Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (BT)/SEM-2/MBT-215A/2010

2010

MICROBIAL & FERMENTATION TECHNOLOGY

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

   i) Chemical precipitation of Phosphorus is

      a) Primary Treatment

      b) Secondary Treatment

      c) Tertiary Treatement

      d) None of these.

   ii) All of the following are considered coliforms *except*

      a) *Entrobacter aerogenes*

      b) *Klebsiella pneumoniae*

      c) *Escherichia coli*

      d) *Salmonella typhi.*

iii) 'Superbug' was a name coined for organisms engineered for

a) Antibiotic production

b) Probiotic production

c) Hydrocarbon degradation

d) Enzyme production

e) Insulin production.

iv) *Acetobacter* is necessary for only one of the steps in Vitamin *C* manufacture. The easiest way to accomplish this step would be to

a) add substrate and *Acetobacter*

b) affix *Acetobacter* to a surface and run substrate over it

c) add substrate and *Acetobacter* to a bioreactor

d) find an alternative to this step

e) none of these.

v) Micro-organisms themselves are industrial products. Which of the following pairs are mismatched ?

a) *Penicillium — Treatment of Disease*

b) *S. cerevisiae — For Fermentation*

c) *Rhizobium — Increase Nitrogen in Soil*

d) *B. Thuringiensis — Insecticide.*

vi) To be suitable for industrial use, a micro-organism should

a) grow rapidly and produce product in a relatively short period of time

b) be capable of growth and product formation in large scale culture

c) be genetically stable

d) all of these

e) more than one of the above, but not all.

vii) The term 'primary metabolite' refers to

a) a product that is produced during the primary stage of growth

b) the major waste product produced during growth of a culture

c) a product that is produced during the end of the growth phase, frequently at or near stationary phase

d) all of these

e) more than one of the above, but not all.

viii) Which of the following is an example of a primary metabolite ?

a) Ethanol b) Erythromycin

c) Tetracycline d) Penicillin.

ix) The scale up of an industrial fermentation is usually the task of a person trained as a

a) microbial geneticist

b) biochemical engineer

c) microbial physiologist

d) general microbiologist.

x) Which of the following is not true of antibiotic producing strains of bacteria used in industry ?

a) They are often highly modified to produce much more antibiotic than the original isolate of the microbe

b) More recently, many newer strains contain gene amplifications

c) They are essentially the wild type strains, so extensive modification of the strain is rarely needed.

d) all of these

e) more than one of the above, but not all.

xi) The major use of microbially derived proteases is

a) as an isomerase during production of high fructose corn sugar

b) chemical modification of food additives

c) an animal feed

d) as an additive for laundry detergents.

GROUP – B

2. State whether the following statements are *True* or *False*. Give a short reasoning for your selection. 10 × 2 = 20

i) A major challenge in biotechnology is to be able to grow and characterize the observed but uncultured micro-organisms in what is called bioprospecting.

ii) Protoplast fusion only works between closely related organisms as a method to transfer genetic information.

iii) The term 'fermentation' can be used in a physiological sense and to describe the mass culture of micro-organisms.

iv) Rapid production of penicillium cells, which can occur when high levels of glucose are used as a carbon source, leads to maximum antibiotic yields.

v) Today, most citric acid is produced by micro-organisms.

vi) Growth in controlled environments is expensive and is used primarily for products employed in maintaining animal and human health.

vii) Microarray technology has been suggested to provide the equivalent of the chemist's peiodic table.

viii) The term 'antibiotic' refers to microbial products or their derivatives that affect micro-organisms, but is sometimes used to encompass some synthetic agents.

ix) Vectors typically code for a phenotypic trait that can be used to detect their presence.

x) Plasmids are always present as a single copy per host cell.

3. Match the following : $15 \times 1 = 15$

	PART-A		***PART-B***
i)	2-Amino-Cysteine	a)	Penicillin Recovery
ii)	*Rhizopus nigricans*	b)	Inhibit Protein Synthesis
iii)	*Streptomyces*	c)	Xanthan production
iv)	Citric acid	d)	*Aspergillus niger*
v)	Solvent Extraction (Podbielniak Solvent Extractor)	e)	*Streptomyces peucetius*
vi)	Aminoglycosides	f)	L-Glutamic Acid
vii)	Anticancer Dru-Adriamycin	g)	Progesterone
viii)	Hop Plant (*Humulus lupulus*)	h)	Chemical Analogue of Threonine
ix)	Kanamycin	i)	Lipolytic and proteolytic activity of Blue veined cheese
x)	Cheese starter	j)	Used in Beer Productin
xi)	*Brevibacterium flavum*	k)	9-α-fluorocortisone
xii)	Whey Utilization	l)	Recombinant Strain of *E. coli*
xiii)	Citronellor	m)	Leuconostoc mesenteroides
xiv)	Used in Humulin poduction	n)	*Pseudomonas aeruginosa*
xv)	*Penicillium roquefortii*	o)	*Streptomyces kanamyceticus.*

GROUP – C

4. "It is impossible to express gene products from eucaryotic genes in bacterial cells." Do you agree with the statement ? Justify your agreement/disagreement with some case studies. 10

OR

"Growth in controlled environments is expensive and is used primarily for products employed in maintaining animal and human health." Justify the statement with a specific case study.

5. "*Corynebacterium glutamicum* has been used since several decades for the large-scale production of amino acids, esp. *L*-glutamate and *L*-lysine." Elaborate on the process of strain development for their production. 10

OR

"Polyketide natural products are a rich source of bioactive substances that have found considerable use in human health and agriculture." Elaborate on the production process and downstream processing on any one of the polyketides.

6. The manufacture of paper includes the use of bleach and formaldehyde based glue. The microbial enzyme Xylanase whitens paper by digesting dark lignins. Oxidase causes the fibres to stick together and cellulase will remove ink. List 5 advantages of using these microbial enzymes over traditional chemical methods for making paper. 5

OR

Write a short note on the different kinds of 'Starter Cultures' associated with cheese production.

OR

Write a short note on Microbial Steriod Bioconversion.