NAMAKKAL (DT)

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SECOND MID TERM TEST, NOVEMBER - 2019

STANDARD - XII

Time : 1.30 hrs **ZOOLOGY** **Marks: 50**

Part - A

I. Answer all questions. Choose the correct answer:- **10×1=10**

1) The most common substrate used in distilleries for the production for ethanol is
   a) Soya meal b) Groundgram c) Molasses d) Corn meal
2) Choose the correct option
   a) Lactic acid - Rhizopus oryzae
   b) Cyclosporin A - Trichoderma Polysporum
   c) Citric acid - Acetobacter aceti
   d) Butyric acid - Lactobacillus
3) CO_2 is not released during
   a) Alcoholic fermentation b) Lactate Fermentation
   c) Aerobic respiration in animals d) Aerobic respiration in plants
4) GEAC stands for
   a) Gerome Engineering Action Committee
   b) Ground Environment Action Committee
   c) Genetic Engineering Approval Committee
   d) Genetic and Environment Approval Committee
5) Assertion (A): Genetic immunisation carried out by DNA vaccines.
   Reason(R): The immune response of the body is stimulated by a DNA molecule
   a) Both A and R correct and R is the correct explanation of A
   b) Both A and R correct but R is not the correct explanation of A
   c) A is true but R is false d) Both are False.
6) The first clinical gene therapy was done for the treatment of
   a) AIDS b) Cancer c) ADA deficiency d) Haemophila
7) The relationship between crocodile and bird
   a) Parasitism b) Competition c) Amensalism d) Mutualism
8) Competition between species leads to
   a) Extinction b) Mutation c) Amensalism d) Symbiosis
9) The term "niche" was used for the first time by
   a) Charles Elton b) Charles Darwin c) Campbell d) Kary Mullis

10) Identify wrong match

a) Sea anemone on hermit crab	-	Commensalism
b) Salmon Fish	-	Anadromous
c) Eel Fish	-	Catadromous
d) Jack rabbits	-	Cold deserts

Part - B

II. Answer any four questions. (Question No.14 compulsory) **4×2=8**

11) Define Parasitism
12) What is Pedogenesis?
13) What is bioremediation?
14) What is biological oxygen demand?
15) Name the four types of ELISA Test.
16) Define cloning.
17) Pure biodiesel is better than Petroleum - based diesel Fuel. Give reason.
18) What are Stem cells?

Part- C

III. Answer any four questions. (Question No.22 compulsory) **4×3=12**

19) Define natality.
20) Explain hibernation and aestivation with examples.
21) Explain how ADA deficiency can be corrected?
22) Differentiate between Somatic cell gene therapy and Germ Line gene therapy.
23) Explain the role of Cry-genes in genetically modified crops.
24) What is meant by Tertiary waste water treatment.
25) Write a note on Single Cell Protein. (SCP)
26) Differentiate between Predator and Prey.

Part - D

IV. Answer any four questions:- **4×5=20**

27) Give an account of the properties of Soil. **[or]**
Differentiate J and S shaped Curve.
28) Explain how recombinant insulin can be produced. **[or]**
What are recombinant vaccines? Explain the types.
29) Explain Primary and Secondary Sewage treatment. **[or]**
Justify the role of microbes as a bio-fertilizer.
30) What are the various steps involved in the production of transgenic organisms.

[or]

What are the Possible risk of Genetically modified organism. (GMOs)

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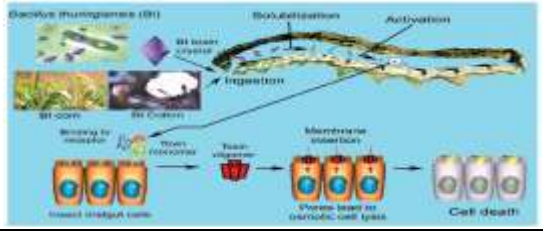
SECOND MID TERM TEST, NOVEMBER - 2019

STD: XII **Date : 11.11.19**

SUBJECT: ZOOLOGY(PS) **MAKS : 50**

TENTATIVE ANSWER KEY

Q. NO	CHOOSE THE CORRECT ANSWER	Marks
	Part-A	**10x1=10**
1	c) Molasses	1
2	b) Cyclosporin A - Trichoderma Polysporum	1
3	b) Lactate Fermentation	1
4	c) Genetic Engineering Approval Committee	1
5	a) Both A and R correct and R is the correct explanation of A	1
6	c) ADA deficiency	1
7	d) Mutualism	1
8	a) Extinction	1
9	a) Charles Elton	1
10	a) Sea anemone on hermit crab - Commensalism	1
	Part-B (Any four (Q.No.14 compulsory)	**4x2=8**
11	➢ It is a kind of harmful interaction between two species, wherein one species is the 'parasite' and the other its 'host'. ➢ The parasite benefits at the expense of the host.	1 1
12	➢ Soil is formed from rocks which are the parent materials of soil, by weathering and is called embryonic soil. ➢ The formation of soil is known as Pedogenesis.	1 1
13	The use of naturally occurring or genetically engineered microorganisms to reduce or degrade pollutants is called bioremediation.	2
14	Biological oxygen demand refers to the amount of the oxygen that would be consumed, if all the organic matter in one litre of water were oxidized by bacteria.	2
15	There are four kinds of ELISA namely ➢ Direct ELISA ➢ Indirect ELISA ➢ sandwich ELISA ➢ competitive ELISA.	1 1
16	➢ Cloning is the process of producing genetically identical individuals of an organism either naturally or artificially. ➢ In nature many organisms produce clones through asexual reproduction.	1 1
17	➢ Biodiesel fuel can be used in diesel engines without altering the engine. ➢ Pure biodiesel is non-toxic, biodegradable and produces lower level of air pollutants than petroleum-based diesel fuel.	1 1
18	➢ Stem cells are undifferentiated cells found in most of the multi cellular animals. ➢ These cells maintain their undifferentiated state even after undergoing numerous mitotic divisions.	1 1

	Part-C (Any four (Q.No.22 compulsory)	**4X3=12**
19	➢ Populations increase because of natality. Natality is equivalent to birth rate and is an expression of the production of new individuals in the population by birth, hatching, germination (or) fission. ➢ The two main aspects of reproduction, namely fertility and fecundity play a significant role in a population. Natality rate may be expressed in crude birth rate number of organisms born per female per unit time. ➢ Birth rate (b) = number of birth per unit time / average population	1 1 1
20	➢ In certain conditions, if the organisms is unable to migrate, it may avoid the stress by becoming inactive. ➢ This is seen commonly in bears going into **hibernation** during winter. ➢ Some snails and fish go into **aestivation** to avoid summer related problems like heat and desiccation.	1 1 1
21	➢ In some children ADA deficiency could be cured by bone marrow transplantation, where defective immune cells could be replaced with healthy immune cells from a donor. In some patients it can be treated by enzyme replacement therapy, in which functional ADA is injected into the patient. ➢ During gene therapy the lymphocytes from the blood of the patient are removed and grown in a nutrient culture medium. A healthy and functional human gene, ADA cDNA encoding this enzyme is introduced into the lymphocytes using a retrovirus. The genetically engineered lymphocytes are subsequently returned to the patient. ➢ Since these cells are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes. The disease could be cured permanently if the gene for ADA isolated from bone marrow cells are introduced into the cells of the early embryonic stages.	1 1 1
22	<table><tr><th>SOMATIC CELL GENE THERAPY</th><th>GERM LINE GENE THERAPY</th></tr><tr><td>Therapeutic genes transferred into the somatic cells.</td><td>Therapeutic genes transferred into the germ cells.</td></tr><tr><td>Introduction of genes into bone marrow cells, blood cells, skin cells etc.,</td><td>Genes introduced into eggs and sperms.</td></tr><tr><td>Will not be inherited in later generations.</td><td>Heritable and passed on to later generations.</td></tr></table>	1 1 1
23	➢ *Bacillus thuringiensis* is a soil dwelling bacterium which is commonly used as a biopesticide and contains a toxin called ***cry* toxin** . Scientists have introduced this toxin producing genes into plants and have raised genetically engineered insect resistant plants. e.g. Bt-cotton. ➢ When the insects ingest the toxin crystals their alkaline digestive tract denatures the insoluble crystals making them soluble. The *cry* toxin then gets inserted into the gut cell membrance and paralyzes the digestive tract. The insect then stops eating and starves to death. 	1 1 1

24	➢ Tertiary treatment is the final process that improves the quality of the waste water before it is reused, recycled or released into natural water bodies. This treatment removes the remaining inorganic compounds and substances, such as nitrogen and phosphorus. ➢ UV is an ideal disinfectant for wastewater since it does not alter the water quality – except for inactivating microorganisms. ➢ UV is a chemical-free process that can completely replace the existing chlorination system and also inactivates chlorine-resistant microorganisms like *Cryptosporidium* and *Giardia*.	**1** **1** **1**
25	➢ Single cell protein refers to edible unicellular microorganisms like *Spirulina*. ➢ Protein extracts from pure or mixed cultures of algae, yeasts, fungi or bacteria may be used as ingredient or as a substitute for protein rich foods and is suitable for human consumption or as animal feed.	**1** **2**
26		

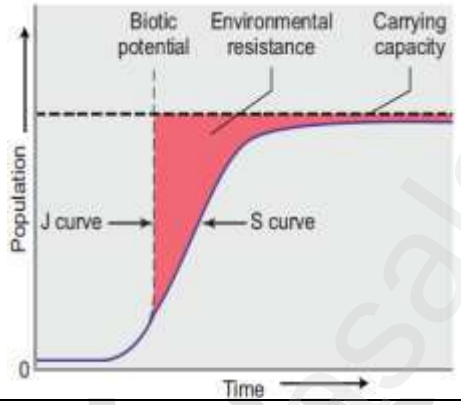
Predator	**Prey**	
1. The animal which kills another animal for its foods is called a Predator	The animal which gets killed by the Predator is called Prey.	**1**
2. A Predator is larger than the prey.	The prey is smaller than he predator.	**1**
Eg. Lion is a predator	Eg. Deer is a prey for Lions and Tigers.	**1**

	Part-D	**4x5=20**
27	**Texture of soil** – The texture of soil is determined by the size of the soil particles. The types of soil include sand, silt and clay on the basis of their size differences. **Porosity** – The space present between soil particles in a given volume of soil are called pore spaces. The percentage of soil volume occupied by pore space or by the interstitial spaces is called porosity of the soil. **Permeability of soil**-The characteristic of soil that determines the movement of water through pore spaces is known as soil permeability. Soil permeability is directly dependent on the pore size. Water holding capacity of the soil is inversely dependent on soil porosity. **Soil Temperature**-Soil gets its heat energy from solar radiation, decomposing organic matter, and heat from the interior of earth. Soil temperature effects the germination of seeds, growth of roots and biological activity of soil-inhabiting micro and macro-organisms. **Soil water**- In soil, water is not only important as a solvent and transporting agent, but also maintains soil texture, arrangement and compactness of soil particles, making soil habitable for plants and animals.	**1** **1** **1** **1** **1**

(OR)

J shaped growth form:	S-Shaped growth form (sigmoid growth)
➢ When a population increases rapidly in an exponential fashion and then stops abruptly due to environmental resistance or due to sudden appearance of a limiting factor, they are said to exhibit J-shaped growth form. ➢ Many insects show explosive increase in number during the rainy season followed by their disappearance at the end of the season	➢ Some populations, as in a population of small mammals, increase slowly at first then more rapidly and gradually slow down as environmental resistance increases whereby equilibrium is reached and maintained. ➢ Their growth is represented by S shaped growth curve.

2 + 2



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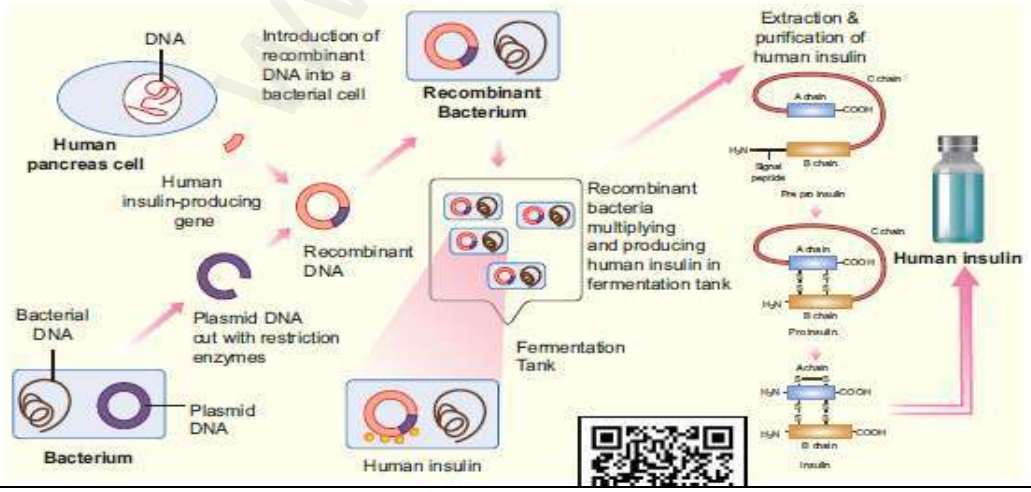
28

➢ Production of insulin by recombinant DNA technology started in the late 1970s. This technique involved the insertion of human insulin gene on the plasmids of *E.coli*. 1

➢ The polypeptide chains are synthesized as a precursor called pre-pro insulin, which contains A and B segments linked by a third chain (C) and preceded by a leader sequence. 1

➢ The leader sequence is removed after translation and the C chain is excised, leaving the A and B polypeptide chains.Insulin was the first ever pharmaceutical product of recombinant DNA technology administered to humans. 1

➢ The approval to use recombinant insulin for diabetes mellitus was given in 1982. In 1986 human insulin was marketed under the trade name Humulin. 1



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(OR)

Recombinant DNA technology has been used to produce new generation vaccines.The limitations of traditional vaccine production could be overcome by this approach.
The recombinant vaccines are generally of uniform quality and produce less side effects as compared to the vaccines produced by conventional methods. Different types of recombinant vaccines include subunit recombinant vaccines, attenuated recombinant vaccines and DNA vaccines. 1

Subunit recombinant vaccines

Vaccines that use components of a pathogenic organism rather than the whole organism are called **subunit vaccines**; recombinant DNA technology is very suited for developing new subunit vaccines. It includes components like proteins, peptides and DNAs of pathogenic organisms. The advantages of these vaccines include their purity in preparation, stability and safe use. 1

Attenuated recombinant vaccines

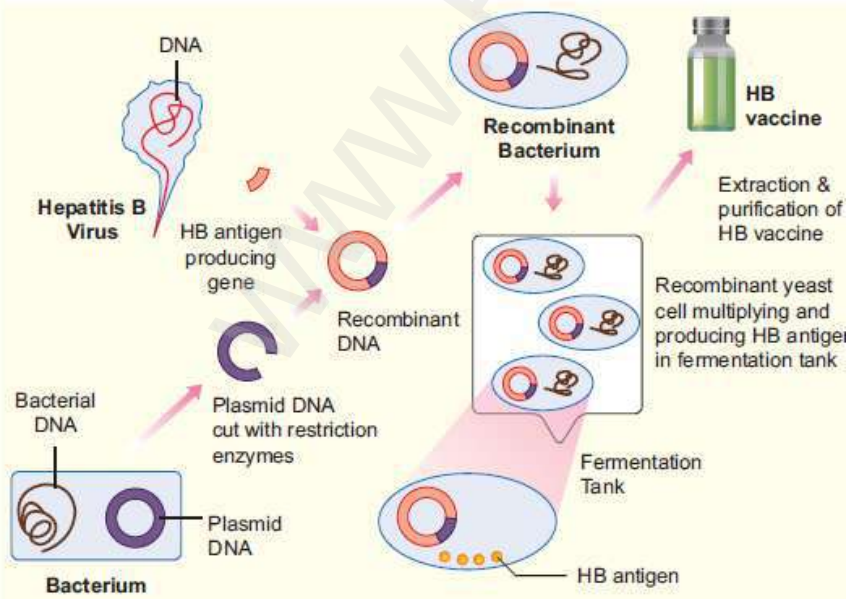
This includes genetically modified pathogenic organisms (bacteria or viruses) that are made nonpathogenic and are used as vaccines. It is now possible to genetically engineer the organisms (bacteria or viruses) and use them as live vaccines and such vaccines are referred to as attenuated recombinant vaccines. 1

DNA Vaccines

Genetic immunisation by using DNA vaccines is a novel approach that came into being in 1990. The immune response of the body is stimulated by a DNA molecule. A DNA vaccine consists of a gene encoding an antigenic protein, inserted onto a plasmid, and then incorporated into the cells in a target animal. DNA instructs the cells to make antigenic molecules which are displayed on its surfaces. This would evoke an antibody response to the free floating antigen secreted by the cells. The DNA vaccine cannot cause the disease as it contains only copies of a few of its genes. DNA vaccines are relatively easy and inexpensive to design and produce. 1

Vaccines produced by these new techniques have definite advantages like producing target proteins, long lasting immunity and trigger immune response only against specific pathogens with less toxic effects.

Recombinant hepatitis B vaccine as a subunit vaccine is produced by cloning hepatitis B surface antigen (HbsAg) gene in the yeast, *Saccharomyces cerevisiae*



1

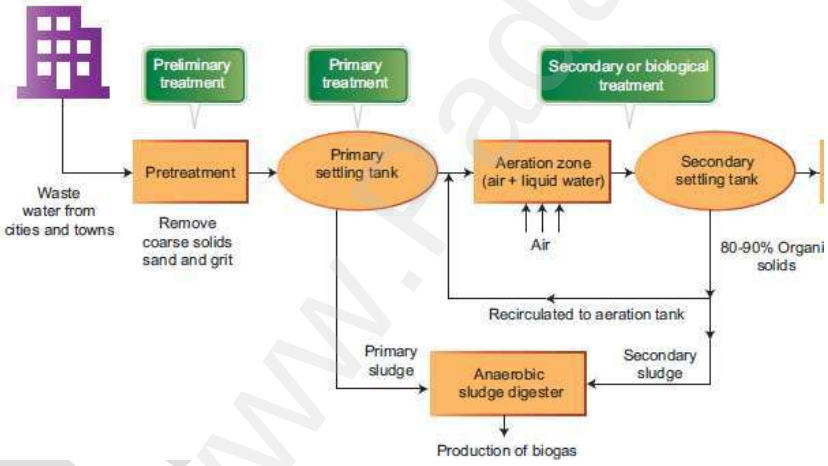
29.

Primary treatment

- Primary treatment involves the physical removal of solid and particulate organic and inorganic materials from the sewage through filtration and sedimentation. Floating debris is removed by sequential filtration. **1**
- Then the grit (soil and small pebbles) are removed by sedimentation. All solids that settle form the primary sludge and the supernatant forms the effluent. The effluent from the primary settling tank is taken for secondary treatment. **1**

Secondary treatment or biological treatment

- The primary effluent is passed into large aeration tanks where it is constantly agitated mechanically and air is pumped into it. This allows vigorous growth of useful aerobic microbes into floc (masses of bacteria associated with fungal filaments to form mesh like structures). **1**
- While growing, these microbes consume the major part of the organic matter in the effluent. This significantly reduces the BOD (Biochemical oxygen demand or Biological oxygen demand). BOD refers to the amount of the oxygen that would be consumed, if all the organic matter in one litre of water were oxidized by bacteria. The sewage water is treated till the BOD is reduced. The greater the BOD of the waste water more is its polluting potential.
- Once the BOD of sewage water is reduced significantly, the effluent is then passed into a settling tank where the bacterial "**flocs**" are allowed to sediment. This sediment is called **activated sludge**. **1**
- A small part of activated sludge is pumped back into the **aeration tank** to serve as the inoculum. The remaining major part of the sludge is pumped into large tanks called **anaerobic sludge digesters**. Here, the bacteria which grow anaerobically, digest the bacteria and the fungi in the sludge. During this digestion, bacteria produce a mixture of gases such as methane, hydrogen sulphide and CO2. These gases form biogas and can be used as a source of energy.



1

(OR)

- Biofertilisers are formulation of living microorganisms that enrich the nutrient quality of the soil. They increase physico – chemical properties of soils such as soil structure, texture, water holding capacity, cation exchange capacity and pH by providing several nutrients and sufficient organic matter. The main sources of biofertilisers are bacteria, fungi and cyanobacteria. **1**
- *Rhizobium* is a classical example for symbiotic nitrogen fixing bacteria. This bacterium infects the root nodules of leguminous plants and fixes atmospheric nitrogen into organic forms. *Azospirillum* and *Azotobacter* are free living bacteria that fix atmospheric nitrogen and enrich the nitrogen content of soil. **1**

	➢ A symbiotic association between a fungus and the roots of the plants is called **mycorrhiza**. The fungal symbiont in these associations absorbs the phosphorus from soil and transfers to the plant. Plants having such association show other benefits such as resistance to root-borne pathogens, tolerance to salinity, drought, enhances plant growth and developments. ➢ For example, many members of the genus *Glomus* form mycorrhiza. **Cyanobacteria** (or) blue green algae (BGA) are prokaryotic free-living organisms which can fix nitrogen. *Oscillatoria, Nostoc, Anabaena, Tolypothrix* are well known nitrogen fixing cyanobacteria. Their importance is realized in the water logged paddy fields where **Cyanobacteria** multiply and fix molecular nitrogen. ➢ Cyanobacteria secrete growth promoting substances like indole-3-acetic acid, indole-3- butyric acid, naphthalene acetic acid, amino acids, proteins, vitamins which promotes plant growth and production. Biofertilisers are commonly used in organic farming methods. Organic farming is a technique, which involves cultivation of plants and rearing of animals in natural ways. This process involves the use of biological materials, avoiding synthetic substances to maintain soil fertility and ecological balance thereby minimizing pollution and wastage.	1 1 1
30	The various steps involved in the production of transgenic organisms are ➢ Identification and separation of desired gene. ➢ Selection of a vector (generally a virus) or direct transmission. ➢ Combining the desired gene with the vector. ➢ Introduction of transferred vector into cells, tissues, embryo or mature individual. ➢ Demonstration of integration and expression of foreign gene in transgenic tissue or animals. Transgenic animals such as mice, rat, rabbit, pig, cow, goat, sheep and fish have been produced	1 1 1 1 1
	(OR) Creating new or more vigorous pests and pathogens. Worsening the effects of existing pests through hybridization with related transgenic organisms. ➢ Harming non-target species such as soil organisms, non-pest insects, birds and other animals. ➢ Disrupting biotic communities including agro ecosystems. ➢ Irreparable loss or changes in species diversity or genetic diversity within species. ➢ Creating risks for human health. ➢ The release of GMOs into the environment could also have far reaching consequences. This is because the living GMOs proliferate, persist, disperse and sometimes may transfer their DNA into other organisms. GEOs could also displace the existing organism and create new species which may cause severe environmental damage. Due to these risks the regulatory authorities are very careful in permitting the field trials of GMOs into the environment.	1 1 1 1 1