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MEC III BASIC BIOTECHNOLOGY-16SMBEBC3

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TWO MARKS QUESTIONS AND ANSWER

1. FERMENTATION

Fermentation is anaerobic breakdown of complex organic materials by the action of anaerobic microorganisms or free enzymes. Microorganisms produce a wide variety of substance in the culture during their growth. The production of food substance found in the feed-stock.

2. CULTURE MEDIUM

The food material required for growing microorganisms in vitro is called culture medium. To identify the cause of infection from the clinical sample, so that proper treatment can be given. To study the characteristics of microorganisms.

3. FOUR MILK PRODUCTS IN FOOD INDUSTRY

The products synthesized from milk are called milk products. Microorganisms play an important role in the manufacture of dairy products.

- Butter milk
- Yoghurt
- Cheese
- Ghee

4. BIOREMEDIATION

Bioremediation is a biotechnology used to clean up the toxic substances. Large areas are clean up by bioremediation. It may clean be oil, fledges, soil etc..,

5. TWO APPLICATION OF ETHANOL

Ethanol was used as dye lubricant paint and resins. Ethanol was used for making rubber. Perfume made by ethanol

6. CLONING

The copied material the same genetic makeup as the original, is referred as a clone. Cloning describe a number of different processes to produce genetically identical copies of a biological entity. Biological materials, including genes, cells and tissue.

7. TRANSGENIC ANIMALS

Genetically manipulated animals having introduced gene in their genetic makeup are called transgenic animals. They are known as transgenic. Transgenic mice, sheep, rabbit, fish etc.,

8. rDNA

Recombined DNA Or rDNA, is two DNA strands that are constructed artificially. Genetic scientists can do this to create unique DNA strand for different purposes, using several types of techniques. rDNA has the ability to produce recombinant proteins

9. IMPORTANCE OF BIOTECHNOLOGY

Biotechnology has benefited medical and health sciences (diagnostic, vaccine, therapeutic, foods). Agriculture science (

improved crop yield, food quality, improved animal health. Environmental science (pollution control, environmental monitoring, bioremediation).

10. BIO FERTILIZER

Bio fertilizer are natural fertilizer that are microbial inoculants of bacteria, alga, fungi. Which may help biological nitrogen fixation for the benefit of plant. Bio fertilizer also include organic fertilizer.

11. BLUE GREEN ALGAE

Blue green algae was otherwise known as cyanobacteria. It was connecting bacteria with plants. It was the process which is important in photo synthesis.

12. VECTOR

Vectors are the Genomic technique. Virus is used as vector to insert material the cell. This the vector is known to be as the particle which to be insert the cell.

13. PCR

PCR is defined as polymerase chain Reaction. In this technique the DNA copies are made up as a new material. The DNA which is going to put as the copies.

14. PLURIPOTENT CELL

Pluripotent stem cells are cells that, which have the capacity to self-renew. By dividing and the develop into three primary germ

cell layers of the early embryo and becomes cells, not the extra embryonic tissue such as the placenta.

15. PROTOPLAST:

Protoplast are nothing but original plant cell which lack in cell wall. They are prepared from cell of plant by removing cell walls. Isolated by mechanical method and enzymatic method.

16. IPR:

Intellectual Property Rights. It may include intangible creation of human intellect. The most well known types are copyrights, pattern, Trademark and Trade secrets.

17. BIOREMEDIATION:

Bioremediation is a Biotechnology used to clean up the toxic substances. Large areas are cleaned up by bioremediation. It may clean the oil sledges, soils and etc.,

18. LAG PHASE OF MICROBIAL GROWTH CURVE:

The initial brief period of culturing after inoculation is referred to as lag phase. During the lag phase, the microorganisms adapt to the new environment-available nutrients pH etc. There is no increase in the cell number, although the cellular weight may slightly increased.

19. BIOMASS:

Biomass is plant or animal material used for energy production, or in various industrial processing as raw substance for a range of products. It can be purposely grown energy crops, wood or forest

grown energy crops, wood or forest residues, wastes from food crops, horticulture, food processing, animal farming or human waste from sewage plants.

20. TWO USES OF METHANE:

Methane is used to manufacture organic chemicals. Primarily used as fuel to make heat and light. Widely used as a reinforcing agent in rubber used for Automobile tires.

21. ANIMAL TISSUE CULTURE:

Tissue culture is the branch of biology in which tissues or cells of higher animals and plants are grown artificially in a controlled environment. Animal cell cultures are used to replicate the viruses instead of animals for the production of vaccine. Cell culture can also be used to detect and isolate viruses, and also to study growth and development cycle of viruses. It is also used to study the mode of infection. The development of animal tissue culture commenced after the breakthrough frog tissue culture technique, which was discovered by Harrison in 1907. Due to this effort Harrison is considered as the father of tissue culture.

22. PLANT TISSUE CULTURE:

Plant tissue culture is a collection of techniques used to maintain or grow plant cells, tissues or organs under sterile conditions on a nutrient culture medium of known composition. It is widely used to produce clones of a plant in a method known as micropropagation. Different techniques in plant tissue culture

may offer certain advantages over traditional methods of propagation, including:

The production of exact copies of plants that produce particularly good flowers, fruits, or have other desirable traits. To quickly produce mature plants. The production of multiples of plants in the absence of seeds or necessary pollinators to produce seeds. The regeneration of whole plants from plant cells that have been genetically modified. The production of plants in sterile containers that allows them to be moved with greatly reduced chances of transmitting diseases, pests, and pathogens. The production of plants from seeds that otherwise have very low chances of germinating and growing, i.e. orchids and Nepenthes. To clean particular plants of viral and other infections and to quickly multiply these plants as 'cleaned stock' for horticulture and agriculture.

23. TRANSGENIC PLANT:

Transgenic plants are plants that have been genetically engineered, a breeding approach that uses recombinant DNA techniques to create plants with new characteristics. They are identified as a class of genetically modified organism (GMO). Transgenic plants are used to express proteins, like the cry toxins from *Bacillus thuringiensis*, herbicide resistant genes and antigens for vaccinations. Cisgenic plants are made up of using genes, found within the same species or a closely related one, where conventional plant breeding can occur. Examples of transgenic plants include it corn (containing genes from a

bacterium, *Bacillus thuringiensis*) and tobacco (containing the Ti plasmid from *Agrobacterium tumefaciens*).

24. TOTIPOTENT CELL:

A totipotent cell has the capacity to form an entire organism. Human development begins when a sperm fertilizes an egg and creates a single totipotent cell. In the first hours after fertilization, this cell divides into identical totipotent cells. Zygotes is the only totipotent cells in humans and it is formed during the process of fertilization when there will be a fusion of male sperm cell and female's egg cell.

25. PROTOPLAST CULTURE:

The basic principle of protoplast culture is the aseptic isolation of large number of intact living protoplasts removing their cell wall and cultures them on a suitable nutrient medium for their requisite growth and development. Protoplast can be isolated from varieties of plant tissues. The term protoplast was introduced in 1880 by Hanstein. The first isolation of protoplasts was achieved by Klercker (1892) employing a mechanical method. A real beginning in protoplast research was made in 1960 by Cocking who used an enzymatic method for the removal of cell wall.

26. ARTIFICIAL SEEDS:

Artificial seed can be defined as artificial encapsulation of somatic embryos, shoot bud or aggregates of cell of any tissues which has the ability to form a plant in in-vitro or ex-vivo

condition. Artificial seed have also been often referred to as synthetic seed.

27. BIOLEACHING:

Bioleaching (or biomining) is a process in mining and biohydrometallurgy (natural processes of interactions between microbes and minerals) that extracts valuable metals from a low-grade ore with the help of microorganisms such as bacteria or archaea. Bioleaching reactions industrially are performed by many bacterial species that can oxidize ferrous iron and sulfur. An example of such species is *Acidithiobacillus ferrooxidans*. Some fungi species (*Aspergillus niger* and *Penicillium simplicissimum*) have also been shown to have the ability to dissolve heavy metals. Disadvantages. Economical: The bacterial leaching process is very slow compared to smelting. This brings in less profit as well as introducing a significant delay in cash flow for new plants. Environmental: Toxic chemicals are sometimes produced in the process.

28. SEWAGE TREATMENT:

Sewage treatment is the process of removing contaminants from municipal wastewater, containing mainly household sewage plus some industrial wastewater. ... If the sewer system is a combined sewer then it will also carry urban runoff (stormwater) to the sewage treatment plant. There are three main stages of the wastewater treatment process, aptly known as primary, secondary and tertiary water treatment. In some applications, more advanced treatment is required, known as quaternary water treatment.

29. IPR:

Intellectual property rights refers to the general term for the assignment of property rights through patents, copyrights and trademarks. These property rights allow the holder to exercise a monopoly on the use of the item for a specified period. There are four primary types of intellectual property (IP) that can be legally protected: patents, trademarks, copyrights, and trade secrets

The main purpose of intellectual property law is to encourage the creation of a wide variety of intellectual goods. To achieve this, the law gives people and businesses property rights to the information and intellectual goods they create, usually for a limited period of time.

30. DEFINITION:

ETHANOL:

Ethanol (also called ethyl alcohol, grain alcohol, drinking alcohol, or simply alcohol) is a chemical compound, a simple alcohol with the chemical formula C_2H_6O . Its formula can be also written as CH_3-CH_2 . Ethanol is used extensively as a solvent in the manufacture of varnishes and perfumes; as a preservative for biological specimens; in the preparation of essences and flavorings; in many medicines and drugs; as a disinfectant and in tinctures (e.g., tincture of iodine); and as a fuel and gasoline additive.

METHANOL:

Methanol is a nondrinking type of alcohol (also known as wood alcohol and methyl alcohol) which is mostly used to create fuel, solvents and antifreeze. A colorless liquid, it is volatile, flammable, and unlike ethanol, poisonous for human consumption.

31. BASIC PRINCIPLES OF CLONING

The term cloning described a number of different process that can be used to produce genetically identical copies of a biological entity. The copied material which has the some genetic make up as the original is referred to as clone. Research have cloned a whole range of biological materials, including genes, cells, tissue, even entire organism such as cheep.

32. PARTICAL BOMBARDMENT

Shooting the plant or animal cell by DNA coated gold or tungsten particals for introducing DNAs into the cell is called Partical Bombardment or biolistiese. This method is also called Microprojectile bombardment. By this method rDNA can be introduced into plant cells, fungal cells, animal cells and cell organelles such as chloroplast and mitochondria.

33. ELECTROPORATION

Electroporation is a process of changing the permeability of Cell membrane of cells to update macromolecules or organelles in the medium. It is done with an electrical instrument called

electroporator. It consists of an electroporator, two aluminium electrodes, a cuvette.

34. MICROINJECTION

Microinjection refers to the injection of DNAs or cell organelles directly into cells in a fine injection needle. By this method RNAs, DNAs, proteins or cell organelles are introduced into animal cells, eggs, zygote and protoplast.

35. APPLICATION OF PCR

PCR is used to propagate DNA for gene manipulation and for constructing DNA libraries. It is used to amplify DNA fragments isolated from an organism. PCR is employed for the amplification of DNA to detect the criminals in forensic science.

36. MICROARRAY

A series of small spots of DNAs fixed on a solid surface to detect and screen mRNA and genomic DNAs in a sample is called a DNA microarray or DNA chip or gene chip. Each DNA spot contains 10¹⁰ molecules of DNA probe.

37. USES OF MICROARRAY

DNA microarrays are used to study the expression of thousands of genes for analysing their differential expression in an organism. They are very important to the gene content of closely related organisms. This approach is called Genomic hybridization.

38. HUMAN GENOME PROJECT

The human genome project is a multinational research project to determine the genomic structure of man (Homo sapiens). It is aiming at sequencing all DNAs of man and at determining the location of various genes in the DNAs.

39. APPLICATION OF GENOME PROJECT

A proper remedial gene can be chosen and administered to treat genetic disease. The action of harmful genes is blocked by introducing an antisense gene to stop the genetic disease. Genome project provide database information of DNA sequence of man.

40. PRODUCTION OF AMYLASE

It hydrolyze starch to dextrin and sugar.

Source

Basillus diastaticus, B.sabtilis, Aspergillus oryzae, A.niger etc.

Uses

Preparing adhesive

Designing textile

Making bread

Removing wall paper.

41. PRODUCTION OF PROTEASE

Enzymes are proteins composed of 20 amino acids. They are produced by cellular anabolism, the naturally occurring biological process of making more complex molecules from simpler ones.

42. USES OF AMYLASE

α - and β -amylases are important in brewing beer and liquor made from sugars derived from starch. In fermentation, yeast ingests sugars and excretes ethanol.

43. USES OF PROTEASE

Digestive proteases are part of many laundry detergents and are also used extensively in the bread industry in bread improver. A variety of proteases are used medically both for their native function (e.g. controlling blood clotting) or for completely artificial functions.

44. PRODUCTION OF SINGLE CELL PROTEIN?

The single-cell protein must be dehydrated to approximately 10% moisture content and/or acidified to aid in storage and prevent spoilage. The methods to increase the concentrations to adequate levels and the de-watering process require equipment that is expensive and not always suitable for small-scale operations.

45. SPIRULINA

Spirulina is a biomass of cyanobacteria (blue-green algae) that can be consumed by humans and animals. The three species are *Arthrospira platensis*, *A. fusiformis*, and *A. maxima*. Cultivated worldwide, *Arthrospira* is used as a dietary supplement or whole food. It is also used as a feed supplement in the aquaculture, aquarium, and poultry industries.

46. YOGHURT

Yoghurt is a food produced by bacterial fermentation of milk. The bacterial used to make yoghurt are known as yoghurt cultures. The fermentation of lactase by these bacteria produces lactic acid, which acts on milk protein to give yoghurt its texture and characteristic fact flavour such as, is the milk most commonly used to make yoghurt milk from water buffalo, goats , camels and yaks is also used to produce yoghurt where available locally.

47. CHEESE

Cheese is a milk product, produced by separating casein from milk. The rest of the milk is in the form of a liquid called whey. When contains 93%water, 5%lactose and smaller amounts of minerals, vitamins lactalbumin and facts. Depending on the activity of the microorganisms, the manufacture of cheese varies. The cheese is of two types, namely acid curd and Renner curd.

48. PRODUCTION OF PENICILLIN

Penicillin is a group of antibiotics derived originally from common moulds which includes penicillin G (intravenous use), penicillin V, procaine pencillin and benzanthine pencillin. Pencillin antibiotics were among the first medications to be defective against many bacterial infections cause by staphylococcs and streptococi.

49. PRODUCTION OF VITAMIN B₁₂

1. Formulation of medium
2. Sterilization of medium
3. Making starter culture
4. Anaerobic fermentation

5. Aerobic fermentation

6. Recovery of vitamin B₁₂

50. DOWNSTREAM PROCESSING

The extraction and purification of a bio technological product from fermentation is referred to as downstream processing or product recovery.