

MT

2018 ____ 1100

MT - SCIENCE & TECHNOLOGY - II (72) - SEMI PRELIM - I : PAPER - 2

Time : 2 Hours

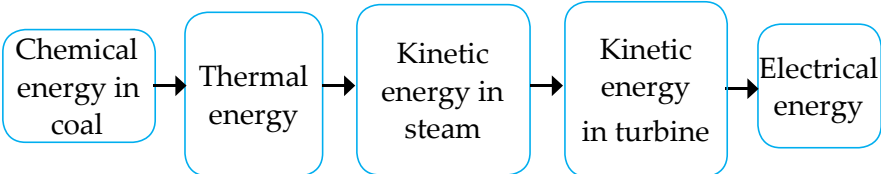
(Model Answer Paper)

Max. Marks : 40

A.1.	(A) Fill in the blanks :											
(1)	An enzyme rennet obtained from alimentary canal of cattle was traditionally used to produce cheese.	1										
(2)	The disease related with the synthesis of insulin is Diabetes .	1										
(3)	The disaster management act has been established in 2005 .	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) War</td><td>(d) Man-made disaster</td></tr><tr><td>(2) Volcano</td><td>(c) Geological disaster</td></tr><tr><td>(3) Cyclones</td><td>(a) Atmospheric disaster</td></tr><tr><td>(4) Infectious virus</td><td>(b) Biological disaster</td></tr></tbody></table>	Column 'A'	Column 'B'	(1) War	(d) Man-made disaster	(2) Volcano	(c) Geological disaster	(3) Cyclones	(a) Atmospheric disaster	(4) Infectious virus	(b) Biological disaster	
Column 'A'	Column 'B'											
(1) War	(d) Man-made disaster											
(2) Volcano	(c) Geological disaster											
(3) Cyclones	(a) Atmospheric disaster											
(4) Infectious virus	(b) Biological disaster											
A.1.	(C) Choose the correct alternative and rewrite the statement :											
(1)	Very hard parmesan cheese is formed after ripening for 12 - 18 months.	1										
(2)	Stem cell preserved in sterile vials are kept in liquid nitrogen at -135°C to -190°C .	1										
(3)	In Maharashtra NDRF is in action through State Reserve Force.	1										
(4)	Tsunami is a geological type of disaster.	1										
(5)	The photovoltaic cells convert solar energy into electrical energy.	1										
A.2.	Answer the following questions : (Any Five)											
(1)	(i) Lactobacilli is used for Yoghurt production. (ii) Yeast <i>Saccharomyces cerevisiae</i> is used for vinegar and bread production. (iii) <i>Acidophilus</i> , <i>Lactobacillus casei</i> , <i>Bifidobacterium bifidum</i> are probiotic microbes. (iv) <i>Acetobacter</i> , <i>Glucanobacter</i> is mixed for microbial degradation of ethanol.	2										

(2)	<p>(i) Dough for bread is formed by mixing of baker's yeast - <i>Saccharomyces cerevisiae</i>, water, salt and other necessary materials with flour.</p> <p>(ii) Due to fermentation of carbohydrates by yeast, sugar is converted into carbon-dioxide (CO_2) and ethanol ($\text{C}_2\text{H}_5\text{OH}$).</p> <p>(iii) Dough rises up due to CO_2 and the bread becomes spongy.</p>	2
(3)	<p>(i) Sulphuric acid is present in the acid rain and in materials coming out of mines.</p> <p>(ii) Erosion of bridges, metal statues, occurs due to acid rain.</p> <p>(iii) Sulphuric acid is the source of energy for some species of bacteria like <i>Acidophillium</i> spp. and <i>Acidobacillus ferroxidens</i>.</p> <p>(iv) Hence these bacteria can control the soil pollution occurring due to acid rain, and the soil can be made fertile again.</p>	2
(4)	<p>Edible vaccines :</p> <p>(i) Work on production of edible vaccines is in progress and presently, potatoes are being produced with the help of biotechnology.</p> <p>(ii) These potatoes are called as transgenic potatoes.</p> <p>(iii) These potatoes will act against bacteria like <i>Vibrio cholerae</i>, <i>Escherichia coli</i>.</p> <p>(iv) Consumption of these raw potatoes generates immunity against cholera and the diseases due to E-coli.</p>	2
(5)	<p>(i) Salaam Mumbai Foundation runs programs empower the children living in slum area in the field of education, sports, arts and business.</p> <p>(ii) This organization encourages the children to take education by helping them to improve their health and lifestyle.</p> <p>(iii) This trust has made some districts in Maharashtra completely tobacco-free through hard work.</p> <p>(iv) Since the year 2002, this organization is working with various schools in urban and rural area for making the society tobacco-free.</p> <p>(v) This programme is being implemented with the help of government in about 200 schools in Mumbai and 14000 schools in the rest of Maharashtra.</p> <p>(vi) The oath of freedom from tobacco is taken in every school as per the government letter.</p>	2
(6)	<p>30 mA electric current can be obtained from 1cm^2 silicon solar cell and 0.5V potential difference is obtained.</p> <p>\therefore Since cells i, ii are in series, Potential difference = Sum of the individual potential differences.</p>	2

	<p> $V_a = V_1 + V_2$ $\therefore = 0.5 + 0.5$ $\therefore V_a = 1V$ </p> <p>Electric current will be the same $I_a = 30 \text{ mA}$</p> <p>Since iii, and iv are in series,</p> <p> $V_b = V_3 + V_4$ $= 0.5 + 0.5$ $\therefore V_b = 1V$ </p> <p>Since i and ii, iii and iv are in parallel,</p> <p>\therefore Potential difference will remain the same.</p> <p>\therefore Total electric current (I) = $I_a + I_b$</p> <p style="padding-left: 100px;">$= 30 + 30$</p> <p style="padding-left: 100px;">$= 60 \text{ mA}$</p> <p>\therefore Potential difference is 1V and electric current of 60 mA can be obtained.</p>	
A.3.	Answer the following questions : (Any Five)	
(1)	<p>Yoghurt production :</p> <p>(i) Yoghurt is a milk product produced with the help of lactobacilli.</p> <p>(ii) Condensed milk powder is mixed with milk to be fermented for maintaining the protein content for industrial production of yoghurt.</p> <p>(iii) Milk is boiled and once it cools to warm temperature, bacterial strains of <i>Streptococcus thermophilus</i> and <i>Lactobacillus delbrueckii</i> are added in 1 : 1 proportion.</p> <p>(iv) Lactic acid formed due to <i>Streptococcus</i> makes the proteins to gel out and gives dense consistency to the yoghurt.</p> <p>(v) Acetaldehyde like compounds which are formed due to lactobacilli give characteristic taste to Yoghurt.</p> <p>(vi) Shelf life of Yoghurt and its probiotic properties can be improved by pasteurization.</p>	3
(2)	<p>Genetically modified crops :</p> <p>(i) Crops developed with desired characters by integrating foreign gene with their genome are called as genetically modified crops.</p> <p>(ii) High yielding varieties with resistance to disease, alkalinity, weeds other stresses like extreme cold and drought are produced.</p> <p>(iii) A gene had been isolated from the bacterium <i>Bacillus thuringiensis</i> and integrated with the gene of cotton and brinjal.</p> <p>(iv) This improved variety - BT cotton, BT Brinjal kills the pests and yield is maintained.</p>	3

	<p>(iv) A gene synthesizing the vitamin A (beta carotene) has been introduced in the variety of rice. This variety contains 23 times more amount of beta carotene than the original variety.</p> <p>(v) Herbicide tolerant plant varieties are being developed. Due to this, it has become possible to selectively destroy the weeds.</p>	
<p>(3)</p>	<p>(i) Fruits are perishable agro - produce.</p> <p>(ii) Fruits contain vitamins, proteins, minerals and dietary fibres.</p> <p>(iii) There is a need to process fruits in order to increase their storage or shelf - life significantly.</p> <p>(iv) Various products are prepared from fruits like chocolates, jams, juices and jellies and are used daily.</p> <p>(v) Fruit processing is done in such a way that it can be used throughout the year.</p> <p>(vi) Fruit processing include various methods ranging from cold storage to drying, salting, air tight packing, pickling, evaporating etc.</p>	<p>3</p>
<p>(4)</p>	<p>(i) Various physical problems like tiredness, headache, insomnia, forgetfulness, tinnitus, joint pains and problems in vision may arise due to radiations of cell phone.</p> <p>(ii) These radiations penetrate the bones of children more effectively than the bones of adults.</p> <p>(iii) Also, a person becomes solitary.</p> <p>(iv) Hence, I will make a conscious attempt to not spend more time in internet/mobile phones, games etc. I will cultivate some good hobby or play sports and concentrate on my studies.</p> <p>(v) I will even meditate to get rid of internet addiction.</p>	<p>3</p>
<p>(5)</p>	<p>Following are the objectives of Mock Drill.</p> <p>(i) Evaluating the response to the disaster.</p> <p>(ii) Improving the co-ordination between various departments of disaster control.</p> <p>(iii) Identification of own abilities.</p> <p>(iv) Checking the competency of the planned actions.</p> <p>(v) Improving the ability of quick response.</p> <p>(vi) Identifying the possible errors and risks.</p>	<p>3</p>
<p>(6)</p>	 <pre> graph LR A[Chemical energy in coal] --> B[Thermal energy] B --> C[Kinetic energy in steam] C --> D[Kinetic energy in turbine] D --> E[Electrical energy] </pre>	<p>3</p>

A.4.
(1)

Answer the following questions : (Any One)

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Source	Microbe	Amino acid	Use
Sugar and beet molasses, ammonia salt	<i>Brevibacterium, Corynebacterium</i>	L-glutamic acid	Production of monosodium glutamate (Ajinomoto)
Sugar molasses, salt	<i>Aspergillus niger</i>	Citric acid	Drinks, toffees, chocolate production
Glucose, corn steep liquor	<i>Aspergillus niger</i>	Gluconic acid	Production of minerals used as supplement for calcium and iron
Molasses, corn steep liquor	<i>Lactobacillus delbrueckii</i>	Lactic acid	Source of nitrogen, production of vitamins.
Molasses, corn steep liquor	<i>Aspergillus itaconius</i>	Itaconic acid	Paper, textile, plastic industry, gum production

(2)

- (i) Vaccine is the antigen containing material given to acquire either permanent or temporary immunity against a specific pathogen or disease.
- (ii) Traditionally, vaccines were prepared with the help of pathogens which may be completely or partially killed.
- (iii) However due to this, there were chances of contracting the disease in certain persons.
- (iv) Hence, as an alternative, scientists have given artificially produced vaccines with the help of biotechnology.
- (v) A safer vaccine was produced with the help of gene isolated from the pathogen and an antigen produced from it.
- (vi) Now, proteins which act as antigens are injected in pure form instead of injecting the killed or semikilled pathogens.
- (vii) These proteins keep the persons away from the disease by keeping the immune system active.
- (viii) Vaccines produced with the help of biotechnology are more thermostable and remain active for longer duration. E.g. vaccines of polio, hepatitis etc.

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(ix) Edible vaccines are produced in combination with transgenic potatoes. These potatoes will act against bacteria like *Vibrio cholerae* and *Escherichia coli* and consumption of such raw potatoes will generate immunity against cholera and various other disease caused by *E. coli*.

