

Total No. of Questions :5]

SEAT No. :

P1573

[Total No. of Pages :2

[5227] - 11

M.Sc. - I

MICROBIOLOGY

MB-501: Microbial Diversity and Taxonomy

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat - labelled diagrams wherever necessary.*
- 4) *Use of logarithmic tables and scientific calculators is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) Attempt any two of the following :

[16]

- a) Justify : The classification of molds is chiefly based on their morphological characters.
- b) Explain the significance of lipid profiles in bacterial taxonomy.
- c) Describe the characteristic features of bacterial cell in VBNC state. What is resuscitation?

Q2) Attempt any two of the following:

[16]

- a) Justify: The 16S rRNA is the most widely accepted 'Molecular Chronometer' in bacterial taxonomy.
- b) Explain the various culture independent molecular methods used in bacterial taxonomy.
- c) Describe the pair wise dynamic programming and gap penalties in sequence alignment.

P.T.O.

Q3) Attempt any two of the following : **[16]**

- a) Outline the strategy for identification of pure cultures with suitable flow sheet diagram.
- b) Explain the need and techniques of extracting total bacterial DNA from a habitat.
- c) Describe the significance of databases in proteomic and genomic analysis.

Q4) Write short notes on any four of the following : **[16]**

- a) Protein profiles in taxonomy.
- b) Methods to determine the extent of DNA hybridization.
- c) Application of FISH in bacterial taxonomy.
- d) Compare PSI - BLAST and PHI - BLAST.
- e) Environmental clone libraries.

Q5) The two different soil samples were collected, one from the organic farming field and the other from conventional farming field. Design a methodology to determine whether there is a drastic change in the diversity of microbial communities present in these soils. **[16]**



Total No. of Questions : 5]

SEAT No. :

P1574

[5227]-12

[Total No. of Pages : 3

M.Sc. -I

MICROBIOLOGY

**MB-502 : Quantitative Biology
(2008 Pattern) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat-labeled diagrams wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Statistical tables and scientific calculator are allowed.*
- 6) *Assume suitable data if necessary.*

Q1) Attempt any two of the following:

[16]

- a) Following are the number of colonies observed on 15 sterile Nutrient agar plates after air exposure (10 min). Calculate Arithmetic Mean and standard deviation?

No. of colonies	1-10	11-20	21-30	31-40	41-50	51-60	61-70
Frequency	3	5	8	15	9	4	2

- b) Draw a histogram, frequency polygon representing following data:

Number of pods	10-20	20-40	40-50	50-70	70-80	80-100	100-130	130-150
Number of plants	13	48	24	20	5	8	6	2

- c) Explain in detail epidemiological model.

P.T.O.

Q2) Attempt any two of the following:

[16]

- a) In an Mendelian experiment on breeding. Four types of plants are expected to occur in the proportion if 9:3:3:1. The observed frequencies are (891) round and yellow, (316) wrinkled and yellow, (290) round and green and (119) wrinkled and green. Find the chi-square value and examine the correspondence between the theory and experiment.
- b) The Carbohydrate content of two banana variety are as follow:
Variety A: 41, 41, 44, 44, 43, 46, 53
Variety B: 47, 44, 54, 50, 40, 53, 50
Test whether there is any significant difference in carbohydrate content of two varieties.
- c) Describe various non parametric tests.

Q3) Attempt any two of the following:

[16]

- a) The table given below shows the data obtained during the epidemic of cholera. Test the effectiveness of inoculation in preventing the susceptibility or attack of cholera (L.S.5%).

	Attacked	Not attacked
Inoculated	24	32
Not inoculated	50	14

- b) Calculate the probability of following:
A bag contains 10 balls in the proportion of 7 red and 3 white.
- i) If two balls are drawn at random replacing one after other. What is the probability that one is red and other is white?
- ii) If two balls are drawn at random one after the other without replacement. What will be the probability that both the balls drawn are red?
- c) Describe chemostate model with its significance.

Q4) Write short notes on any four of the following:

[16]

- a) Computer application in Microbiology.
- b) Multiple regression.
- c) Significance level.
- d) Two tailed test.
- e) Survey Methodology.

Q5) Attempt any one of the following:

[16]

- a) In an experiment on salt tolerance in wheat, seeds of a variety of wheat are treated with three salinity levels ($SL_1 = 0.02\%$, $SL_2 = 0.04\%$, $SL_3 = 0.06\%$ NaCl). The data were recorded on four replicates on the number of roots per plant. State whether the different salinity levels have any effect on mean number of roots.

Replicates	Salinity levels of NaCl		
	SL_0	SL_1	SL_3
1	5	6	7
2	5	6	6
3	6	7	9
4	4	6	8

- b) The following is the data of A and B variables. Calculate regression coefficient and obtain the two lines of regression and show them on graph

A	6	7	8	9	10	11	12	13	14	15
B	13	14	15	17	16	20	19	18	21	22



Total No. of Questions :5]

SEAT No. :

P1575

[5227]-13

[Total No. of Pages : 2

M.Sc. -I

MICROBIOLOGY

MB - 503 : Cell Organization and Biochemistry

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of log tables, graph paper, non programmable-electronic pocket calculator is allowed.*
- 4) *Assume suitable data if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt any two of the following: **[16]**

- a) Derive Henderson-Hasselbalch equation and give its significance.
- b) Describe one method each for qualitative and quantitative estimation of proteins.
- c) Describe the classification of phospholipids with suitable examples.

Q2) Attempt any two of the following: **[16]**

- a) Describe regulation of cell cycle in eukaryotes.
- b) Describe the mechanism of biofilm formation with suitable example.
- c) Explain denaturation of DNA and its relationship with T_m value.

Q3) Attempt any two of the following: **[16]**

- a) Diagrammatically illustrate the working of confocal microscope, comment on its applications.
- b) Diagrammatically illustrate the D-series of ketoses.
- c) Diagrammatically illustrate the process of gastrulation in *Xenopus*.

P.T.O.

Q4) Write short note on any four of the following: **[16]**

- a) Significance of resonance in biomolecules.
- b) Maternal transcripts.
- c) N-terminal labeling
- d) Retinol
- e) Microtubules

Q5) Attempt the following: **[16]**

- a) The flat faces of the bases of DNA are hydrophobic. What is the effect of this fact on 3-D structure of double stranded DNA?
- b) A mixture of following amino acids is subjected to electrophoresis at pH 3.9: Ala, Leu, Arg, Asp, His. i) Which ones will go toward anode(-)? Toward cathode(+)? Why? ii) Is it possible to separate amino acids by the above mentioned method?

Given: $pK_a \alpha\text{-COOH} = 2.3$, $pK_a \alpha\text{-NH}_2 = 9.7$, $pK_R \text{ Asp} = 3.65$, $pK_R \text{ His} = 6.0$, $pK_R \text{ Arg} = 12.48$



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SEAT No. :

P1576

[5227]-21

[Total No. of Pages : 2

M.Sc. - I

MICROBIOLOGY

MB - 601 : Instrumentation And Molecular Biophysics

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of log tables, non programmable - electronic pocket calculator is allowed.*
- 4) *Assume suitable data if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt any two of the following: **[16]**

- a) Explain the principle and working of HPLC.
- b) Describe Pulse chase experiment with the help of a diagram.
- c) Write the differences between Native and denaturing PAGE.

Q2) Attempt any two of the following: **[16]**

- a) What is Ramachandran plot? Explain its significance.
- b) Explain Density gradient centrifugation.
- c) Explain the principle of X-ray diffraction.

Q3) Attempt any two of the following: **[16]**

- a) Diagrammatically describe differential centrifugation.
- b) With the help of a neat labeled diagram describe the process of ion exchange chromatography.
- c) Schematically explain components of CD instrument.

P.T.O.

Q4) Write short note on any four of the following:

[16]

- a) Fluorescence spectroscopy.
- b) Liquid Scintillation counting.
- c) Crystallization of proteins for X ray crystallography.
- d) Basic components of Mass spectrometer.
- e) Nuclear Overhauser Effect.

Q5) Attempt the following:

[16]

- a) Amino acid analysers are instruments that automatically separate amino acids by cation exchange chromatography. Predict the order of elution (first to last) for each of the following sets of amino acids at pH = 4.0. Justify your answer.
 - i) Gly, Asp, His
 - ii) Arg, Glu, Ala
 - iii) Phe, His, Glu
- b) Calculate the half life of an isotope from the following experimental measurements. At time $t = 0$, the activity is 300 disintegrations/minute. After 1 hr, activity is 200 disintegrations/minute.



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SEAT No. :

P1577

[5227]-22

[Total No. of Pages : 2

M.Sc. - I

MICROBIOLOGY

**MB - 602 : Evolution, Ecology and Environmental Microbiology
(2008 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat - labeled diagrams wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

Q1) Attempt any one of the following : **[16]**

- a) Enlist different aerobic suspended growth treatment processes. Describe in detail activated sludge treatment process, its microbiology and process analysis.
- b) Describe various mechanisms of speciation in sexual and asexual organisms.

Q2) Attempt any two of the following : **[16]**

- a) Describe the process of flow equalization. Give its advantages in waste water treatment.
- b) Describe mechanisms of organic matter production and utilization in marine ecosystem.
- c) Describe with suitable examples of various benevolent interactions which shape community structure.

Q3) Attempt any two of the following : **[16]**

- a) Elaborate on the concept of sexual selection with suitable examples.
- b) Explain evolutionary origin of biochemical disorders in context to insulin resistance.
- c) Describe solid waste management using composting and vermiculture.

P.T.O.

Q4) Write short notes on any four of the following:

[16]

- a) Evolutionary game theory.
- b) Rhizosphere community structure.
- c) Sequencing batch reactor process.
- d) Phytoremediation.
- e) Interaction of mycorrhizal fungi with non host plants.

Q5) UASB treatment process treating an industrial waste water has upflow velocity = 1.5m/h, height of gas collection = $H_G = 2.5\text{m}$ and $E = 0.85$. The characteristics of waste water are given below.

Flowrate = $1000\text{m}^3/\text{d}$

Influent COD = $2300\text{g}/\text{m}^3$

Temperature = 30°C

Organic loading = $10\text{kg COD}/\text{m}^3.\text{d}$

Determine.

- a) Size and dimensions of the reactor.
- b) Hydraulic detention time.

[16]

☆ ☆ ☆

Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5227] - 23

M.Sc. - I

MICROBIOLOGY

MB-603: Microbial Metabolism

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of log tables, graph paper, non programmable - electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt any two of the following:

[16]

- a) Describe the steps recommended by King and Altman to derive kinetic equation for multi - substrate enzyme catalyzed reactions with suitable example.
- b) Describe the mechanisms adapted by various organisms to prevent oxidative damage to nitrogenase.
- c) Explain with the help of suitable example structure and function of gated ion channels.

Q2) Attempt any two of the following:

[16]

- a) With the help of suitable example explain role of allosteric enzymes in metabolism.
- b) What are inhibitors and uncouplers of oxidative phosphorylation? What is their significance?
- c) What is Nernst's equation? Explain its role in biochemistry.

P.T.O.

Q3) Attempt any two of the following: [16]

- a) Diagrammatically illustrate shuttle systems across mitochondrial membrane.
- b) Describe electron transport chain in sulfate reducing bacteria.
- c) Diagrammatically illustrate Z scheme of electron transport in plants.

Q4) Write short note on any four of the following: [16]

- a) Liposomes.
- b) Water splitting complex.
- c) Significance of K_{cat} , Catalytic efficiency, K_M .
- d) Atkinson's energy charge.
- e) Significance of entropy.

Q5) Attempt the following: [16]

- a) ^{14}C - labeled carbon dioxide is administered to a green plant, and shortly there after the following compounds are isolated from the plant: 3 - phosphoglycerate, glucose, erythrose - 4 - phosphate, sedoheptulose-1, 7 - biphosphate, ribose - 5 - phosphate. In which carbon atoms will radioactivity be found? Why?
- b) The kinetics of an enzyme is measured as a function of substrate concentration in the presence and in the absence of 2 mM inhibitor (I).
 - i) What are the values of V_{max} and K_M in the absence of inhibitor? In its presence?
 - ii) What type of inhibition is it?

[S] (μM)	Velocity ($\mu mol/min$)	
	No inhibitor	Inhibitor
3	10.4	4.1
5	14.5	6.4
10	22.5	11.3
30	33.8	22.6
90	40.5	33.8



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :3

P1579

[5227] - 31

M.Sc. (Part - II)

MICROBIOLOGY

MB-701: Immunology

(2008 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) All questions carry equal marks.*
- 3) Draw neat labelled - diagrams wherever necessary.*
- 4) Use of logarithmic tables and scientific calculators is allowed.*
- 5) Assume suitable data if necessary.*
- 6) Figures to the right indicate full marks.*

Q1) Attempt any two of the following :

[16]

- a) Explain the role of IL - 1 in immune activation and pyrogenesis.
- b) With the help of suitable diagram explain the role of Super antigen in pathogenesis.
- c) Explain the mechanisms of tolerance induction.

Q2) Attempt any two of the following :

[16]

- a) Explain the Idiotype network theory and its role in immune regulation.
- b) Explain the escape mechanisms of tumours from host defence.
- c) Describe the characteristic features of benign and malignant tumours.

P.T.O.

Q3) Attempt any two of the following :

[16]

- a) Explain role of Biological response modifiers in cancer therapy.
- b) Explain complement deficiencies and its diagnosis.
- c) Explain the animal models for AIDS.

Q4) Write short notes on any four of the following :

[16]

- a) Septic shock syndrome.
- b) Tumour vaccine therapy.
- c) Stem cell therapy.
- d) T cell deficiencies.
- e) Myasthenia Gravis.

Q5) Breast cancer is the most frequently occurring cancer in women. It is essential to identify reliable prognostic factors to guide decision making during the treatment of breast cancer in order to improve prognosis. In breast cancer, carcinoembryonic antigen (CEA) and cancer antigen 15 - 3 (CA15 - 3) are the two most widely used serum tumour markers in the clinical fields. The present study aims to investigate the prognostic value of preoperative serum CEA and CA 15 - 3 levels in breast cancer patients. Serum CEA and CA 15 - 3 in a total of 432 patients who were treated for stage I - III invasive breast cancer at the Affiliated Cancer Hospital of Zhengzhou University were investigated.

Disease - free survival (DFS) was defined to be from the time of surgery to the local regional recurrence, distant metastasis, and death before recurrence. Serum CEA and CA 15 - 3 levels were determined using an automatic electrochemistry luminescence immunoassay system. The results are as follows:

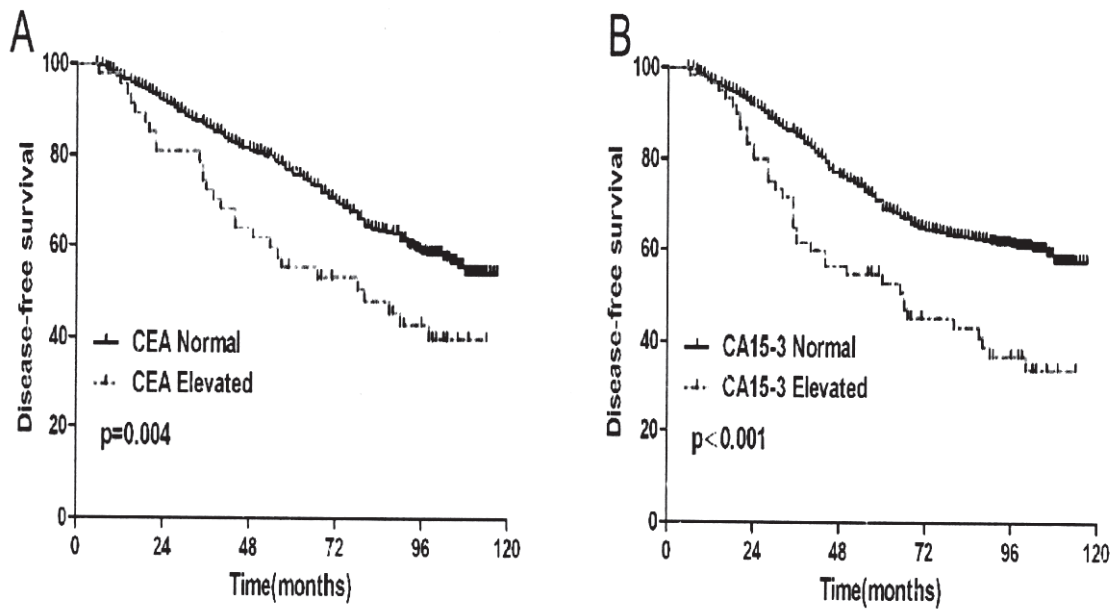


Fig 1: Kaplan - Meier survival curves of patients with normal or elevated CEA and CA15 - 3 levels. Disease-free survival (DFS) according to carcinoembryonic antigen (CEA) (A) and cancer antigen 15 - 3 (CA15 - 3) (B)

- a) Explain whether Serum CEA and CA 15 - 3 concentration levels can be used as tumour markers in breast cancer. [8]

- b) Which are the different tumour markers used in diagnosis of various tumours? [8]



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P1580

[5227]-32

M.Sc. (Part-II)

MICROBIOLOGY

**MB-702 : Molecular Biology - I
(2008 Pattern) (Semester-III)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat-labeled diagrams wherever necessary.*

Q1) Attempt any two of the following: **[16]**

- a) What are proto-oncogenes? Explain how RB proteins play important role in cancer?
- b) What are Ty elements in yeast? Explain their role.
- c) Explain mismatch repair system.

Q2) Attempt any two of the following: **[16]**

- a) Explain mechanism of Tn 10 transposon.
- b) Comment on tumor suppressors.
- c) Explain super-family with example.

Q3) Attempt any two of the following: **[16]**

- a) Explain repetitive and non repetitive DNA.
- b) Explain the differences between V-onc and C-onc genes?
- c) Explain different DNA polymerase of eukaryotes and their individual role in DNA replication.

P.T.O.

Q4) Write short notes on any four:

[16]

- a) Tn5 Elements.
- b) SINES.
- c) src kinase.
- d) Pseudogenes.
- e) Ruv proteins.

Q5) a) How long would it take to replicate a human genome of 250,000 kb if replication is bidirectional from one origin at the centromere and the rate is 6000 nucleotides per minute? **[8]**

b) How long would it take to replicate the same genome if replication is having 2500 origins? **[8]**



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5227] - 33

M.Sc. (Part - II)

MICROBIOLOGY

MB - 703 : Virology

(2008 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat, labeled diagrams wherever necessary.*
- 4) *Use of graph papers, log tables and electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) Attempt *any two* of the following: **[16]**

- a) Explain genome organization and life cycle of M13 phage.
- b) Explain DNA microarray technique.
- c) Explain replication of negative sense SS RNA.

Q2) Attempt *any two* of the following: **[16]**

- a) Justify - Conventional vaccines are now replaced by modern viral vaccines.
- b) What are Oncogenic viruses? Elaborate cell transformation by Oncogenic viruses.
- c) Comment on cellular sites for virus replication.

Q3) Diagrammatically illustrate *any two* of the following: **[16]**

- a) Life cycle of *Cauliflower mosaic virus*.
- b) Capsid symmetries in viruses.
- c) Genomic structure of *SV40*.

P.T.O.

Q4) Write short note on *any four* of the following:

[16]

- a) Marek disease of poultry.
- b) Prions
- c) Flow cytometry
- d) Indicator plants
- e) Antiretroviral agents.

Q5) a) Give stepwise protocol for preparing Primary cell line from an organ. Add a note on cultivating viruses using this cell line. [8]

- b) What is LD₅₀ value? An experiment with five sets of mice with six mice in each set was carried out. Each set of mice was injected with a fixed volume of ten fold diluted viral suspension and mice were observed for survival in next 48 hrs. following table shows the data obtained.

Dilution of virus used	Number of mice survived
10⁻³	0
10⁻⁴	2
10⁻⁵	4
10⁻⁶	6
10⁻⁷	6

Calculate LD₅₀ value of viruses by cumulative values for the given data.[8]



Total No. of Questions : 5]

SEAT No. :

P1582

[5227]-41

[Total No. of Pages : 3

M.Sc. - IV

MICROBIOLOGY

MB - 801 : Pharmaceutical and Medical Microbiology

(2008 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat-labeled diagrams wherever necessary.*
- 4) *Use of logarithmic tables and scientific calculators is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Figures to the right indicate full marks.*

Q1) Answer *any two* of the following: [16]

- a) How modulation of host cell cytoskeletal is carried out by bacterial pathogens to cause infection? Explain with suitable example.
- b) Describe the methodologies for testing antimycobacterial drugs.
- c) Enlist different methodologies for rational drug discovery. Explain any one in detail.

Q2) Answer *any two* of the following: [16]

- a) What is drug metabolism? Explain metabolism of drug in liver.
- b) Explain the screening strategies to study mode of action of drugs inhibiting Cell membrane, giving suitable examples.
- c) How are drugs formulated? Comment on targeted drug delivery.

Q3) Answer *any two* of the following: [16]

- a) Explain *in vivo* and *in vitro* assay systems for endotoxins produced by Gram negative bacteria.
- b) Discuss the role of adhesions in bacterial pathogenesis.
- c) Describe the methods for bioassay of anti bacterial agent in liquid media.

P.T.O.

Q4) Write *short notes* on *any four* of the following:

[16]

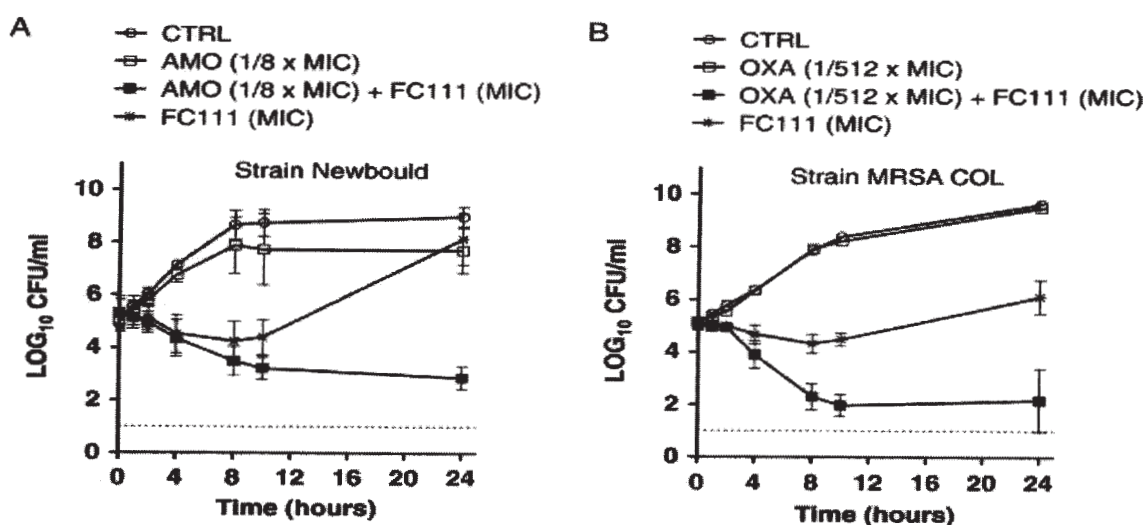
- Micronucleus test.
- Role of FDA.
- Lead optimization.
- Pathogenecity Islands.
- Hemolysins.

Q5) Cranberry (*Vaccinium macrocarpon* Ait) is one of the berries having the most potent antimicrobial effects against several human pathogens. Water-soluble phenolic compounds of cranberry juice, such as flavonoids, have higher antimicrobial activities against food borne pathogens. The bacterial cell wall and cellular membranes have been identified as targets of cranberry extracts on Gram-negative and Gram-positive food borne pathogens like *Escherichia coli* O157:H7 and *Staphylococcus aureus*.

S. aureus kill-curve kinetics was evaluated in Mueller Hinton broth containing Cranberry extract FC111 alone or in combination with the specified antibiotic; to observe the bactericidal effect (*i.e.*, a 3 log₁₀ reduction in CFU/mL) of cranberry extracts alone or in combination with sub-inhibitory concentrations (sub-MICs) of traditional antibiotics. The strains used were - *Staphylococcus aureus* MRSA strain COL and bovine mastitis isolate Newbould (ATCC 29740).

Figure A: FC111 alone (at its MIC, 1 mg/mL) or in combination with a sub-MIC (1/8 × MIC) of amoxicillin against *S. aureus*

Figure B: FC111 with a sub-MIC (1/512 × MIC) of oxacillin against MRSA COL.



Values are means of duplicates of two separate experiments. Bars represent standard deviations (SD).

Based on the given data, answer the following:

- a) What is the efficacy of cranberry extract as compared with amoxicillin and oxacillin? [5]
- b) Give mode of action of amoxicillin/oxacillin. [5]
- c) What will be the steps in processing cranberry extract FC111 into a candidate antibacterial drug? [6]



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

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[5227]-42

M.Sc. (Part - II)

MICROBIOLOGY

**MB - 802 : Molecular Biology - II
(2008 Pattern) (Semester - IV)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat - labeled diagrams wherever necessary.*

Q1) Attempt any two of the following : **[16]**

- a) Explain rRNA synthesis.
- b) Explain cytosolic protein degradation.
- c) Explain altered code in mitochondria.

Q2) Attempt any two of the following : **[16]**

- a) Explain process of mRNA polyadenylation.
- b) Explain Human genome project.
- c) Explain codon usage.

Q3) Attempt any two of the following : **[16]**

- a) Explain RDT in detail.
- b) Explain role of regulatory RNA with example.
- c) Explain PCR technique.

P.T.O.

Q4) Write short notes on any four of the following:

[16]

- a) DNA microarray.
- b) Micro RNA.
- c) Sigma Factor.
- d) PAC
- e) Expression vector

Q5) a) The following sequencing of bases in *E. coli* RNA is part of a gene. Mark the region that, if transcribed will form the first codon to be translated? **[8]**

‘3,-CCGAUGCCCACCGUGAGGGCCACC-5’

- b) A gene encodes a polypeptide 30 amino acid long containing an alternating sequence of Phenylalanine and Tyrosine. What are the sequences of nucleotides corresponding to this sequence in the following. **[8]**
 - The DNA Strand that is not read.

☆ ☆ ☆

Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5227] - 43

M.Sc. (Part - II)

MICROBIOLOGY

MB-803: Microbial Technology

(2008 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat labeled diagrams wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of the logarithmic tables scientific calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

Q1) Discuss the design of CSTR. Add a note on advantages of CSTR over immobilized cell reactor. **[16]**

OR

With the help of flow chart, describe the commercial production of lipase.

Q2) Answer any two of the following: **[16]**

- a) Justify 'SOP is a vital component for any analytical processes.
- b) Explain the various mechanisms involved in regulation of primary metabolites.
- c) Describe various types of biosensors and their possible use in monitoring process parameters.

Q3) Answer any two of the following : **[16]**

- a) Illustrate various forms of IPR
- b) Describe the process to produce recombinant vaccines using animal cell culture.
- c) Justify with example 'Mycelial forms of growth affects mass transfer of heat and oxygen'.

P.T.O.

Q4) Write short notes on any four of the following :

[16]

- a) Baffles.
- b) Growth rate.
- c) Non - Newtonian fluids.
- d) Process validation.
- e) Sensors to monitor pH.

Q5) Refer to the given plot and answer the following.

[16]

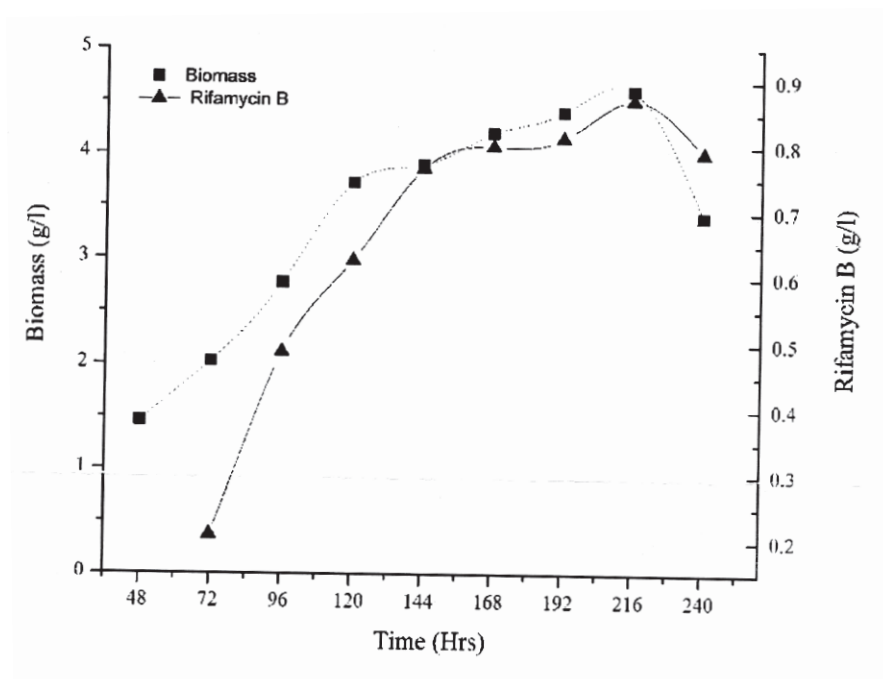


Fig. - Period of fermentation for Rifamycin B production.

- a) Interpret the plot for maximum production of RifamycinB
- b) Comment about the optimum time required for Rifamycin B production.
- c) Describe all the parameters that needs to be optimized for Rifamycin production
- d) Discuss the process of recovery of Rifamycin from fermented medium

