Total No. of Questions : 8]

SEAT No. : ____

P1458

[Total No. of Pages : 2

[5434] - 101
M.Sc. - II
MICROBIOLOGY
MB - 501 : Microbial Diversity & Taxonomy
(2013 Pattern) (Semester - I) (Credit System)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt five questions.***
2) ***Attempt any 3 questions from Q.1 to Q.4.***
3) ***Attempt at least 2 questions form Q.5 to Q.8***
4) ***Figures to the right indicates marks.***
5) ***Draw diagrams wherever necessary.***
6) ***All questions carry equal marks.***
7) ***Use of the logarithmic electronic pocket calculator is allowed.***
8) ***Assume suitable data, if necessary.***

Q1) Attempt any two of the following :

a) Differentiate between species concept in eukaryotes and prokaryotes. **[5]**

b) The bacterial load of an garden soil sample was found to be 10^{14} cells/ gm by direct microscope counting technique.The soil sample was than heated at 90° C for one hour and examined by conventional standard plate count technique which was 10^{8} CFU/gm .Explain the reason fot the difference in count. **[5]**

c) What is phylogenetic tree? Explain how it is constructed. **[5]**

Q2) Attempt any two of the following :

a) Explain the species divergence.Enlist the techniques for measurement of microbial diversity. **[5]**

b) Given data is obtained from pond water sample.The total number of colonies were 195×10^{8}. Find out the simpson index. **[5]**

Sr. No.	Types	No.of colonies
01	Pale,Pinpointed	47
02	Pigmented,1 mm	66
03	White, more than 1 mm	82

c) Briefly explain the expanse of microbial diversity. **[5]**

P.T.O.

Q3) Attempt any two of the following :

a) Outline the strategy for identification of pure culture with suitable flow sheet diagram. **[5]**

b) Write short note on five Kingdom classification. **[5]**

c) Define phylogenetic approach to bacterial systematic. **[5]**

Q4) Attempt any two of the following.

a) Describe the importance of FAME profilling in bacterial taxonomy. **[5]**

b) Enlist the various approaches to access the total number of bacterial species. **[5]**

c) Enlist different molecules used as molecular clocks in bacterial taxonomy. **[5]**

Q5) Attempt any two of the following :

a) Justify : Classification of molds is chiefly based on their morphological characters. **[5]**

b) Enlist the different classes of fungi with examples. **[5]**

c) Give the salient features of Basidiomycetes. **[5]**

Q6) Attempt any two of the following :

a) Enlist the culture independent molecular methods for identifying unculturable bacteria. **[5]**

b) Explain the methods of extracting total bacterial DNA from habitat. **[5]**

c) Define : Metagenomic library. **[5]**

Q7) Attempt any two of the following :

a) What is coevolution ? Explain coevolution with respect to host - parasite evolution. **[5]**

b) Explain Neo - Darwinism and its importance in prokaryotic evolution. **[5]**

c) Enlist the levels of selections. Define kin selection. **[5]**

Q8) Attempt any two of the following :

a) What is vector ? Explain use of vectors in gene sequencing. **[5]**

b) Explain the role of BLAST in microbial identification. **[5]**

c) Write a short note on pyro - sequencing. **[5]**

❄❄❄❄

Total No. of Questions : 8]

SEAT No. :

P1459

[Total No. of Pages : 4

[5434]-102
M.Sc.
MICROBIOLOGY
MB- 502 : Quantitative Biology
(2013 Pattern) (Semester - I) (Credit System) (Part - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any THREE questions from 1 to 4 (Core credits)***
2) ***Attempt any TWO questions from 5 to 8 (Non-core credits)***
3) ***All questions carry equal marks.***
4) ***Draw neat diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic tables/Scientific Calculator is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Attempt any two of the following. **[10]**

a) Calculate the arithmetic mean from the following data:

Variable	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	10	25	30	20	10

b) Calculate the variance of the following data:

Baker's yeast yield(g)/ liter: 55,52,47,61,63,75,69 & 68.

c) Following are the height and weight of 7 students. Draw scatter diagram and calculate correlation coefficient.

Height (inches)	58	62	72	78	65	70	66
Weight(kg)	50	50	65	63	54	60	61

Q2) Attempt any two of the following. **[10]**

a) The data below represent the length of fish from two different geographically isolated lakes. Determine whether there is statistically significant difference between two fish populations in terms of body length.

	Lake 1	Lake 2
Sample size	42	56
Mean	74	78
Variance	225	169

P.T.O.

b) The result of IQ test are given below. Find out whether there is any change in IQ after the training programme.

Candidate	1	2	3	4	5	6	7
IQ before Training	112	120	116	125	131	132	129
IQ after Training	120	124	118	129	136	136	125

c) What is hypothesis testing in statistics?

Q3) Attempt any two of the following. **[10]**

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	20	28
Not inoculated	46	10

b) Consider a Phase II clinical trial designed to investigate the effectiveness of a new drug to reduce symptoms of asthma in children. A total of n=10 participants are randomized to receive either the new drug or a placebo. Participants are asked to record the number of episodes of shortness of breath over a 1 week period following receipt of the assigned treatment. The data are shown below.

Placebo	7	5	6	4	12
New Drug	3	6	4	2	1

Is there a difference in the number of episodes of shortness of breath over a 1 week period in participants receiving the new durg as compared to those receiving the placebo? By inspection, it appears that participants receiving the placebo have more episodes of shortness of breath, but is this statistically significant?

c) In an Mendelian experiment on breeding. Four types of plants are expected to occur in the proportion of 9:3:3:1. The observed frequencies are: 880 round and yellow, 303 wrinkled and yellow, 290 round and green and 110 wrinkled and green. Find the chisquare value and examine the correspondence between the theory and experiment.

Q4) Attempt any two of the following. **[10]**

a) Calculate the Karl Pearson's coefficient of skewness from the data recorded on number of pods per plant in a pulse crop.

No. of Pods	8	11	14	17	20	23
No. of Plants	2	4	6	10	6	3

b) Twenty patients on a certain diet made the following weight gains (in pounds): 7, –6, 3, 1, 6, 4, 9,–5, 9, –7, –3, 7, –9, 8, 6, -4, 4, 9, -6, 1. Test the hypothesis that the median weight gain is zero against it is not. Use 5% level of significance. (When $\alpha = 0.05$, critical value is 5)

c) Compare one tailed and two tailed test.

Q5) Attempt any two of the following.

a) Represent the following data by a pie diagram: **[10]**

Country	China	India	New Zealand	United Kingdom	Germany	Swedan
Birth Rate	40	33	30	20	16	15

b) Describe Kaplan Meier survival curve.

c) Represent the following data using suitable diagram

Table: Percentage of the estimated population of six species of bacteria in three lakes.

Species/Group	% of total population		
	Lake A	Lake B	Lake C
Bacillus sp	25.69	27.54	12.01
Pseudomonas sp.	23.69	15.94	11.17
Azotobacter sp.	18.20	19.42	14.80
Actinomyetes	13.97	17.39	12.57
E. Coli	10.97	15.36	21.51
Blue green bacteria	7.48	4.35	27.93

Q6) Attempt any two of the following. **[10]**

a) In random mating population of *Drosophila* there are 876 males and 1000 female flies. What is the probability that a fly chosen at random from this population will be male?

b) If the capacities of cranial cavities of a certain population are approximately normally distributed with a mean of 1400 cc and a standard deviation of 125, find out the probability that a person randomly picked from this population will have a cranial cavity capacity greater than 1450cc.

c) Alpha particles are emitted by radioactive source at the rate of three per every minute on an average. The number of particles is distributed according to the Poisson distribution. Calculate the probability of getting exactly 6 emissions in one minute.

Q7) Attempt any two of the following. **[10]**

a) Describe epidemiological study design.

b) Explain PlackettBurman design in detail.

c) Two samples are drawn from two normal populations. From the following data test whether the samples have same variances at 5% level of significance using F test or Variance ratio test.

Sample 1	40	45	51	54	56	63	65	68	-	-
Sample 2	44	46	47	65	58	69	67	65	43	71

Q8) Attempt any two of the following. **[10]**

a) Describe population model.

b) Explain SIR model.

c) Compare stochastic and deterministic models.

Total No. of Questions : 8]

SEAT No. :

P1460

[Total No. of Pages : 2

[5434]-103
M.Sc. (Part - I)
MICROBIOLOGY
M - 503 : Cell Organization and Biochemistry
(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Q1 to Q3 are compulsory.***
2) ***Attempt at least two from Q4 to Q8.***
3) ***All questions carry equal marks.***
4) ***Draw neat labeled diagrams wherever necessary.***
5) ***Use of logarithmic tables and scientific calculator is allowed.***
6) ***Assume suitable data if necessary.***
7) ***Figures to the right indicate full marks.***

Q1) Attempt any two of the following: **[10]**

a) Explain C- terminal sequencing of protein by giving at least two methods.

b) i) A mixture of following amino acids is subjected to electrophoresis at pH 3.9: Ala, Leu, Arg, Asp, His. Which ones will go toward anode (-)? Toward cathode (+)? Why?

ii) Is it possible to separate amino acids by the above mentioned method?

c) Diagrammatically illustrate double helix of DNA showing Watson and Crick base pairing.

Q2) Attempt any two of the following: **[10]**

a) Explain the targeting of secretory proteins to ER.

b) Justify: 'The cyclin-cdk complexes play important role in regulation of cell cycle'.

c) Describe the structure and function of microfilaments.

Q3) Attempt any two of the following: **[10]**

a) Diagrammatically illustrate the process of gastrulation in *Xenopus*.

b) Explain the role of MPF in development.

c) Justify: 'Maternal messenger RNAs are critical to the formation of the anterior-posterior axis in Drosophila'.

P.T.O.

Q4) Attempt any two of the following: **[10]**

a) Explain molecular mechanism of quorum sensing in Gram negative bacteria.

b) Describe the process of cellular differentiation in *Dictyostelium*.

c) Explain S-motility and A- motility and comment on their significance in lifecycle of myxobacteria.

Q5) Attempt any two of the following: **[10]**

a) What is hydrogen bonding? Explain the significance of H-bonding in biomolecules.

b) Explain the mechanism of addition reaction giving suitable examples.

c) What is the intracellular and extracellular buffering system used by animals with lungs?

Q6) Attempt any two of the following: **[10]**

a) Explain mutarotation with suitable example.

b) What are terpenes? Comment on their biological roles.

c) Describe the structure and function of phospholipids.

Q7) Attempt any two of the following: **[10]**

a) Give structure of coenzyme form of pyridoxine and comment on its function.

b) Describe the structure and function of vitamin A.

c) Describe the function of manganese and zinc as cofactor.

Q8) Attempt any two of the following: **[10]**

a) Justify: 'Hormones produced by adrenal medulla help body to overcome stress'.

b) Write a note on hormones of posterior pituitary.

c) Explain chemical structure and functions of parathyroid hormones.

Total No. of Questions : 8]

SEAT No. :

P1461

[Total No. of Pages : 2

[5434]-201
M.Sc.-I
MICROBIOLOGY
MB-601 : Instrumentation & Molecular Biophysics
(2013 Pattern) (Semester - II) (Credit System)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any three questions from 1 to 4 (Core Credit)***
2) ***Attempt any two questions from 5 to 8 (Non- Core Credit)***
3) ***All questions carry equal marks.***
4) ***Draw neat well labeled diagrams wherever necessary.***
5) ***Figures to the right indicates full marks.***
6) ***Use of log tables graph papers and scientific calculators is allowed***
7) ***Assume suitable data if necessary.***

Q1) Attempt any two of the following. **[10]**

a) Explain: Partition coefficient and resolution of column chromatography.

b) Describe Agarose gel electrophoresis with a suitable diagram.

c) A centrifuge rotor is spinning at 25,000. The 'top' of the cell is 5.5 cm from the rotor's central axis, and the 'bottom' of the cell is 9.5cm from the central axis. What are the g forces on a particle found at the top and at the bottom of the tube?

Q2) Attempt any two of the following **[10]**

a) What is FRET? Explain with an appropriate example.

b) The concentration of yeast tRNA in an aqueous solution is 10 M. the absorbance is found to be 0.209 when this solution is placed in a 1 cm cuvette and 258 nm radiations are passed through it.

- Calculate the specific absorptivity.
- What will be the absorbance if the solution is 5 M?
- What will be the absorbance if the path length of the original solution is increased to 5 cm?

c) Diagrammatically explain the instrumentation of Mass spectrometry.

Q3) Attempt any two of the following **[10]**

a) What is Ewald's sphere and why is it significant in X-ray diffraction studies.

b) Explain the significance of spin spin coupling constant with a suitable example.

c) What is COSY and enlist its applications.

P.T.O.

Q4) Attempt any two of the following. **[10]**

a) Give differences between gel filtration and gas chromatography

b) Explain the concept of Cotton Effect.

c) What are the different crystal structures? Describe with suitable diagram.

Q5) Attempt any two of the following. **[10]**

a) Explain Ramchandran plot in detail.

b) What are the cis/trans isomers of peptide group?

c) Describe the tertiary structure of myoglobin.

Q6) Attempt any two of the following. **[10]**

a) Comment on: Dynamic Programming

b) What is PDB and explain how it is different from OMIM database.

c) Explain sequence alignment in reference to local and global alignment.

Q7) Attempt any two of the following. **[10]**

a) What are the steps involved in FASTA.

b) What are the chemical and physical properties of aromatic amino acids?

c) What is 3-D protein model and explain its significance with an example.

Q8) Attempt any two of the following. **[10]**

a) Explain the applications of nanoparticles in detail.

b) What is Zeta potential and why is it important for nanoparticle study.

c) In detail describe any two characterization methods of nanoparticles.

✓ ✓ ✓

Total No. of Questions : 8]

SEAT No. : ____

P1462

[Total No. of Pages : 2

[5434]-202
M.Sc. - I
MICROBIOLOGY
MB-602 : Virology
(2013 Pattern) (Semester - II)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt any three questions from Q1 to Q4 (Core credits)***
2) ***Attempt any two questions from Q5 to Q8. (Non - core credits)***
3) ***All questions carry equal marks.***
4) ***Draw neat-labeled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of graph paper, log tables and scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Attempt any two of the following: **[10]**

a) Diagrammatically illustrate capsid symmetries in viral structure.

b) Elaborate different types of nucleic acids found in viruses with one example of each.

c) What are the common steps associated with replication of different viruses?

Q2) Attempt any two of the following: **[10]**

a) Comment on : embryonated chicken egg in cultivation of viruses.

b) Elaborate use of electron microscopy in detection of viruses.

c) In an animal infectivity assay, viruses were diluted ten fold and a fixed volume was injected in the sets of six mice each. Following data was obtained.

Dilution of virus used	Number of mice died
10^{-1}	6
10^{-2}	5
10^{-3}	2
10^{-4}	1
10^{-5}	0

Calculate LD_{50} value of virus titer using cumulative value table.

P.T.O.

Q3) Attempt any two of the following **[10]**

a) Elaborate rules for Classification and Nomenclature of Viruses as per ICTV, 9th report (2012)

b) How are viruses classified on the basis of hosts they infect? Explain with suitable examples.

c) Enlist various criterion in the classification of viruses.

Q4) Attempt any two of the following: **[10]**

a) State the significance of enveloped proteins

b) Comment on : DNA microarray as a diagnostic tool.

c) Enlist the steps involved in naming and classifying a newly isolated virus.

Q5) Attempt any two of the following: **[10]**

a) Explain genome organization and life cycle of M13 Phage.

b) Comment on bacteriophage therapy.

c) Give morphological details and life cycle of phage T_4

Q6) Attempt any two of the following: **[10]**

a) What are sub-unit vaccines/How do they differ from recombinant DNA vaccines.

b) Give a protocol for screening antiviral agents.

c) Write a note on Ribozymes.

Q7) Attempt any two of the following: **[10]**

a) Explain antigenic characters and epidemiology of *Herpes virus*.

b) Comment on cell transformation by RNA Oncogenic viruses.

c) Describe antigenic variants of *FMD virus*. Explain spread of *FMD virus*.

Q8) Attempt any two of the following: **[10]**

a) Enlist and explain different morphological changes occurring in plants after infection by viruses.

b) Elaborate antigen based methods for detection of plant viruses.

c) Comment on cellular sites of virus replication and assembly.

Total No. of Questions : 8]

SEAT No. :

P1463

[Total No. of Pages : 2

[5434]-203
M.Sc.
MICROBIOLOGY
MB - 603 : Microbial Metabolism
(2013 Pattern) (Part - I) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Q.1 to Q.3 is compulsory.***
2) ***Attempt at least two questions from Q.4 to Q.8.***
3) ***All questions carry equal marks.***
4) ***Use of the logarithmic table and scientific calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Draw neat labeled diagrams wherever necessary.***
7) ***Figures to the right indicate full marks.***

Q1) Attempt any two of the following: **[10]**

a) Explain the concept of allosterism with help of suitable example.

b) Describe the steps involved in King Altman approach to derive velocity equation for two substrate enzyme catalyzed reaction.

c) In a single substrate enzyme catalyzed reaction show that Km is the substrate concentration when velocity = $V_{max}/2$.

Q2) Attempt any two of the following: **[10]**

a) Explain the terms - Entropy and Enthalpy.

b) Justify, 'Phosphoenol pyruvate is high energy compound'.

c) Explain the term phosphorylation potential and give its significance.

Q3) Attempt any two of the following: **[10]**

a) Write a short note on 'Proton motive force.'

b) Describe the energy generation pathway in sulphate reducing bacteria.

c) Schematically represent bacterial ETC.

Q4) Attempt any two of the following: **[10]**

a) Write a note on model membranes.

b) Diagrammatically illustrate the structure and function of mitochondrial ATPase.

c) Describe the passive diffusion of solute across membrane.

P.T.O.

Q5) Attempt any two of the following: **[10]**

a) Write a note on ammonia assimilation.

b) Outline the biosynthesis of glutamate family of amino acids.

c) Describe any five mechanisms used by organisms to protect enzyme nitrogenase from oxygen toxicity.

Q6) Attempt any two of the following: **[10]**

a) Describe different electron carriers involved in photosynthetic ETC.

b) Write a note on CAM pathway.

c) Describe different groups of photosynthetic bacteria.

Q7) Attempt any two of the following: **[10]**

a) Diagrammatically represent Calvin cycle.

b) Describe biosynthesis of sucrose in plants.

c) Differentiate between C_3 and C_4 pathway.

Q8) Attempt any two of the following: **[10]**

a) Outline the pathway of biosynthesis of triacylglycerols.

b) Write a note on role of vitamin K in metabolism.

c) Explain the role of phosphotidyl inositol as signal molecule.

Total No. of Questions : 8]

SEAT No. :

P1464

[Total No. of Pages : 2

[5434] - 301
M.Sc. - II
MICROBIOLOGY
MB - 701 : Immunology
(2013 Pattern) (Semester - III) (Credit System)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any three questions from 1 to 4 (Core credits).***
2) ***Attempt any two questions from 5 to 8 (noncore Credits)***
3) ***All questions carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of the logarithmic tables & scientific calculators is allowed.***

Q1) Attempt any two of the following : **[10]**

a) Explain the structure & Function of toll like receptors.

b) Describe the role of Tyrosine kinase linked receptors.

c) Describe the role of cytokine receptors.

Q2) Attempt any two of the following : **[10]**

a) Diagramatically describe T-cell mediated supression of immune response.

b) Explain the role of idiotypic network in immune regulation.

c) Describe the regulation of classical complement pathway.

Q3) Attempt any two of the following : **[10]**

a) Describe different factors affecting animal cell culture techniques.

b) Describe functional assays for phagocytes.

c) Explain the use of experimental animals in immunology research.

Q4) Attempt any two of the following : **[10]**

a) Explain the role of B- cell reptors in immune activation.

b) Compare regulation of classical & alternative complement pathway.

c) Draw the diagram of ELISPOT assay for quantification of cytokines.

P.T.O.

Q5) Attempt any two of the following : **[10]**

a) Explain host immune responses in tumors.

b) What are immune adjuvant's & explain its role in cancer immunotherapy.

c) Enlist different tumors of lymphoid system. Describe Hodgkin's disease.

Q6) Attempt any two of the following : **[10]**

a) Explain the pathophysiology in Leishmania.

b) Describe host immune response to Mycobacterium tuberculosis**.**

c) Describe the differences in immunotherapeutic approaches of bacterial, viral & parasitic infections.

Q7) Attempt any two of the following : **[10]**

a) Describe the diagnosis & therapeutic approaches of humoral deficiencies.

b) Describe Systemic Lypus Erythomatosus (SLE) as autoimmune disorder.

c) What are the therapeutic approaches to humoral & T - cell deficiencies.

Q8) Attempt any two of the following : **[10]**

a) Compare the anatomical organisation of immune system in invertebrates & vertebrates.

b) Explain the evolution of immunoglobulins.

c) Describe the strategies of survival of living form with respect to immune system evolution.

❄❄❄❄

Total No. of Questions : 8]

SEAT No. : ____

P1465

[Total No. of Pages : 2

[5434]-302
M.Sc. - II
MICROBIOLOGY
MB - 702 : Molecular Biology - I
(2013 Pattern) (Semester - III) (Credit System)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt any three questions from 1 to 4 (core credits).***
2) ***Attempt any two questions from 5 to 8 (non-core credits).***
3) ***All questions carry equal marks.***
4) ***Draw neat, labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of log tables/scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Attempt any two of the following: **[10]**

a) Explain method used for measuring transcription rates with suitable example.

b) Explain protein foot printing as a tool in molecular biology.

c) Explain DNA helicase assay.

Q2) Attempt any two of the following: **[10]**

a) Comment on role of cAMP-CAP in regulation of lac operon.

b) Explain role of riboswitches with examples.

c) Explain positive control of ara operon.

Q3) Attempt any two of the following: **[10]**

a) Explain is RNA and its applications.

b) Explain auto splicing of group I introns.

c) Explain transesterification reaction in mRNA splicing.

Q4) Draw neat well labelled diagrams of any two of the following: **[10]**

a) DMS foot printing.

b) Auto regulation of ara C.

c) tRNA splicing in eukaryotes.

P.T.O.

Q5) Attempt any two of the following: **[10]**

a) Justify the retrovirus life cycle involves transposition like events.

b) Comment on Controlling of Tn 10 transposition.

c) Differentiate between LINES and SINES.

Q6) Attempt any two of the following: **[10]**

a) What is MALDI? How is it used in proteomics.

b) Comment on 2D electrophoresis as a tool in characterization of protein.

c) Write a note on metabolomics.

Q7) Attempt any two of the following: **[10]**

a) Explain the principle of rested PCR.

b) Give applications of DNA micro array technique with suitable examples.

c) Write applications of PCR with examples.

Q8) Attempt any two of the following: **[10]**

a) What alterations are made in DNA by transposons.

b) Explain the factors affecting the expression of proteins.

c) State the significance of use of reverse transcriptase in PCR.

⌘⌘⌘

Total No. of Questions : 8]

SEAT No. :

P1466

[Total No. of Pages : 2

[5434]-303
M.Sc. - II
MICROBIOLOGY
MB - 703 : Industrial Waste Water Treatment
(2013 Pattern) (Credit System) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any three questions from Q.1 to Q.4.***
2) ***Attempt any two questions from Q.5 to Q.8.***
3) ***All questions carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of the logarithmic tables, electronic pocket calculator is allowed.***
7) ***Assume suitable data, if necessary.***

Q1) Attempt any two: **[10]**

a) Comment on sampling of industrial waste water.

b) Describe respirometric method of determination of BOD.

c) Enlist different types of solids found in industrial waste water & state the significance of estimating them.

Q2) Attempt any two: **[10]**

a) Give significance of flow equillzation in industrial waste water treatment.

b) Give comparative account of various pretreatment processes used in waste water treatment.

c) Diagramatically explain the working of continuous sand filters.

Q3) Attempt any two: **[10]**

a) Enlist various combined biological processes used in waste water treatment. Describe any one process.

b) Discuss the characteristics of an ideal disinfectant in industrial waste water treatment.

c) Explain the principle & mechanism of activated sludge digestion.

P.T.O.

Q4) Attempt any two: **[10]**

a) What is the importance of ratio of BOD to COD in waste water treatment.

b) Describe various agents & their use in flocculation method in waste water treatment.

c) Explain methods used for disposal of treated waste.

Q5) Attempt any two: **[10]**

a) Diagramatically explain waste water treatment of a paper industry.

b) Explain the characteristics of waste of dairy industry.

c) Comment on : Variations in content of waste from food industry & its effect on determination of waste treatment.

Q6) Attempt any two: **[10]**

a) What are the attributes of different types of environmental impact assessment?

b) Give comparative account of phase I & phase II studies of EIA.

c) Comment on base line characterisation as a crucial step in EIA.

Q7) Attempt any two: **[10]**

a) Diagramatically explain rotating biological contactors (RBCS).

b) Describe the role of microbes in MBRs.

c) Explain the advantages & disadvantages of MBBRs.

Q8) Attempt any two: **[10]**

a) Explain the characteristics of dyeing industry.

b) Discuss Identity, predict & Judgement with respect to EIA study.

c) A screening pit at food processing unit has a capacity of 1000 ft^3. If an average of 30 ft^3 of screenings is removed daily from the waste water flow, in how many days will the pit be full?

Total No. of Questions : 8]

SEAT No. :

P1467

[Total No. of Pages : 2

[5434]-401
M.Sc.-II
MICROBIOLOGY
MB-801 : Pharmaceutical & Medical Microbiology
(2013 Pattern) (Semester - IV) (Credit and Semester System)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any three from Q.1 to Q.4.***
2) ***Attempt any two from Q.5 to Q.8.***
3) ***All questions carry equal marks.***
4) ***Draw neat-labeled diagrams wherever necessary.***
5) ***Use of logarithmic tables and scientific calculators is allowed.***
6) ***Assume suitable data if necessary.***

Q1) Attempt any two of the following:

a) Give the objectives and conduct of clinical trial I. **[5]**

b) Write the applications of high throughput screening. **[5]**

c) Describe the methods of acute and subacute toxicity testing. **[5]**

Q2) Attempt any two of the following:

a) Describe E-test for susceptibility testing. **[5]**

b) What are the methods for susceptibility testing for anti-protozoan agents? **[5]**

c) Explain the concept of MIC and MBC. Elaborate the MIC using liquid media. **[5]**

Q3) Attempt any two of the following:

a) Describe *in vitro* and *in vivo* assay of diphtheria toxin. **[5]**

b) Write a note on endotoxins of Gram negative bacteria. **[5]**

c) Describe non specific and specific humoral factors involved in bacterial resistance to host defence. **[5]**

Q4) Attempt any two of the following.

a) Describe the rational drug design. **[5]**

b) Illustrate the factors affecting susceptibility testing as per CLSI guidelines. **[5]**

c) Explain the mechanisms of adhesions and colonization of bacterial pathogens. **[5]**

P.T.O.

Q5) Attempt any two of the following.

a) Explain the principle and use of turbidometry and nephlometry to evaluate activity of anti-infectives. **[5]**

b) Enlist drugs targeting nucleic acid synthesis. Explain the action of anyone. **[5]**

c) Describe the methods to study drug interactions. **[5]**

Q6) Attempt any two the following.

a) Describe role of GMP in pharmaceutical industry. **[5]**

b) Explain adverse drug reactions with examples. **[5]**

c) Write a note on Ames test. **[5]**

Q7) Attempt any two of the following.

a) Describe the different drug delivery systems. **[5]**

b) Write a role of FDA in pharmaceutical industry. **[5]**

c) Explain advantages of Yeasts as production system for recombinant protein in biopharmaceutical preparations. **[5]**

Q8) Attempt any two of the following.

a) What are the investigational approaches for SARS? **[5]**

b) Explain the mechanisms of resistance in VRSA. **[5]**

c) Write a note on ESBL producers. **[5]**

✓ ✓ ✓

Total No. of Questions : 8]

SEAT No. : ____

P1468

[Total No. of Pages : 2

[5434]-402
M.Sc.
MICROBIOLOGY
MB-802 : Molecular Biology-II
(2013 Pattern) (Part - II) (Semester - IV) (Credit System)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt any three questions from Q1 to Q4 (Core Credit)***
2) ***Attempt any two questions from Q5 to Q8. (Non - Core Credit)***
3) ***All questions carry equal marks.***
4) ***Draw neat-labeled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of log tables, graph papers, scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Attempt any two of the following: **[10]**

a) Explain how more than one protein get synthesized from a single gene with example.

b) What are SNP's? Explain their role in genomic variation with example.

c) Describe trade-offs associated with genomic variation with example.

Q2) Attempt any two of the following: **[10]**

a) What is site directed mutagenesis? Explain its application with example.

b) Describe any two methods of gene transfer to host cells.

c) Write applications of transgenic animals with examples.

Q3) Attempt any two of the following **[10]**

a) Describe use of RDT in production of novel antibiotics with example.

b) Explain any one unconventional microbial system for production of high quality protein drugs with example.

c) Explain synthesis of rubber by using RDT.

Q4) Attempt any two of the following: **[10]**

a) Explain synthesis of L-Ascorbic acid by using RDT.

b) Write short note on YAC.

c) Explain DNA imprinting with example.

P.T.O.

Q5) Attempt any two of the following: **[10]**

a) What are xenobiotics? Explain degradation of any one xenobiotic by using RDT.

b) Explain utilization of starch for alcohol production.

c) Explain silage production.

Q6) Attempt any two of the following: **[10]**

a) Explain genome project of E.coil and its applications.

b) Explain Human Genome Project and its applications.

c) Write short note on gene annotation.

Q7) Attempt any two of the following: **[10]**

a) Explain ethical and social issues for genetically modified organisms.

b) Explain gene augmentation with example.

c) Write advantages of transgenic plants with examples.

Q8) Attempt any two of the following: **[10]**

a) Explain gene augmentation with example.

b) Explain expression vector with example.

c) What is comparative genomics? Write its applications.

Total No. of Questions : 8]

SEAT No. :

P1469

[Total No. of Pages : 2

[5434]-403
M.Sc. - II
MICROBIOLOGY
MB - 803 : Microbial Technology
(2013 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any Three from Q.1 to Q.4.***
2) ***Attempt any two from Q.5 to Q.8.***
3) ***All questions carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Assume suitable data, if necessary.***

Q1) Attempt any two: **[10]**

a) Write a note on immobilized cell reactor with recycle.

b) Discuss the necessity of baffles in bioreactors.

c) Comment on 'Influence of sparger location on gas distribution in airlift reactors'.

Q2) Attempt any two: **[10]**

a) Comment on enzyme based recognition of analyte in biosensors.

b) Write a note on principle, construction and operation of a pressure sensor.

c) Explain the use of a sensor to monitor DCO_2.

Q3) Attempt any two: **[10]**

a) Explain the principle of immobilization of microbial cells using the gel entrapment method.

b) Comment about the effect of agitation on Pullulan production.

c) Describe all the parameters that need to be optimized for Chitinase production.

Q4) Attempt any two: **[10]**

a) Justify 'Continuous process is more efficient than batch process'.

b) Write a note on Non - Newtonian fluids.

c) Write a note on Industrial design as an IPR.

P.T.O.

Q5) Attempt any two: **[10]**

a) Explain the various mechanisms involved in regulation of primary metabolites.

b) Discuss the concept of growth rate.

c) With the help of suitable examples. describe various types of control mechanisms involved in regulation of growth associated metabolites.

Q6) Attempt any two: **[10]**

a) Write a note on architecture of fungal cell.

b) Comment on 'Versatility of fungi as bioremediating agent.

c) Discuss the concept 'Fungi as biofertilizers'.

Q7) Attempt any two: **[10]**

a) Describe the process to produce recombinant vaccines using animal cell culture.

b) Enlist advantages of recombinant forms of natural proteins.

c) How to produce nucleic acid based products using animal cell culture technique?

Q8) Attempt any two: **[10]**

a) Write a short note on installation qualification.

b) Justify 'SOP is a vital component for any analytical processes.

c) Explain the concept of ISO certification and discuss its necessity with respect to microbial products.