Total No. of Questions :8]

SEAT No. :

P1585

[Total No. of Pages :3

[5227] - 101

M.Sc. (Part - I)

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 atleast 2 questions form Q. 5 to Q. 8.***
4) ***Figures to the right indicate full marks.***
5) ***Draw diagrams wherever necessary.***
6) ***All questions carry equal marks.***
7) ***Use of the logarithmic electronic pocket calculators is allowed.***
8) ***Assume suitable data, if necessary.***

Q1) Attempt any two of the following :

a) Discuss the concept of evolutionary r and k selection. **[5]**

b) A sample from a saline water body was analyzed for its bacterial content. Direct microscopic bacterial count were found to be 10^8 cells/ml. On examination by conventional standard plating technique, the counts were found to be 10^5 CFU/ml.Explain the reason for the difference in count by above two methods. **[5]**

c) Give the definition of species in prokaryotes. **[5]**

Q2) Attempt any two of the following :

a) Justify : 'Shannon index is better than the Simpson's index for expressing bacterial diversity in an ecological sample'. **[5]**

P.T.O.

b) Given data is obtained from soil sample. The total number of colonies were counted to be 171×10^6. Find out the Simpson index. **[5]**

Sr. No.	Types	No. of colonies
01	Umbonate	37
02	Flate raised	76
03	Convex	58

c) Give the flowsheet diagram for estimating total number of species from given environment. **[5]**

Q3) Attempt any two of the following :

a) Explain the characteristics of bacteria in VBNC state. How does this state influence taxonomy? **[5]**

b) Describe the gradient gel electrophoresis techniques. **[5]**

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

Q4) Attempt any two of the following :

a) Justify : The 16S rRNA is the most widely accepted 'molecular chronometer' in bacterial taxonomy. **[5]**

b) Define 'molecular clock'. **[5]**

c) Describe the importance of protein profiling in bacterial taxonomy. **[5]**

Q5) Attempt any two of the following :

a) Describe the various asexual spores found in different classes of fungi. **[5]**

b) Give salient features of zygomycetes. **[5]**

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

Q6) Attempt any two of the following :

a) What are the universal primers? Explain how these are applied in microbial taxonomy and diversity. **[5]**

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

c) Explain the concept of 'uncuturable' bacterial diversity. **[5]**

Q7) Attempt any two of the following :

a) What is coevolution? Explain host - parasite coevolution. **[5]**

b) Explain the concept of phylogeny and molecular distances. **[5]**

c) Describe the spontaneous mutation controversy. **[5]**

Q8) Attempt any two of the following :

a) Describe the various techniques of DNA - DNA hybridization. **[5]**

b) Write a note on automated sequencer. **[5]**

c) Explain the strategies for whole genome sequencing. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P1586

[Total No. of Pages : 3

[5227]-102

M.Sc. (Part-I)

MICROBIOLOGY

MB-502 : Quantitative Biology

(2013 Pattern) (Semester-I) (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 diagrams wherever necessary.***
5) ***Figures to the right indicates full marks.***
6) ***Use of logarithmic tables scientific calculators is allowed.***
7) ***Assume suitable data if necessary.***

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

a) Calculate the median from the following data:

No. of pigmented colonies	0-3	3-6	6-9	9-12	12-15
No. of plates	4	8	22	10	4

b) Compute Karl Pearson's coefficient of correlation for the following data of Goldfish.

Length (cm)	7	5	6	3	4	8
Weight (g)	16	8	10	2	4	18

c) The incubation period of certain disease recorded on 10 patients is given below.

Calculate the standard deviation:

Incubation period (days) = 12, 16, 15, 13, 17, 12, 11, 14, 12, 18.

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

a) The Carbohydrate content of two banana varieties 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.

P.T.O.

b) Medical examination of students of city colleges showed that 432 girls out of 1437 and 152 boys out of 441 had defective eyesight. Test whether there is any significant association between gender and defective vision.

c) Describe the Type I and type II errors.

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

a) Pure black rats when test crossed to albinos produce only black F_1 offspring. The F_2 in one experiment was found to consist of 43 blacks, 15 creams and 22 albinos. The genetic control of these coat color is postulated to involve two genetic loci with recessive epistasis (9:3:4 ratio expected). Is the genetic hypothesis consistent with data.

b) The data on heights of male and female students is given to you. Test with the help of "Mann-Whitney test" whether heights of male and female students is same (Critical $U_{0.05(2),7.5} = 30$).

Height of Males(cm)	193	188	186	183	179	177	171
Height of female(cm)	176	174	168	165	163		

c) A new drug candidate was administered to 450 persons out of a total 800 persons in a locality where epidemic was prevalent to test its efficacy against malaria. The results are given below in the table. Find out effectiveness of drug against disease.

	Infection	No infection
Drug	200	300
No Drug	250	50

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

a) Calculate the geometric mean of the following data:

X	6	7	8	9	10	11
Y	4	7	10	9	6	2

b) A scientist is concerned about the possibility that too many changes are occuring in the volume of liquid taken by a 'fixed volume micropipette'. Following are the volumes (in μ1) of 15 successive pipettings: 0.261, 0.258, 0.249, 0.251, 0.247, 0.256, 0.250, 0.248, 0.255, 0.252, 0.253, 0.266, 0.264, 0.263, 0.262. Use 0.05 level of significance to test the null hypothesis of randomness against the alternate hypothesis that there is a frequently alternating pattern (when $\alpha = 0.05$; lower critical value is 3 and upper critical value is 13).

c) Describe the concept of hypothesis testing in statistic.

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

a) Give an account of the various methods of random sampling.

b) The following data relate to the expenditure of the family per month. Represent data by pie diagram:

Items of Expend.	Food	Rent	Clothing	Education	Transport	Miscellaneous
Amount in Rs.	4000	1500	1000	1000	1200	1300

c) Describe various levels of scale used in statistic.

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

a) A certain disease has a morality rate of 75%. Two patients suffering from the disease are selected at random. What is the probability that at least one of them will recover.

b) The life expectancy of light bulbs whose life times are normaly distributed with a mean life of 700 hours and standard deviation of 40 hours. What is the probability that the bulb will last 790 hours?

c) An average of 5 cars arrives at a tollbooth every minute. Assuming this to be a poisson distribution, what is the probability that exactly 1 car will arrive in a one minute period.

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

a) In laboratory experiment two samples gave the following results.

Sample	Size	Sample mean	Sum of squares of deviation from the mean
1	10	15	90
2	12	14	108

Test the quality of sample variances using F-test at 5% level of significance.

b) What is factorial experiment? Explain it in detail.

c) How clinical trials are conducted using statistics?

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

a) What is modeling? Explain the concept of deterministic model.

b) Explain models based on Hardy-Weinberg equation.

c) Describe any Epidemiological model.

Total No. of Questions :8]

SEAT No. :

P1587

[Total No. of Pages : 2

[5227]-103
M.Sc. (Part - I)
MICROBIOLOGY
MB - 503 : Cell Organization and Biochemistry
(2013 Pattern) (Semester - I) (CSS Pattern)

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) Justify: 'Although RNA is single stranded it can possess extensive secondary structure'.

b) Describe the classification of amino acids.

c) What is quaternary structure of proteins? Explain with suitable example.

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

a) Describe the structure and function of golgi complex.

b) Justify that mitochondria play significant role in apoptosis.

c) Diagrammatically illustrate the working of confocal microscope, comment on its applications.

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

a) Describe organizers in Xenopus.

b) Diagrammatically illustrate the process of gastrulation in *Drosophilla*.

c) What is meant by dedifferentiation and redifferentiation? Explain giving suitable example.

P.T.O.

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

a) Describe the mechanism of biofilm formation and comment on its significance.

b) What is Quorum sensing? Discuss its role in virulence of pathogenic bacteria.

c) Describe the cell-cell signaling in myxobacteria.

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

a) Explain biochemical significance of inductive effect.

b) Derive the Henderson and Hasselbalch equation and give its application in buffer preparation.

c) Justify: 'Non-covalent interactions are crucial to macromolecular structure and function'.

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

a) Diagrammatically illustrate the D- series of aldoses.

b) Enlist various types of isomerism observed in sugars and explain any one type with example.

c) What are steroids? Explain their structure and function with suitable example.

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

a) Explain the significance of folic acid in cellular biosynthesis.

b) Describe the structure and function of vitamin E.

c) Explain the role of copper as cofactor.

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

a) Justify: ' Pancreatic hormones regulate glucose metabolism in body'.

b) Write a note on male sex hormones.

c) Describe the structure and function of thyroid hormones.

Total No. of Questions : 8]

SEAT No. :

P1588

[Total No. of Pages : 2

[5227]-201
M.Sc. (Part - 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/scientific calculators is allowed.***
7) ***Assume suitable data if necessary.***

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

a) What is the maximum relative centrifugal force applied when red blood cells are sedimented at 1000 rpm in a rotor of maximum sample radius equal to 10 cm?

b) Describe the working of SDS-PAGE.

c) What is the principle of ion exchange chromatography and how is it used to purify proteins?

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

a) What is Beer-Lambert's law? What is its role in the study of macromolecules using UV-VIS spectrophotometer?

b) Describe the different ion fragmentation techniques in MS.

c) What is FRET? Explain its significance with a suitable example.

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

a) Differentiate between reciprocal and direct lattice.

b) Enlist the different methods for purifying proteins and explain any one with a suitable example.

c) What are relaxation parameters and why are they necessary?

P.T.O.

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

a) A solution of transmittance of 20%, when taken in a cell of 2.5 cm thickness. Calculate its concentration, if the molar absorption coefficient is 12,000 dm^3/mol/cm.

b) Describe ultracentrifugation with a suitable diagram.

c) Describe the instrumentation of X-ray crystallography. Account for the role of goniometer.

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

a) What is multiple sequence alignment? Explain with an appropriate diagram.

b) Differentiate between local and global sequence alignment.

c) Write a short note on GENBANK.

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

a) What are the different structural classes of proteins and describe the meaning of super-secondary structure.

b) Briefly comment on the physico-chemical properties of amino acids.

c) Describe the quarternary structure of hemoglobin.

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

a) Explain the significance of physical properties of nanoparticles.

b) Differentiate between TEM and SEM.

c) Briefly write the applications of biological databases.

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

a) Justify for nanoparticles: “there is plenty of room at the bottom”.

b) What is SPM and describe it.

c) What are magnetosomes and comment on its importance?

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Total No. of Questions : 8]

SEAT No. :

P1589

[Total No. of Pages : 3

[5227]-202

M.Sc. (Part - I)
MICROBIOLOGY
MB - 602 : Virology
(2013 Pattern) (Semester - II) (Cresit System)

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) Give a comparative account of different forms of Nucleic Acids found in viruses.

b) What are Prions? How do they resemble width viruses?

c) Explain interaction between proteins and nucleic acid during replication of a virus.

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

a) Give significance of using experimental animals in cultivation of animal viruses.

b) Comment on : western blotting as a diagnostic tool in virology.

c) What is $TCID_{50}$ value? In an experiment five sets of ten tissue culture flasks each were inoculated with.0.1 ml suspension of ten fold dilution of viruses and incubated appropriately. Following table shows the result of this experiment.

P.T.O.

Dilution of virus used	Number of flasks showing CPE
10^{-3}	10
10^{-4}	08
10^{-5}	06
10^{-6}	04
10^{-7}	02

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

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

a) Elaborate composition, functions and working of ICTV.

b) Give examples of classification of viruses based on type of hosts involves.

c) Justify the need for nomenclature and classification of viruses.

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

a) Describe icosahedral symmetry in viral structure.

b) How are plant viruses cultivated?

c) Explain the classification of viruses based on various vectors that transmit them.

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

a) Comment on genome organization of M13 Phage.

b) Justify : bacteriophage as therapeutic agent.

c) Explain switching of lysogenic cycle to lytic cycle in bacteriophage lambda.

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

a) Compare killed and attenuated viral vaccines.

b) Elaborate modern vaccines with suitable examples.

c) Explain mechanism of action of nucleotide analogues for controlling viruses.

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

a) Comment on : emerging viruses and their threats.

b) Explain genome organization pathophysiology of SV40.

c) What are Prions? How are they spread?

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

a) Elaborate various methods used for preventing crop losses due to virus infection.

b) State the protocol of half leaf assay method.

c) How are viruses translocated and released from infected plant tissues?

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Total No. of Questions :8]

SEAT No. :

P1590

[Total No. of Pages :3

[5227] - 203

M.Sc. (Part - I)

MICROBIOLOGY

MB-603: Microbial Metabolism

(2013 Pattern) (CSS Pattern) (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) Write the importance of constructing purification chart during process of enzymes purification.

b) Describe different types of cooperativity exhibited by allosteric enzymes.

c) Justify 'During uncompetitive inhibition, both K_m and V_{max} decrease'.

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

a) Write the statements of Laws of Thermodynamics & discuss their applicability in biological compounds.

b) Write a note on high energy compounds.

c) Comment on Atkinson's energy charge and its significance.

P.T.O.

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

a) Describe mitochondrial ETC.

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

c) Enlist the inhibitors & uncouplers of ETC & write its significance.

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

a) Explain the term ionophore with help of suitable example.

b) Diagrammatically illustrate the architecture of biological membrane.

c) Describe the process of ion mediated transport across membranes.

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

a) Explain regulation of glutamine synthetase in *E coli.*

b) Describe the structure of nitrogenase enzyme complex.

c) Outline the biosynthesis of pyruvate family of amino acids.

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

a) Describe the structure of chloroplast.

b) Write a note on photorespiration.

c) Diagrammatically illustrate the Z - scheme involved in photosynthesis.

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

a) Describe the biosynthesis of starch in plants.

b) Differentiate between C_3 & C_4 pathway.

c) Write a note on regulation of Calvin cycle.

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

a) Outline the biosynthesis of saturated fatty acids.

b) Write a note on 'Role of vitamin A in metabolism'.

c) Discuss the role of eicosanoids as signal molecule.

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Total No. of Questions :8]

SEAT No. :

P1591

[Total No. of Pages :3

[5227] - 301

M.Sc. (Part - 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 (Non Core Credits).***
3) ***All questions carry equal marks.***
4) ***Draw neat labelled - diagrams wherever necessary.***
5) ***Use of logarithmic tables and scientific calculators is allowed.***
6) ***Figures to the right indicate full marks.***

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

a) Explain the role of TCR - CD3 complex in immune activation.

b) Explain JAK/STAT signal transduction pathway.

c) Explain the role of Toll - like receptors in the immune system.

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

a) Explain mechanisms of tolerance induction by giving experimental evidences.

b) Explain cytokine mediated cross regulation of T_H subsets.

c) Explain the role of Biological response modifiers in immune therapy.

P.T.O.

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

a) What are functional assays for cytokines? Explain any two functional assays for cytokines.

b) What are primary cell cultures and cell lines?

c) Explain the use of transgenic animals in immunological research.

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

a) Explain the structure of B cell receptor.

b) Explain regulation of alternative complement pathway.

c) Explain functional assays for phagocytes.

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

a) Explain Immuno - surveillance theory.

b) Explain tumour vaccine therapy with examples.

c) What is the difference between benign and malignant tumours?

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

a) Explain immunotherapeutic approaches to *Salmonella* infections.

b) How does the host immune system respond to *Mycobacterium tuberculosis* infections?

c) Explain the pathophysiology in Herpes simplex infections.

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

a) Describe the symptoms of humoral deficiencies.

b) Explain the mechanisms of symptoms development in Systemic Lupus erythomatosus.

c) Explain the immunotherapeutic approaches for Myasthenia gravis.

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

a) Explain the function of immune system components in invertebrates.

b) Explain how phagocytosis functions evolved in invertebrate species.

c) Describe the diversity of humoral immunity components in the different species of vertebrates.

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Total No. of Questions : 8]

SEAT No. :

P1592

[Total No. of Pages : 2

[5227]-302

M.Sc. - (Part-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 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/scientific calculators is allowed.***
7) ***Assume suitable data if necessary.***

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

a) Explain knock out mice technique with example.

b) Explain yeast three hybrid assay with example.

c) Comment on: DNA Finger printing as a tool in molecular biology.

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

a) Explain negative control in lac operon.

b) Comment on: formation of repression loop in araOperon.

c) Explain defeating of attenuation mechanism in trp operon.

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

a) How capping takes place for mRNA? Why it is important?

b) Explain: siRNA and its applications.

c) Comment on: importance of polyadenylation in mRNA processing.

P.T.O.

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

a) Explain protein foot printing.

b) Write short note on SPO1 infection in *Bacillus*.

c) Comment on: Coordination of mRNA processing.

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

a) How is TnA transposition controlled?

b) Explain significance of Ty elements in Yeast.

c) Explain replicative transposons.

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

a) Explain MALDI technique.

b) Comment on: Importance of proteomics study in Molecular Biology.

c) Write short note on Isoelectric focusing.

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

a) Explain Hot start PCR and its applications.

b) Elaborate Nested PCR and its applications.

c) Write short note on RT-PCR.

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

a) Write applications of microarray techniques.

b) Explain SDS gel electrophoresis in proteomics.

c) Explain non replicative transposons.

Total No. of Questions :8]

SEAT No. :

P1593

[Total No. of Pages : 2

[5227]-303
M.Sc. (Part - II)
MICROBIOLOGY
MB - 703 : Industrial Wastewater Treatment
(2013 Pattern) (Semester - III)

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 indicates full marks.***
6) ***Use of logarithmic tables, electronic pocket calculator is allowed.***
7) ***Assume suitable data, if necessary.***

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

a) What precautions should be taken while selecting and preparing the sample containers?

b) Discuss the need of treating industrial wastewater.

c) Give significance of bacterial indicators in characterizing wastewater.

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

a) Briefly explain the Dissolved Air Flotation system without recycle.

b) Give advantages of natural products used as flocculants.

c) Explain working of continuous sand filters.

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

a) Discuss the chemical methods of disinfection.

b) Describe the process of sludge thickening by centrifugation.

c) Why settling behavior is distinguished on the basis of nature of particle in case of sedimentation.

P.T.O.

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

a) Explain the benefit of combined anaerobic -aerobic process.

b) Discuss the significance of flow equalization.

c) Draw neat and labelled layout of an entire wastewater treatment plant treating dairy waste.

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

a) How to increase efficiency of wastewater treatment in dyestuff and dye manufacturing industry?

b) Discuss the biological treatment methods used to treat dairy wastewater.

c) Enlist the pollution effects of pulp and paper mill wastewater.

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

a) Discuss the impact evaluation process using a suitable example.

b) Justify that baseline characterization is crucial step in EIA.

c) How does mitigation reduce adverse impacts?

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

a) Discuss the methods of fouling control in MBRs.

b) Describe the advantages of RBC.

c) Explain the working of SAFF reactors.

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

a) What are the types of impacts studied under EIA?

b) Explain various strategies used for oil mill food industry effluent treatment.

c) The total daily grit removed from a paper and pulp wastewater treatment plant is 130 gal. If the plant flow is 8.2 MGD, how many cubic feet of grit is removed per million gallons of flow?

Total No. of Questions : 8]

SEAT No. :

P1594

[Total No. of Pages : 2

[5227]-401
M.Sc.
MICROBIOLOGY
MB - 801 : Pharmaceutical & Medical Microbiology
(2013 Pattern) (Credit System) (Semester - IV)

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-labeled diagrams wherever necessary.***
5) ***Use of logarithmic tables/graph papers/scientific calculators is allowed.***
6) ***Figures to the right indicate full marks.***
7) ***Assume suitable data if necessary.***

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

a) What is a "lead" compound? Explain lead discovery and lead optimization.

b) Give principles of extraction of bioactive compound from natural sources.

c) Explain in brief steps in preclinical development of candidate drug.

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

a) Explain E-test for the susceptibility testing of a clinical isolate.

b) Discuss the factors affecting susceptibility testing in liquid media.

c) Define the term "therapeutic ratio" and give its significance.

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

a) Giving suitable examples, explain anchoring mechanisms of bacterial pathogens.

b) Justify, "Extracellular enzymes play an important role in bacterial pathogenesis".

c) Describe assay of bacterial endotoxins.

P.T.O.

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

a) How the bias is avoided in conducting clinical trials?

b) How susceptibility testing of antimycobacterial agents is carried out?

c) Giving suitable examples, explain host cytoskeleton modulation by bacterial pathogens.

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

a) List the drugs targeting protein synthesis in bacteria. Diagrammatically illustrate the mechanism of action for any one.

b) How anti-infectivity activity of a drug can be evaluated by radiometric methods?

c) Explain laboratory methods to study antimicrobial interactions.

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

a) What are the clinical manifestations of adverse drug reactions?

b) Give an account of *in vitro* and *in vivo* drug interactions, when used in combination.

c) What steps are taken to assure safety in microbiology laboratory?

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

a) Explain the regulatory role of FDA for pharmaceutical industry.

b) With suitable examples, explain methods used to prolong drug action.

c) How transgenic animals can be used as source of biopharmaceuticals?

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

a) How bacterial pathogens develop resistance to methicillin?

b) With suitable examples, explain use of microorganisms as weapons of biological warfare".

c) How epidemics of severe acute respiratory syndrome (SARS) are investigated?

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Total No. of Questions : 8]

SEAT No. :

P1595

[Total No. of Pages : 2

[5227]-402

M.Sc. (Part - II)
MICROBIOLOGY
MB - 802 : Molecular Biology - II
(2013 Pattern) (Semester - IV) (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 from5 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/scientific calculators is allowed*
7) *Assume suitable data if necessary*

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

a) Explain SNPs and their role in trade off associated genome variation with example.

b) Explain cost of prolonged life with any one example.

c) Describe Sanger's method of gene sequencing.

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

a) Explain nucleic acid hybridization method for library screening

b) Describe PCR cloning and write its applications

c) What is protein engineering? Write applications of protein engineering with examples

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

a) Describe use of RDT in production of tryptophan

b) Explain use of RDT in L- Ascorbic acid production.

c) Explain synthesis of rubber by using RDT

P.T.O.

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

a) Explain alternative gene expression with example

b) Explain synthesis of peptide antibodies by using RDT

c) Write short note on HAC

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

a) Explain utilization of cellulose for fructose production

b) Explain utilization of starch for alcohol production

c) Explain silage production and its importance

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

a) Explain genome project of Plasmodium and its applications

b) Explain genome project of Mouse and its applications

c) Write short note on Human Genome Project

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

a) Write short note on applications of transgenic animals with examples

b) Comment on gene augmentation

c) Explain gene therapy with example and write its applications

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

a) Comment on gene annotation

b) Write advantages and disadvantages of transgenic plants

c) Write short note on comparative genomics

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Total No. of Questions :8]

SEAT No. :

P1596

[Total No. of Pages :3

[5227] - 403

M.Sc. (Part - 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) Describe the operational aspects of CSTR.

b) Discuss the limitations of fed-batch operation mode.

c) Elucidate the design of immobilized cell reactor with continuous process.

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

a) Discuss the principle, construction and operation of a 'C' Bourdon tube pressure sensor.

b) Explain the use of a sensor to monitor DO.

c) Justify with example 'Mycelial forms of growth affects mass transfer of heat and oxygen' .

P.T.O.

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

a) Write a note on product patent.

b) Describe all the parameters that need to be optimized for Pullulan production.

c) Discuss the process of recovery of Chitinase from fermented medium

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

a) Comment on advantages of batch process.

b) Describe various types of biosensors and their possible use in monitoring process parameters.

c) Describe any two applications of immobilization of microbial cells using gel entrapment method.

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

a) Discuss the concept of death rate.

b) Give detail account of various mechanisms involved in regulation of secondary metabolites.

c) Explain the relationship between yield and productivity

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

a) Write a sort note on advantages of fungi as biocontrol agent.

b) Comment on the limitations of fungi in environmental applications.

c) Discuss the use of fungi in food industry with the help of suitable examples.

Q7) Attempt <u>any two</u>: **[10]**

a) Discuss the advantages of recombinant enzymes.

b) Write a short note on monoclonal antibody produced through animal cell culture technique.

c) Describe the process to produce recombinant restriction endonuclease using animal cell culture.

Q8) Attempt <u>any two</u>: **[10]**

a) Comment about the validation characteristics of analytical procedure.

b) Discuss the format of SOP.

c) Write a note on Process validation.

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