Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (BIOTECHNOLOGY)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: ANIMAL AND PLANT BIOTECHNOLOGY [BIO 401]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.

1A. In the culturing of animal cells, glutamine is added in the medium as an important energy source which is used once glucose gets depleted. As a result of this component, two metabolite accumulations take place, one being lactate and the other ammonia. Give one reason why this accumulation takes place and two remedies to avoid it **3**

1B. A student, highly impressed by the action of probiotics procured a vial of *Staphylococcus* sp. and ingested it. Are there any regulations for a product to be used as a probiotic? List two such attributes. In the above case what would happen to the student? **3**

1C. A cell biologist working on adherent cell lines wanted to scale-up his culture. With the help of a **diagram only** depict the entire scale-up procedure. Can she use disposable bioreactors for the same? If yes what are the required attributes? **4**

2A. A student was studying the genome of a plant species and found that the genome is multipartite. To which genome it belongs i.e. chloroplast, mitochondria or nucleus? How it is different from other genomes? **4**

2B. Mr Rehan was working with plant genomes. He found that the circular genome has two inverted repeats each of size 80kb, it has large single copy and small single copy regions. Draw a diagram representing an illustration of this genome and give a comment on the coding capacity of the genome **3**

2C. Copy the following table to your answer sheet and give a proper explanation for each statement **3**

Statement	Explanation
Rice and wheat are cereals. The genome size of wheat is 16,000 million, but that of rice is only 400 million	
Each cell of the fern *Ophioglossum reticulatum* has 1260 chromosomes, but a more complex human cell contains only 46 chromosomes	
Psilotum (Whisk Fern) is a simpler plant than *Arabidopsis thaliana*, but contains 3000 times as much DNA as *Arabidopsis thaliana*.	

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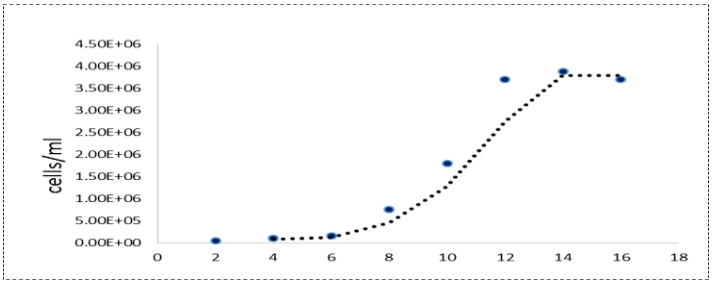
3A. Methane produced from enteric fermentation represents both a loss of feed energy and a threat to the environment. This is a major cause of concern in the cattle industry. If you are approached by the farmer to reduce this greenhouse gas, what are the steps that would be suggested? **3**

3B. One of the scientist working on primary cell line from lymphocytes found the growth profile as depicted below with the time (days) represented on the X-axis and the cell density on the Y-axis. The scinetist was concerned about the dying cells after two weeks of span. Can the profile of the cells be prolonged? Give atleast two vectors and the methdology followed in each case. Would the profile be different or the same in that case? Depict the profile with a diagram. **4**



3C. You find yourself in the laboratory, late at night, working on an important assay and you discover that the last of the ATP stock is used up. After frantically searching everywhere, you find a 10 mg bottle of 2'-deoxyadenosine 5'-triphosphate. Is this a high-energy compound? Will it substitute for ATP in your assay? **3**

4A. Give a flow chart representation of a technology to produce thousands of plantlets for an orchid species in a limited time **3**

4B. How we can produce synthetic seeds? **3**

4C. Callus cultures from the leaf explants of *Sida,* a medicinal herb contains 0.05% of ephedrine while cell suspension cultures produces 1.5% of ephedrine based on dry cell biomass. Explain four different methodologies to increase the yield of ephedrine for possible industrial use of these cultures **4**

5A. We have two varieties of tomato named as A and B, but they are sexually incompatible i.e. the seeds produced by artificial pollination between them are sterile. How you are going to utilize the tissue culture technology in producing a hybrid of A and B? **3**

5B. A tissue culture laboratory has developed a novel technology to purify a drug compound produced in plant tissue cultures. How we can have a patent for this? Explain **3**

5C. Assume that we have isolated genes responsible for early maturity and high yield from a rice variety. How will you utilize these genes creating elite rice plants? Explain four different strategies we can utilize effectively for this task. **4**

6A. The human genome project, one of the major land mark in the history of medical genetics has tried to unleash the information stored in the DNA. What ethical issues could arise as a result of this knowledge? Give at least three **3**

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6B. An enthusiastic student, haven read about Dolly wanted to repeat the same steps in order to understand the cellular mechanism involved. He didn't have access to the electric pulse so used calcium chloride method to mimic the process. Will he get the clone? Justify with at least two valid reasons **3**

6Ci. The effects of temperature and lipid composition on membrane fluidity are often studied by using the artificial membranes. A student was working on the making of artificial membranes **3**

Membrane 1: Made from phosphatidylcholine with saturated 16-carbon fatty acids

Membrane 2: Same as membrane 1, except that each 16-carbon fatty acids has a single cis double bond

Membrane 3: Same as membrane 1 except that each of the saturated fatty acid has only 14 carbon atom.

There was a discrepancy in recording the results. Which of the three membranes are best suited for temperature -36°C, 23°C and 41°C and why

ii Electron transport chain (ETC), the final step in aerobic respiration yields the maximum number of ATP of all the steps in the aerobic respiration. The steps of the ETC are depicted below. What would happen if oxygen was deleted from ETC **1**