity boost moods and help in reducing stress
- 8: It is a great form of aerobic exercise, as you plant will work new muscles in your body and help with strength stamina, and flexibility.

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Some seasonal fruits and vegetables :- In order to eat - fresh fruits and vegetables, it is good to know when and what is available fresh. Here is a seasonality chart that will help us in choice for home gardening. This chart could be slightly different in different parts of the country i.e

Winter January, February	Spring March, April, May	Summer June, July, August	Fall Sep, Oct, Nov
Cabbage Cauliflower Celery Root Grapefruit Mandarin Oranges Sweet Oranges Pears Spinach Sweet Potatoes	Asparagus Basil Beans Berries Broccoli Cabbage Cucumbers Radish Mangoes Okra Sweet Oranges Papayas Peas Chile Peppers Sweet Peppers Spinach, Turnips	Corn Cucumbers Dates Figs Grapes Mangoes Okra Peaches Chile Peppers Sweet Peppers Plums Tomatoes Watermelon ↑ (ETEA-2018)	Apples Cabbage Cauliflower Cranberries Cucumbers Dates Fennel Grapes Pears Chile Peppers Sweet Peppers Spinach Sweet Potatoes

QB Discuss the role of microbes in Human welfare

Answer: Role of microbes in welfare of Human:

Introduction :- microorganisms have a great impact on many area of biology and general human welfare. some are - beneficial to human while other are harmful. The beneficial functions include - production of bread, cheese, antibiotics, vaccines, vitamins, enzymes and many other products.

They are also involve in biogeochemical cycles because they occupy the important position in the ecosystem. i.e.-

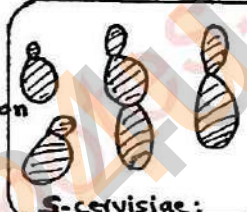
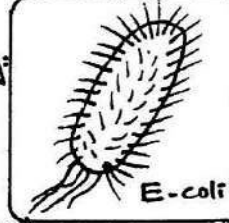
1: Role of microbes in food processing :-

microorganisms influence the quality and productivity of food. They are used to change one substance to another which is used as food such as milk to yoghurt and cheese, sugar to wine and bread. etc.

For example: i:- Yoghurt making :- Yoghurt is produce by fermentation of milk. mostly cow milk is used. The milk is pasteurized i.e.- heating at 71°C for 15 seconds.

Mechanism of formation :- As we know that milk contains lactose-sugar. This lactose is converted to lactic-acid by bacteria - "Lactobacillus bulgaricus". These bacteria are also called lactic acid bacteria. such bacteria feed on lactose and release lactic-acid as byproduct. This acid then cause curdling of milk-protein-casein into solid mass called curd. Yoghurt has low pH than milk ($\text{pH}=4-5$) due to which it does not allow growth of other microbes.

ii: Cheese Making :- cheese is a solid food produced by milk of various animals of different texture and forms. as the production of the milk are coagulated, the solid part is called curd and liquid part is called whey. The curd can be separated and can be pressed to form cheese. The - cheese can be matured or ripened by adding bacteria.

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fungi or both, they reduce the pH, alters the texture and develop the flavour. whey is used as food source for yeast and can be further processed to be used as cattle feed because of large amount of proteins and vitamins.		
2: Role of microbes in Alcohol industry:		 S. cerevisiae:
Alcohols are produced by anaerobic respiration of yeast — "<i>Saccharomyces Cerevisae</i>" which convert sugar to ethanol and CO_2. This is also called alcoholic-fermentation.		
Types of Alcohol :- There are 2-types of alcohol i.e —		
i: Beer :- It is produced from maltose by yeast. It is brewed from barley grain where starch is converted to maltose. The process is called malting in which starch is converted into maltose.		
ii: Wine :- It is produced from grapes-fermentation by yeast.		
3: Role of microbes in pharmaceutical industry:		 E. coli
many microbes are used for the formation of drugs in pharma-industries.		
For example :- i:- Insulin :- Insulin is produced by transgenic E. coli bacteria by the process of genetic-engineering. This insulin is identical to human insulin and can be available in unlimited quantities.		
ii: penicillin :- Similarly penicillin is an antibiotic obtained from penicillium fungi. penicillin is a secondary metabolite		

of fungus penicillium that is produced when growth of the fungus is inhibited by stress. It is not produced during active growth.

iii: cyclosporin :- It is immuno-suppressive agents used in organ transplant patients, produce by fungus - *Trichoderma polysporum*.

iv: Lovastatin :- It is a blood cholesterol lowering substance - produce by yeast - *Monascus purpureus*. It act as a competitive inhibitor for the enzyme responsible for cholesterol synthesis, so lovastatin inhibits cholesterol synthesis.

4: Role of microbes in waste treatment:

Sewage treatment :- Domestic waste water treatment or sewage treatment is the process of removing contaminants from waste water. Various kinds of microbes bring about the degradation of many physical, chemical and biological contaminants in sewage treatment plant to make it safe and environment friendly.

Purposes :- Sewage treatment is performed in order to obtain

- 1: Environmentally safe fluid waste stream or treated effluents
- 2: Solid wastes are treated to be reuse as fertilizer or are made ready for disposal.

Sewage treatment plant :- For above purposes a sewage treatment plant is used. In the sewage treatment plant - microbial culture is prepared in order to treat the wastes in such a way that they give us benefits. i.e. -

i: Aerobic digestion :- Aerobic digestion is a primary waste

water treatment process, used for the purification of waste water into a more useful, environmental friendly effluent. The process involves trillions of bacteria which rely on O_2 to survive and multiply. microbes digest organic waste by taking its oxygens, altering the chemical makeup of the matter into a less environmentally damaging matter.

ii: Anaerobic digestion :- It is the biological fermentation of organic matter. organic materials are converted into biogas, which helps to reduce pollutants and contaminants from the water. Anaerobic treatments are used to alter the chemical composition of the organic material found in wastewater to make it more environmentally friendly.

5: Role of microbes in energy generation :- Biotechnology is one of the future oriented technology and play a key role in the power generation of biomass energy. In many developing countries biomass energy is obtained from fuel wood, animal wastes and agriculture residues with the help of microbes.

Example: Biogas: (ETEA-2017, 2018)

Definition :- Gaseous fuel especially methane produced by the fermentation of organic matter like cattle dung is called Biogas.

Explanation :- Biogas is produced from organic matter in the absence of air and in the presence of decomposers. Biogas consists of 50-75% methane and the remaining is CO_2 , N, etc. It is prepared by the microbial activity i.e- fermentation of

various organic substances to produce biogas. The bacteria involve in the formation of Biogas is methanogen e.g. — Methanobacterium. Methanogen feed on biomass and release methane as a byproduct. Methanogen which live in the gut of cattle symbiotically and are released when animals defecate.

Sources of biogas:

Other than animal manure and sewage sludge, food and domestic wastes, crop remains, paper-wastes are also used as — substrate for fermentation. crops like maize, sugarcane, sugar beet and water plants like hyacinth may also be used.

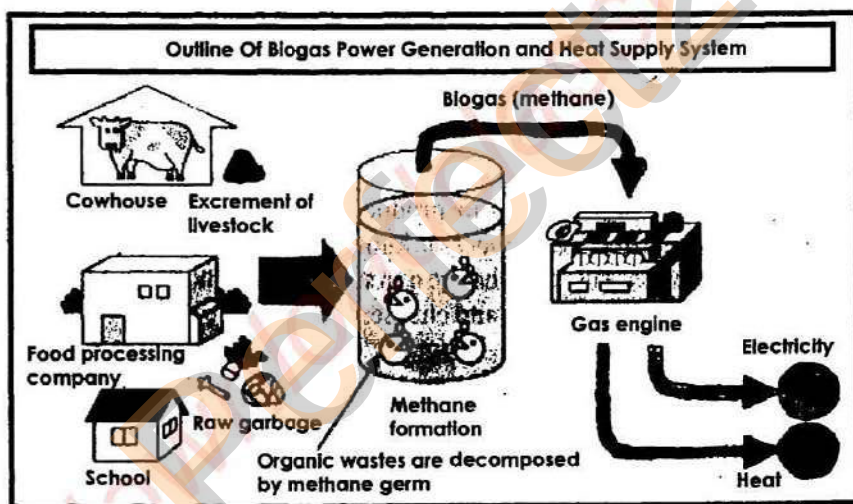
production of Biogas:—(From cattle dung)

- 1: Biogas produce from cattle's dung is called gobar gas.
- 2: The biogas or gobar gas is produced from cattle's dung with the help of methanogenic bacteria present in cattle dung.
- 3: Methanogen bacteria are found in the rumen (stomach) of cattle which carry out the breakdown of cellulose present in the food of cattle. These bacteria are also excreted during — egestion with dung.
- 4: In this method biogas is produce in biogas plant. Biogas plant is a tank which is 10-15 feet deep. ← (ETEA-2019)
- 5: wastes products (gobar) are added to the tank especially cattle-dung which is rich in methanobacteria, so it will — produce methane gas.
- 6: methane gas are collected by outlets, while the slurry left

in the tank can be used as fertilizer.

Uses of Biogas :- As the biogas or methane is relatively non pollutant and valuable, so it is used in many fields. e.g -

- 1: It is used in internal combustion engines and in gas turbines
- 2: It is used for public gas supply. 3:- use in electricity grid.
- 4: It is commercially used in diff; industries for multipurposes.
- 5: It is for heating purpose on large scale used.
- 6: It is used in geyser, for lighting and run engines of power pumps.



Biogas production mechanism.

End

Extra Information

Approximately 114 kilocalories of free energy are stored in plant biomass for every mole of CO_2 fixed during photosynthesis. Solar radiation striking the earth on an annual basis is equivalent to 178,000 terawatts, i.e. 15,000 times that of current global energy consumption. Although photosynthetic energy capture is estimated to be ten times that of global annual energy consumption, only a small part of this solar radiation is used for photosynthesis.

Exercise

Exercise MCQs

A . Multiple Choice Questions (MCQs).

1. Which is an ideal technology for the management of plant diseases?
a) Integrated disease management b) Biological control
c) Chemical control d) None of the above
2. Identify the process in which weakened pathogen is introduced into body?
a) Attenuation **b) Vaccination** c) Biological control d) Radiotherapy
3. Who developed the first vaccine in the history of medicine?
a) Louis Pasteur b) Joseph Miester c) Carl Landsteiner **d) Edward Jenner**
4. Which of the following statement is Incorrect about the vaccine development process?
a) It consists of a live attenuated or killed germ cells
b) Aluminum can be used as an adjuvant in a vaccine
c) Animal trials are not necessary for every vaccine before going to the human trial
d) Normal vaccine production can take up to 10 to 15 years
5. Which of the following is the Not the example of a live attenuated vaccine?
a) Diphtheria vaccine b) Measles vaccine
c) BCG vaccine d) Oral polio vaccine
6. The first scientifically approved vaccine was.....
a) Oral polio vaccine **b) Smallpox vaccine**
c) MMR vaccine (measles, mumps, and rubella) d) Tetanus vaccine
7. Which of the following is not included in integrated disease management?
(a) awareness through media (b) vaccination and medication
(c) physical control **d) project false perception about disease**
8. BCG vaccine is a type of:
a) live attenuated vaccine (b) killed vaccine
(c) subunit vaccine (d) conjugated vaccine
9. Study of proper utilization of economically important domestic animals, it is called:
a) Animal Husbandry (b) Wild life Management
(c) Livestock Management (d) hybrid breeding
10. Holstein Friesian was imported from Holland. This is by far the best dairy breed among exotic cattle regarding milk yield. On an average it gives:
(a) 10 liter of milk per day (b) 15 liter of milk per day
(c) 20 liter of milk per day **d) 25 liter of milk per**

Short Questions

Q1: - Differentiate between animal husbandry and livestock management.

Answer:- see Question No-4. (write only - Definition and explanation of animal husbandry and livestock management).

Q2: - what is the importance of artificial insemination.

Answer:- see Q-5. (write only advantages of art. insemin.)

Q3: - what is biogas.

Answer:- see Q-8. (write only Biogas - last topic of Q-8).

Q4: - write a note on the process of cheese making.

Answer:- see Q-8. (write only ii- cheese making in Q-8).

Q5: - what acclimatization. explain briefly with help of example.

Answer:- see Q-6. (write only 1- acclimatization + example).

Q6: - List the traits that breeders have tried to incorporate into crop plants by using various techniques.

Answer:- see Q-5. (write only - incorporated traits of Q-5)

Q7: - Give the importance of domestic animals.

Answer:- see Question No-4. (write only - imp of domestic ... animals)

Q8: - what are conjugate vaccines, give an example.

Answer: Conjugate vaccines:

Definition:- A conjugate vaccine is a type of vaccine which combines a weak antigen with a strong antigen as a carrier so that the immune system has a stronger response to the weak antigen.

Explanation:- A type of vaccine made from antigen - conjugated to a protein carriers in order to improve the antigen immunogenicity is called conjugate vaccine. - conjugate vaccines have been developed to induce a - robust immune response against bacterial capsular poly-
Saccharides.

Example:- Examples include - Haemophilus influenza - conjugate vaccine and pneumococcal conjugate vaccine.

long Questions

Q1: - what is vaccine. Describe its mode of action and various types.

Answer:- see Question No-3.

Q2: - what are dairy animal, also describe various kinds of dairy products.

Answer:- (for Dairy animals plz write - "milk and meat - producing animals in Question No-4).

Dairy products:- on the basis of fat-contents the various milk products are as follow which ^{are} called dairy ... products

1: Cream:- cream is prepared by churning milk. fats comes on the top. This cream posses 10-70% fats.

2: Curd:- milk is converted to semisolid curd by - microbial activities.

3: Butter:- yellow fatty substance made from cream.

4: Ghee:- after heating the butter, it is converted to

100% fats called Ghee by evaporating water.

5: condensed milk:- when water part is removed from milk. It is called condensed milk. It has 9% fats and 3% milk solid.

6: powdered milk:- This is dry and powdered form of milk.

7: Cheese:- This is coagulated milk protein i.e. - casein with fats and water.

8: Khoya:- This is desicated milk product prepared by - evaporating water contents. when water evaporates from milk reducing the bulk to 70-75%.

Q3:- Describe any two methods of crop improvement.

Answer:- See Q-6. (write any two methods only in Q.No-6).

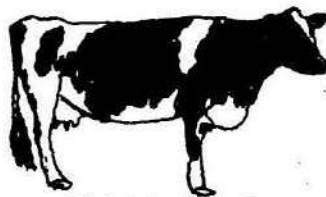
Q4:- Explain the methods for the production of biogas.

Answer:- See Q-8. (write only Biogas production method)

End

For Your Information

This breed is from Holland. This is by far the best dairy breed among exotic cattle regarding milk yield. On an average it gives 25 litres of milk per day, whereas a cross breed H.F. cow gives 10-15 lts per day.



Holstein Friesian
(Milk yield - 7200-9000 kgs)