

MT

2018 ____ 1100

MT - SCIENCE & TECHNOLOGY - II (72) - SEMI PRELIM - I : PAPER - 4

Time : 2 Hours

(Model Answer Paper)

Max. Marks : 40

A.1.	(A) Fill in the blanks :											
(1)	Mixture of bacterial strains like Acetobacter and Glucanobacter is mixed with ethanol for its microbial degradation.	1										
(2)	The property of self-multiplying of stem cells is called as pleuripotency .	1										
(3)	Spreading of weeds is biological type of disaster.	1										
A.1.	(B) Match the columns:	2										
	<table border="1"><thead><tr><th>Column 'A'</th><th>Column 'B'</th></tr></thead><tbody><tr><td>(1) Corynebacterium</td><td>(e) L-glutamic acid</td></tr><tr><td>(2) Aspergillus niger</td><td>(c) Gluconic acid</td></tr><tr><td>(3) Lactobacillus delbrueckii</td><td>(a) Lactic acid</td></tr><tr><td>(4) Aspergillus itaconius</td><td>(b) Itaconic acid</td></tr></tbody></table>	Column 'A'	Column 'B'	(1) Corynebacterium	(e) L-glutamic acid	(2) Aspergillus niger	(c) Gluconic acid	(3) Lactobacillus delbrueckii	(a) Lactic acid	(4) Aspergillus itaconius	(b) Itaconic acid	
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A.1.	(C) Choose the correct alternative and rewrite the statement :											
(1)	Rhizobium bacteria present in root nodules of leguminous plants help in nitrogen fixation.	1										
(2)	Yeast reproduces by budding method of asexual reproduction.	1										
(3)	National Pomegranate Research Institute is located at Solapur .	1										
(4)	In Nil-Kranti Mission - 2016 program, government is offering subsidies of geological .	1										
(5)	Water stored in the dam possess potential energy.	1										
A.2.	Answer the following questions : (Any Five)											
(1)	(i) Bacteria like Pseudomonas spp. and Alcanovorax borkumensis have the ability to destroy the pyridines and other chemicals. (ii) Hence, these bacteria are used to clear the oil spills. (iii) These are called as hydrocarbonoclastic bacteria (HCB). (iv) HCB decompose the hydrocarbons and bring about the reaction of carbon with oxygen. CO ₂ and water is formed in the process.	2										

(2)	<ul style="list-style-type: none"> (i) Microbial enzymes are active at low temperature, pH and pressure, due to which energy is saved and erosion - proof instruments are also not necessary. (ii) Enzymes carry out specific processes, hence unnecessary by-products are not formed due which expenses on purification are minimised. (iii) Elimination and decomposition of waste materials is avoided and enzymes can be reused. Such enzymes are eco-friendly. (iv) Therefore microbial enzymes are used instead of chemical catalysts in chemical industry. 	2
(3)	<p>Organic farming :</p> <ul style="list-style-type: none"> (i) Organic farming relies on fertilizers of organic origin such as compost manure, green manure and places emphasis on biological pest control. (ii) It includes complete ban on chemical fertilizers and pesticides and use of local, sturdy varieties and thereby maintaining natural balance. (iii) Poisonous chemicals from pesticides, chemical fertilizers have reached the human body through food and water. (iv) Their effects on environment like reducing soil fertility, pest infestation and harmful effects on human body are apparent. (v) Hence, organic farming is a welcome decision. 	2
(4)	<p>The various processes used in tissue culture are as follows:</p> <ul style="list-style-type: none"> (i) Selection of source plant. (ii) Removal of Bulb corm of source plant. (iii) Primary treatment of the part. (iv) Reproduction and Multiplication. (v) Shooting and Rooting (vi) Primary hardening. 	2
(5)	<ul style="list-style-type: none"> (i) Villages get submerged in water. (ii) Loss of life and property. (iii) Roads, bridges, farms, automobiles are destroyed. (iv) Animals are killed and more insects infest the affected area leading to imbalance of ecosystem. (v) Chemicals and hazardous substances get mixed with water, polluting the whole area. 	2
(6)	<ul style="list-style-type: none"> (i) Every power plant uses a different kind of medium to rotate the turbine. (ii) In thermal nuclear plants the steam produced rotates the turbine. (iii) In hydroelectric power plants water is used to rotate turbines and wind is the medium in windmills. 	2

	<p>(iv) Also the power output of every power plant is different.</p> <p>(v) Hence there should be turbines of different designs and different pattern at the power generating stations.</p>	
A.3.	Answer the following questions : (Any Five)	
(1)	<p>Mock drill is useful :</p> <p>(i) Mock drill is a practice to check preparedness of facing the disaster as early as possible.</p> <p>(ii) It helps in evaluating the response to the disaster.</p> <p>(iii) Virtual or apparent situations of disaster are created to check the reaction time for any types of disaster.</p> <p>(iv) Trained personnel observe their responsibilities to check execution of plan designed for the disaster rehearsal.</p> <p>(v) Mock drill helps to check the competency of planned actions and identifying the possible errors and risks.</p> <p>(vi) Mock drill includes demonstrations like extinguishing the fire, rescuing the people trapped at higher floors of the building, rescuing the persons whose clothing have caught fire etc.</p> <p>(vii) Hence mock drills is useful.</p>	3
(2)	<p>(i) Communication is the foundation of all human relationships, it plays a vital role in human life.</p> <p>(ii) Communication helps to spread knowledge and information among people.</p> <p>(iii) Communicating helps people to express their ideas and feelings, and helps us to understand emotions and thoughts of the other.</p> <p>(iv) Importance of communication cannot be underestimated.</p> <p>(v) It also helps us to relieve stress.</p> <p>(vi) We should learn how to communicate effectively to make our lives better.</p>	3
(3)	<p>Xanthan gum :</p> <p>(i) Xanthan gum is obtained by fermentation of starch and molasses with the help of Xanthomonas species.</p> <p>(ii) It is variously useful due to properties like solubility in hot and cold water, high density etc.</p> <p>(iii) It is used in production of pigments, fertilizers weedicides, textile pigments, tooth pastes, high quality paper.</p> <p>(iv) It imparts thickness to ice-creams, puddings, chocolates, milk shakes, chocolate drinks, instant soups etc.</p>	3
(4)	<p>(i) Microbes produce an advance biofuel directly from biomass with no additional chemicals.</p> <p>(ii) A engineered strain of E.coli bacteria to produce biodiesel and other important chemicals derived from fatty acids.</p>	3

	<p>(iii) A combination of ever-increasing energy cost and global warming concerns has created an international imperative for new transportation fuels that are renewable and can be produced at a sustainable manner. Hence there is more stress on such fuels.</p> <p>Types:</p> <p>(i) Ethanol-biologically produced alcohols, most commonly ethanol and less commonly propanol and butanol are produced by the action of micro-organisms and enzymes through the fermentation of sugar or starch cellulose.</p> <p>(ii) Bibutanol also called biogasoline is often claimed to provide a direct replacement for gasoline. Biogas is methane produced by the process of anaerobic digestion of organic material by anerobea.</p> <p>(5) Clean technology :</p> <p>(i) Human being has made a very fast progress in technology.</p> <p>(ii) However, environmental pollution is also increasing with the same speed.</p> <p>(iii) Microbes have the natural ability of decomposing the manmade chemicals.</p> <p>(iv) Hydrocarbons and some other chemical are transformed with the help of these abilities.</p> <p>(v) Some microbes remove sulphur from the fuels.</p> <p>(vi) Metals like copper, iron, uranium, zinc etc. leach into the environment from low quality metalloids. These are converted into compounds before leaching with the help of Thiobacilli and Sulphobacilli.</p> <p>(6) (i) A - condenser, B - control Rods</p> <p>(ii) The splitting of a heavy nucleus of Uranium to Barium, Krypton and three neutrons with release of energy is called nuclear fission.</p> <p>(iii) (1) Products of nuclear fission called nuclear waste are all radioactive. The disposal of nuclear waste is a big challenge. (2) Sometimes accident can occur which can leak harmful radiations. (3) Radiation pollution can be most dangerous.</p> <p>A.4. Answer the following questions : (Any One)</p> <p>(1) All biodegradable waste can be converted into compost.</p> <p>(i) Bacteria, fungi and actinomycetes are the microbes that decompose the organic matter.</p> <p>(ii) Aerobic bacteria are the most important ones.</p> <p>(iii) Microbes break down the organic matter and produce carbon dioxide, water, heat and humus which makes it very nutritious.</p>	<p>3</p> <p>1</p> <p>1</p> <p>1</p> <p>5</p>
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	<p>(iv) They provide the most rapid and effective composting.</p> <p>(v) Their excreta contains plant nutrients such as nitrogen, phosphorus and magnesium.</p> <p>(vi) Actinomycetes are responsible for the earthy smell of the compost.</p> <p>(vii) They decompose cellulose, starches and proteins liberating carbon, nitrogen and ammonia in the process, which are useful for higher plants.</p> <p>(viii) Fungi breakdown cellulose and lignin and take over the final stage of composting.</p> <p>(ix) Thus microbes help in recycling the nutrients through composting.</p> <p>(2) (i) Biotechnology is bringing about artificial genetic changes and hybridization in organisms for human welfare.</p> <p>(ii) Various branches of science like cytology, biochemistry, molecular biology and genetic engineering are included in biotechnology.</p> <p>(iii) Commercial applications of biotechnology are as follows:</p> <p>(a) Crop Biotechnology: Biotechnology is used in agricultural field to improve yield and variety, i.e. hybrid seeds, genetically modified crops, herbicide tolerant plants and biofertilizers.</p> <p>(b) Animal Husbandry: Artificial insemination and embryo transfer are used to improve quality and quantity of animal products.</p> <p>(c) Human Health: Diagnosis and treatment of the disease are two aspects of human health management.</p> <p>(d) With the help of biotechnology, disease can be diagnosed before the onset of symptoms.</p> <p>(e) Vaccines and vaccination, treatment, interferon, gene therapy, cloning, i.e. reproductive and therapeutic cloning are also some important developments of biotechnology.</p> <p>(f) Industrial Products: Various industrial chemicals can be produced through less expensive processes.</p> <p>(g) Environment - Biotechnology helps in solving various environmental problems.</p> <p>(h) Food Biotechnology: Improved quality of food is produced with the help of micro organisms.</p> <p>(i) DNA fingerprinting: Identity of any person can be established with the help of its available DNA.</p>	5
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