Total No. of Questions : 7]

SEAT No. :

PC3834

[Total No. of Pages : 2

[6340]-101
M.Sc. - I
MICROBIOLOGY
MBCT-111 : Microbial Systematics
(2019 Pattern) (Semester-I)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five questions from question 2 to question 7.***
3) ***Question 2 to question 7 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat-labelled diagram wherever necessary.***
6) ***Use of logarithmic tables and scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

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

a) Give fullform of RAPD & state one application.

b) Define 'species' in prokanyotes.

c) Name 5 kingdoms with one example of each.

d) Define selfish genes.

e) What is Darwinism?

f) What is kin selection?

Q2) Attempt the following:

a) Explain marphological, metabolic, structural, ecological facets of microbial diversity. **[7]**

b) Explain host parasite coevolution. **[5]**

P.T.O.

Q3) Attempt the following:

a) Define 'molecular chronometer' and explain significance of 16 S & RNA gene in molecular clock. **[7]**

b) From the given data calculate the Shannan diversity index for the river water sample. Total number of colonies are 184×10^7. **[5]**

Sr.No.	Type of Colonies	Number of Colonies
1.	Pinpoint colonies	60
2.	Pigmented colonies	71
3.	Colonies larger than 1mm	83

Q4) Attempt the following:

a) Define species divergence and write a note on estimation of total number of species. **[7]**

b) Explain in brief concept of speciation in asexual organism. **[5]**

Q5) Attempt the following:

a) Explain concept of metagenome analysis and add note on extraction of total DNA from habitat. **[7]**

b) Write a note on 'Game theory'. **[5]**

Q6) Attempt the following:

a) Explain culture dependant strategies for caltivating the unculturable bacteria. **[7]**

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

Q7) Write short notes on (Any two) **[12]**

a) 3-domain classification system.

b) Alpha and beta diversity.

c) DGGE technique in molecular biology.

Total No. of Questions : 7]

SEAT No. : ____

PC3835

[Total No. of Pages : 3

[6340]-102

M.Sc. - I

MICROBIOLOGY

MBCT-112 : Quantitative Biology

(2019 Pattern) (Semester - I)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***
4) ***Figures to the right indicat full marks.***
5) ***Draw neat lablled daigrams wherever necessary.***
6) ***Use of scientific calculators, logarithmic and statistical tables is allowed.***

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

a) What is standard deviation?

b) Enlist different types of the data and explain any two.

c) What is type-II error?

d) Explain the types of variables.

e) Calculate the median from following data : 10, 18, 17, 19, 10, 15, 11, 17, 12.

f) Represent the following data by means of multiple bar diagram.

Treatment	Morphological variations		
	Colour	Flower	Leaf
T_1	30	70	18
T_2	25	60	10

Q2) Attempt the following :

a) Mean soil temperature and germination days of wheat of 10 place are recorded. Determine the regression coefficient. **[7]**

Mean Soil Temperature (°C)	38	42	45	42	44	40	46	44	43	40
Germination Days	21	29	27	27	19	18	19	31	29	33

b) Write a note on : Null hypothesis. **[5]**

P.T.O.

Q3) Attempt the following :

a) A complaint was registered starting that boys in the municipal school were underfed. Average weight of boys of age 10 is 32 kg, with standard deviation 9 kg. A sample of 25 boys were selected from municipal school and average was found to be 29.5 kg. At alpha (0.05) we need to check whether this complaint is true or not by applying Z test. **[7]**

b) Explain one tailed and two tailed test. **[5]**

Q4) Attempt the following :

a) In a mutation breeding experiment, the effect of gamma rays on weight of 10 seeds in grams, per plant of bean variety were given. Analyze the data using t test. **[7]**

Control : 2.9, 3.1, 3.5, 3.4, 3.0, 4.0, 3.7, 3.0, 4.0, 4.0

Test : 2.7, 2.8, 3.0, 3.5, 3.7, 3.2, 3.0, 3.0, 2.9, 2.8

b) From a pack of 52 cards, one card is drawn at random. What is the probability that it is king or queen or heart? **[5]**

Q5) Attempt the following :

a) In F2 generation, Mandel obtained 621 tall and 187 dwarf plants. suggest using chi-square test, whether this ratio are in accordance with the Mandel monohybrid ratio or they deviate from this ratio. **[7]**

b) What is the probability of getting either ace or spade from pack of 52 cards. **[5]**

Q6) Attempt the following :

a) Nephropathy was observed in 100 patients of four classes of diabetes as per sevenity of the disease.

Class	I	II	III	IV
Number of patients	8	15	14	7

Is this difference is due to chance? Test by Chi square test. **[7]**

b) Five persons with their profile are as follows : **[5]**

Sex	Age
Male	40
Male	43
Female	38
Female	27
Male	65

If Chairman have to be selected from this, what is the probability of that it would be female of person over 30 years?

Q7) Attempt any two of the following : **[12]**

a) In a town, 10 accidents take place in 50 days. Find out the probability of at least 3 accidents in a day.

b) Assume the mean height of the Sorghum variety to be 68.22 inch with a variance of 10.8 inch. How many varieties in a field of 100 would you expect over 6 feet?

c) Write a note on : Degree of freedom and Test of significance.

Total No. of Questions : 7]

SEAT No. :

PC3836

[Total No. of Pages : 2

[6340]-103

M.Sc. -I

MICROBIOLOGY

MBCT - 113 : Biochemistry and Metabolism

(2019 Pattern) (Semester - I) (MB-503)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q.1. is compulsory.***
2) ***Solve any Five questions from Q. No. 2. to Q. No. 7.***
3) ***Q. 2 to Q. 7 carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic tables & scientific calculator is allowed.***

Q1) Answer of the following. **[10]**

a) Name two branched amino acids.

b) Write an example of cation and anion exchanger used in Ion-exchange chromatography.

c) What are the main Functions of MPF (any two) in development?

d) Define exocytosis with example.

e) Draw Cis/Trans isomer of peptide group.

Q2) Attempt the following : **[12]**

a) Explain super secondary structures of proteins. **[7]**

b) Draw structure of aspartic aud. Determine net charge of aspartic and at pH=1, pH=3, pH=6 and pH=11 **[5]**

P.T.O.

Q3) Attempt the following : **[12]**

a) Explain Principle and application of Hot-start PCR. **[7]**

b) Predict the order of elution when a mixture containing the following compounds are passed through a column containing a gel that excludes all proteins of MW 200,000 and higher : cytochrome C (MW=13,000) tryptophan synthetase (MW=117,000), hexokinase (MW=96000), ATP Sulfurylase (MW=440,000), glucose oxidase (MW=154000) and xanthine oxidase (MW=300,000) **[5]**

Q4) Attempt the following : **[12]**

a) Explain different modes of specification in developmental Biology. **[7]**

b) Describe floral development in Arabidopsis. **[5]**

Q5) Attempt the following : **[12]**

a) Describe structure and functions of Microtubule. **[7]**

b) Explain events in cell cycle. **[5]**

Q6) Attempt the following : **[12]**

a) Explain Maxam-Gilbert Method of DNA sequencing. **[7]**

b) Explain anyone N-terminal determination method of protein sequencing. **[5]**

Q7) Attempt the following (any two) : **[12]**

a) Explain different types of differentiations with examples. **[6]**

b) Explain Apoptosis with examples. **[6]**

c) Explain Retrieval of E.R resident protein from Cis Golgi.

Total No. of Questions : 5]

SEAT No. :

PC3837

[Total No. of Pages : 2

[6340]-104
M.Sc.-I
MICROBIOLOGY
MBET - 115 : Fungal Systematics and Extremophiles
(2019 Pattern) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three question from Q.2 to Q.5.***
3) ***Question No.2 to Question No.5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) Answer of the following. **[5]**

a) Give two examples of fungi belonging to zygomycetes.

b) What are alkalophiles?

c) Define Halophiles.

d) Write two examples of fungi belonging to Basidio-Mycetes.

e) Write two cellular Adaptive mechanisms observed in Acidopiles.

Q2) Attempt the following.

a) How do psychrophiles maintain membrane fluidity? **[6]**

b) Write a note on Life cycle of phycomycetes? **[4]**

P.T.O.

Q3) Attempt the following.

a) Write a note on sexual Reproduction in Ascomycetes with suitable Diagram. **[6]**

b) Write a note on Enrichment and isolation of methanogens. **[4]**

Q4) Attempt the following.

a) Explain different kinds of Sexual spores found in different classes of fungi. **[6]**

b) Write a note on fungal cell wall composition. **[4]**

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

a) Explain Adaptation mechanism of Extremophiles.

b) Diagrammatically represent- sexual Reproductions in Ascomycetes.

c) Explain in detail Biotechnological Application of Extremophiles.

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Total No. of Questions : 5]

SEAT No. : ____

PC3838

[Total No. of Pages : 2

[6340]-105
M.Sc.-I
MICROBIOLOGY
MBET - 116 : Experimental Design and Quantitative Approaches for Biologists
(2019 Pattern) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three question from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessory.***

Q1) Attempt any five of the following. **[5]**

a) A heterogenous population is divided into _____ .

b) If a population contain infinite number of members, it is celled _____ .

c) Cross- sectional studies is the simplest form of an _____ study.

d) Enlist three tools of disease measurement in epidemiology.

e) Case control and cohort studies are _____ type of epidemiological studies.

f) $\sqrt{2}$, $\sqrt{3}$, π etc are called _____ numbers.

Q2) Attempt the following.

a) Describe the case control study with one clinical example. **[6]**

b) Find the equation of the circle with its centre at (1,2) and its radius equals to 3. **[4]**

P.T.O.

Q3) Attempt the following.

a) Explain the term sampling. Why sampling phenomenon is important in Biostatistics. **[6]**

b) $F(x) = 4x^3 - 7x^2 + 4$. find the value of F when $x = 1$, $x = 2$ & $x = 3$. **[4]**

Q4) Attempt the following.

a) Describe placket Burman's design for media optimisation. **[6]**

b) If Bacillus stereothermophilus containing.

1×10^{10} cfu/ml is heated at 121ºC for 15 minutes. How many bacteria will remain at the end of 10 minutes **[4]**

Q5) Write a short notes on any two of the following. **[10]**

a) DOE in agriculture.

b) Graphs in data presentation.

c) Linear and non-linear models.

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Total No. of Questions : 5]

SEAT No. : ____

PC3839

[Total No. of Pages : 2

[6340]-106
M.Sc.-I
MICROBIOLOGY
MBET - 117 : Microbial Communication Membrane Transport and Signal Transduction
(2019 Pattern) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following. **[5]**

a) Which signaling molecules is crucial for quorum sensing in Dictyostelium discoideum?

b) What is the role of CAMP in Dictyostelium discoideum?

c) What unique structure do myxobacteria form during life cycle?

d) Which signal disperse biofilms?

e) What is quorum quenching?

f) Which part of a phospholipid is hydrophobic?

Q2) Attempt the following.

a) Describe the life cycle of myxobacteria highlighting the molecular mechanisms of quorum sensing involved in their co-ordination and social behavior. **[6]**

b) Explain the difference between primary and secondary active transport with examples? **[4]**

P.T.O.

Q3) Attempt the following.

a) Describe the bacterial two component signal transduction system? How does it regulates bacterial behaviour such as chemotaxis?Include the role of messengers. **[6]**

b) Describe the role of the bacterial two-component signalling system in environmental sensing. **[4]**

Q4) Attempt the following.

a) What are gated ion channels? Explain with suitable example. **[6]**

b) What are liposomes and how are they used as model membranes in research. **[4]**

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

a) What is the function of extracellular polymeric substances (EPS) in biofilm formation and maintenance.

b) Explain the different types of solute transport across membrane's including passive diffusion facilitated transport and active transport.

c) Describe how biofilms contribute to antibiotic resistance in pathogenic bactereia.

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Total No. of Questions :7]

SEAT No. : ____

PC3840

[Total No. of Pages :2

[6340]-201

M.Sc.-I

MICROBIOLOGY

MBCT 121:Instrumentation and molecular biophysics

(2019 Pattern) (Semester- II)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Q.1 is compulsory .***
2) ***Solve any five question from question 2 to question 7.***
3) ***Question 2 to question 7 carry equal marks.***
4) ***Figure to the right side indicate full marks .***
5) ***Draw neat labelled diagram wherever necessary.***
6) ***Use of lagarithmic tables and scintific calculators is allowed***
7) ***Assume suitable data if necessary.***

Q1) Attempt any five . **[10]**

a) Enlist detectors for gas chromatography .

b) What is quenching?

c) Enlist different methods of protein crystallisation .

d) Name any two mass analysers used in mass spectroscopy.

e) Define with example -Dialysis.

f) Define chemical shift in NMR spectroscopy.

Q2) Attempt the following.

a) Describe instrumentation ,working and application of HPLC. **[7]**

b) Describe pulse field gel electrophoresis in detail. **[5]**

Q3) Attempt the following :

a) Explain principle , instrumentation and working of infrared spectroscopy **[7]**

b) If a solution containing ATP is found to have an absorbance of 0.17 in a 1cm cuvette and the molar extinction coefficient is $1.54\times10^{4}(\text{mol dm}^{-3})^{-1}$ cm,what is the concentration of ATP solution. **[5]**

P.T.O.

Q4) Attempt the following.

a) Explain basic principle and working of NMR instrument with suitable diagram. **[7]**

b) Give applications of radio tracer technique in biology **[5]**

Q5) Attempt the following **.**

a) Explain spin -spin relaxation parameter in NMR **[7]**

b) Write short note on -FRET **[5]**

Q6) Attempt the following .

a) Explain mass spectroscopy in detail **[7]**

b) Write a short note on confocal microscope **[5]**

Q7) write short notes on any two of the following . **[12]**

a) Iso electric focusing

b) Batho cromic shift and hypocromic shift

c) Ewald sphere

Total No. of Questions : 7]

SEAT No. :

PC3841

[Total No. of Pages : 2

[6340]-202

M.Sc. - I

MICROBIOLOGY

MBCT-122 : Molecular Biology

(2019 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any 5 questions from Q.2 to Q.7.***
3) ***Q.2 to Q.7 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Assume suitable data, if necessary.***
7) ***Use of scientific calculators is allowed.***

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

a) What is mean by RNA splicing?

b) Comment on use of T4 DNA polymerase.

c) Give applications of knockout mice.

d) Write the significance of siRNA.

e) Write the importance of Ti based vector.

f) What are the applications of genome project.

Q2) Attempt the following :

a) Explain RNA processing by spliceosome and autosplicing. **[7]**

b) Describe how bacteriophages can be used as vectors. **[5]**

Q3) Attempt the following :

a) What are expression vectors? Explain significance of expression vectors with suitable examples. **[7]**

b) Write the techniques used to find out the presence of a DNA fragment directly in the colony. **[5]**

P.T.O.

Q4) Attempt the following :

a) Describe whole genome shotgun sequencing method in detail. **[7]**

b) Explain salient features of human genome project. **[5]**

Q5) Attempt the following :

a) Describe the techniques used for detection of polygenic diseases in detail. **[7]**

b) As a part of undergraduate project, a student was attempting to construct a restriction map of the plasmid PVC 23 using restriction enzymes EcoRI and BamHI, after carrying out both single and double enzyme digest reactions, following fragments were obtained. **[5]**

Enzyme(s)	Fragment length obtained
EcoRI	20kb
BamHI	11kb, 6kb, 3kb
EcoRI + BamHI	8kb, 6kb, 3kb(2)

From the information, construct a restriction map of PVC 23.

Q6) Attempt the following :

a) Describe protein tagging and protein purification in detail. **[7]**

b) Explain applications of restriction edonucleases. **[5]**

Q7) Write a short note on any two of the following : **[12]**

a) Expressed sequence tag.

b) Gene Library.

c) Role of mi RNA in cancer.

Total No. of Questions : 7]

SEAT No. :

PC3842

[Total No. of Pages : 2

[6340]-203
M.Sc. - I
MICROBIOLOGY
MBCT 123 : Enzymology, Bioenergetics & Metabolism
(2019 Pattern) (Semester-II)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five questions from question 2 to question 7.***
3) ***Question 2 to question 7 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw a neat-labelled diagrams wherever necessary.***
6) ***Use of logarithmic tables and scientific calculator is allowed.***
7) ***Assume suitable data necessary.***

Q1) Attempt any five. **[10]**

a) Define Enthalpy and entropy.

b) Write any two examples of polysaccharides.

c) What is reducing surgar?

d) Write any two examples of saturated fatty acids.

e) Give significance of sphingolipids.

f) What are sugar epimers?

Q2) Attempt the following:

a) Describe gluconeogenesis process in detail. **[7]**

b) Explain importance of allosteric enzymes in regulation. **[5]**

Q3) Attempt the following:

a) Explain synthesis of triacylogtycerols in detail. **[7]**

b) Describe regulation of Hydrolysis process. **[5]**

P.T.O.

Q4) Attempt the following:

a) Explain kinetics of uncompetitive inhibitors in detail. **[7]**

b) Describe Nemethy and Filmer model of allostecic enzymes. **[5]**

Q5) Attempt the following:

a) Explain structure and function of sphingolipids. **[7]**

b) Describe TCA cycle. **[5]**

Q6) Attempt the following:

a) Explain regulation of glycogen synthesis in detail. **[7]**

b) Describe metabolic flux and its significance. **[5]**

Q7) Write short notes on any two of the following: **[12]**

a) Sugar derivatives

b) Fats in animals

c) Degradation of unsaturated fatty acid.

Total No. of Questions : 5]

SEAT No. :

PC3843

[Total No. of Pages : 2

[6340]-204
M.Sc. - I
MICROBIOLOGY
MBET-125 : Bioinformatics and Bio-nano Technology
(2019 Pattern) (Semester-II)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from question 2 to question 5.***
3) ***Question 2 to question 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw a neat-labelled diagrams wherever necessary.***

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

a) Define bioinformatics.

b) Name two imaging techniques used for nanoparticle characterization.

c) What is phylogenetic analysis?

d) Define biological databases.

e) List two algorithms used for sequence alignment.

f) What is the principle of working of SEM?

Q2) Attempt the following:

a) Differentiate between local and global sequence alignment. Name the algorithms used for these alignment methods. **[6]**

b) Justify : Homology modelling can be used for protein structure prediction. **[4]**

Q3) Attempt the following:

a) Comment on the use of atomic force microscopy in nanoparticle characterization. **[6]**

b) Justify : Magnetotactic bacteria can be used for synthesizing nanoparticles. **[4]**

P.T.O.

Q4) Attempt the following:

a) What are biogenic nanoparticles? Enlist their applications. **[6]**

b) Describe the OMIM database used in bioinformatics. **[4]**

Q5) Write short notes on any two of the following: **[10]**

a) Data mining tools and their applications

b) Scanning probe microscopy

c) Gen Bank bioinformatics database

Total No. of Questions : 5]

SEAT No. :

PC3844

[Total No. of Pages : 2

[6340]-205

M.Sc. I

MICROBIOLOGY

MBET -126 : Molecular Biology Tools and Applications

(2019 Pattern) (Semester-II)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from question 2 to question 5.***
3) ***Question 2 to question 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw a neat-labelled diagrams wherever necessary.***

Q1) Attempt any five of the following. **[5]**

a) What are polypeptide antibiotics?

b) What is genome microarray?

c) Define biopolymer

d) What is foot print?

e) What are monoclonal antibodies?

f) Write applications of yeast two hybrid system.

Q2) Attempt the following:

a) Explain FISH technique and give its applications. **[6]**

b) Describe in detail synthesis of ascorbic acid. **[4]**

Q3) Attempt the following:

a) Write a note on Polyhydroxyalkonates. **[6]**

b) Explain in detail DNA microarray technique. **[4]**

P.T.O.

Q4) Answer the following:

a) Elaborate on CRISPR-CAS system & give its applications. **[6]**

b) Explain filter binding Assay. **[4]**

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

a) Give an account of SLOT blot.

b) Explain Xanthan gum synthesis using bacteria.

c) Explain how monoclonal antibodies are used in cancer therapy.

Total No. of Questions : 5]

SEAT No. :

PC3845

[Total No. of Pages : 2

[6340]-206

M.Sc. I

MICROBIOLOGY

MBET-127 : Nitrogen Metabolism, Respiration and Photosynthesis

(2019 Pattern) (Semester-II)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from question 2 to question 5.***
3) ***Question 2 to question 5 carry equal marks.***
4) ***Figures to the right side indicate full marks.***
5) ***Draw a neat-labelled diagrams wherever necessary.***

Q1) Solve any five of the following. **[5]**

a) Explain two features of CAM plants.

b) Give two features of C3 plants.

c) Gvie the importance of nitrogen fixing bacteria to the plants.

d) What are the five families of amino acids?

e) What is photosystem I in photosynthesis?

f) Give the properties of glutamines synthetase.

Q2) Attempt the following:

a) Explain the organization of Photosystem II. **[6]**

b) Explain the regulaion of glutamine synthetase. **[4]**

Q3) Attempt the following:

a) Explain the biosynthesis of histidine aminoacid. **[6]**

b) Write note on CAM plants. **[4]**

P.T.O.

Q4) Attempt the following:

a) Explain the biosynthesis of any two families of aminoacids. **[6]**

b) Write note on anaerobic respiration. **[4]**

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

a) Write note on Crassulacean Acid metabolism.

b) Write note on significance of photorespiration.

c) Write note on sulphur oxidising bacteria.

Total No. of Questions : 7]

SEAT No. :

PC3846

[Total No. of Pages : 2

[6340]-301
M.Sc. - II
MICROBIOLOGY
MBCT-231 : Immunology
(2019 Pattern) (Semester-III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five questions from question 2 to question 7.***
3) ***Question 2 to question 7 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw a neat-labelled diagrams wherever necessary.***
6) ***Use of logarithmic tables and scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

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

a) Enlist the types of Cytokine receptor.

b) What are transgenic animals?

c) What are biological response modifiers?

d) Define functional assays.

e) Enlist the characteristics of Hodgkin's lymphoma.

f) What is signal transduction?

Q2) Attempt the following:

a) Discuss the Toll-like receptors in details. **[7]**

b) Write a note on regulation of immune response by an antigen. **[5]**

Q3) Attempt the following:

a) Explain the TCR-CD3 activation pathway. **[7]**

b) Discuss the cytokine mediated cross regulation of T_H subsets. **[5]**

P.T.O.

Q4) Attempt the following:

a) Discuss the quantification of cytokines using ELISPOT assay. **[7]**

b) Explain the concept of immunotolerance. **[5]**

Q5) Attempt the following:

a) Explain how is the classical pathway of complement activation regulated by the immune system. **[7]**

b) Write a note on the diagnosis of cancer using tumour markers. **[5]**

Q6) Attempt the following:

a) Discuss the use of animal models in AIDS. **[7]**

b) Write a note on cellular transformations occurring during the neoplastic growth. **[5]**

Q7) Attempt any two of the following: **[12]**

a) Explain the cell growth assay for cytokine.

b) Discuss the immune network theory.

c) Explain the B-cell receptor with a neat and well labelled diagram.

Total No. of Questions : 7]

SEAT No. : ____

PC3847

[Total No. of Pages : 2

[6340]-302

S.Y. M.Sc.

MICROBIOLOGY

MBCT-232 : Molecular Biology - II

(2019 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***
4) ***Draw neat lablled diagrams wherever necessary.***
5) ***Figures to the right indicat full marks.***
6) ***Use of logarithmic table and scientific calculator is allowed.***
7) ***Assume suitable data wherever necessary.***

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

a) Define gene aging.

b) Give 2 examples of SNP in Eukaryotes.

c) Write any 2 applications of studying genome project.

d) What is genetic trade off mechanism?

e) Define epigenetics and give any one example.

f) Give 2 examples of yeast transposes.

Q2) Attempt the following :

a) What is gene augmentation? Give its applications in disease diagnosis. **[7]**

b) What are social and ethical issues of genetically modified organisms. **[5]**

Q3) Attempt the following :

a) Explain the concept of proteomics with special reference to analysis and characterisation of protein. **[7]**

b) What is global biochemical Network in metaboloimics. **[5]**

P.T.O.

Q4) Attempt the following :

a) What is the significance of alternative gene expression in many proteins forming from one gene. **[7]**

b) How does genomic variation affect gene aging. **[5]**

Q5) Attempt the following :

a) What are replicative and non-replicative transposes. **[7]**

b) What are the disadvantages of transgenic plants and animals. **[5]**

Q6) Attempt the following :

a) What are the characteristics of transposes in drosophila? **[7]**

b) What are the methods to date of SNP. **[5]**

Q7) Write a short note on any 2: **[12]**

a) Tu 10

b) LINES

c) ALU element

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Total No. of Questions : 7]

SEAT No. :

PC3848

[Total No. of Pages : 2

[6340]-303
M.Sc. - II
MICROBIOLOGY
MBCT-233: Clinical Microbiology
(2019 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Question 2 to 7 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use to logarithmic tables/scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

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

a) Which are determinants of microbial pathogenicity?

b) Give Characteristics of bacterial endotoxins with example.

c) Enlist the methods for detection of Mycobacterium tuberculosis.

d) Enlist the morphological forms of Giardia lamblia.

e) HIV is called as Retrovirus. Justify?

f) What is Ghon complex?

Q2) Attempt the following.

a) Describe the mechanism for Cytoskeletal Modulation of host cell. **[7]**

b) Explain disease prediction epidemiological model of Covid 19. **[5]**

Q3) Attempt the following.

a) Write a note on treatment used for HIV AIDS and Describe preventive measures for it. **[7]**

b) Describe general characters of Acinetobacter boumanii. **[5]**

P.T.O.

Q4) Attempt the following.

a) Discuss pathogenicity is land, with suitable example. **[7]**

b) Describe the mechanism of granuloma formation in latent phase of tuberculosis. **[5]**

Q5) Attempt the following.

a) Explain the general characters and prophylaxis of Aspergillus flavus. **[7]**

b) Describe pathophysiology of Ebola virus. **[5]**

Q6) Attempt the following.

a) Describe morphology and detailed life cycle of Ascaris lumbricoides **[7]**

b) Give general steps for safe disposal of infectious material? **[5]**

Q7) Write short notes on any two. **[12]**

a) Phagocytosis.

b) Susceptible infectious recovered (SIR) Model.

c) Structure of Hepatitis B Virus.

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Total No. of Questions : 5]

SEAT No. :

PC3849

[Total No. of Pages : 2

[6340]-304
M.Sc.-II
MICROBIOLOGY
MBET - 235 : Cell Culture Techniques
(2019 Pattern) (Semester - III)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic tables & scientific calculators is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Attempt any five of the following. **[5]**

a) What are secondary cultures?

b) Explain passaging of cell.

c) What are Monolayer Cultures.

d) Give two examples of plant derived immunomodulators.

e) What is the role of serum in the animal cell culture medium?

f) Define! Trypsinisation.

Q2) Attempt the following.

a) What are cell culture system? Write their applications. **[6]**

b) What is the use of trypsinisation process in the cell culture technique.**[4]**

P.T.O.

Q3) Attempt the following.

a) How can the transformed cells be distinguished from normal cells? **[6]**

b) How does the pH and temperature affect the growth of cells in animal cell culture. **[4]**

Q4) Attempt the following.

a) Explain primary lymphoid cell culture & Give their applications. **[6]**

b) What are characteristics of continous cell cultures? **[4]**

Q5) Write a short notes on any two of the following. **[10]**

a) Cell lines

b) Hybrid lymphoid cell lines.

c) Role of immunomodulators

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Total No. of Questions : 5]

SEAT No. :

PC3850

[Total No. of Pages : 2

[6340]-305
M.Sc.-II
MICROBIOLOGY
MBET - 236 : Bioremediation and Biomass Utilization
(2019 Pattern) (Semester - III)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***
4) ***Fighres to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt any five of the following. **[5]**

a) What is mean by natural bioremediation?

b) Which dye is used for screening of cellulase producers?

c) Give names of the enzymes involved in fructose production?

d) Enlist types of bioremediation.

e) Enlist components of lignocellulose.

f) Draw structure of napthalene.

Q2) Attempt the following.

a) n-Octane degradation pathway. **[6]**

b) Explain creation of superbug. **[4]**

P.T.O.

Q3) Attempt the following.

a) How zymomonas genetically engineered to improve alcohol production using pentoses? **[6]**

b) How silage production is improvised by gene manipulation? **[4]**

Q4) Attempt the following.

a) With the help of suitable example discuss gene alteration for effective bioremediation. **[6]**

b) Explain process of isolation eukaryotic cellulase genes. **[4]**

Q5) Write short notes on any two of the following. **[10]**

a) Importance of cell surface expressed enzymes for bioremediation.

b) Factors affecting biodegradation of xenobiotics.

c) Improvization of transcription of yeast to increase yield of alcohol.

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Total No. of Questions : 5]

SEAT No. :

PC3851

[Total No. of Pages : 2

[6340]-306
M.Sc.-II
MICROBIOLOGY
MBET - 237 : Microbial Virus Technology
(2019 Pattern) (Semester - III)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to right indicate full marks.***

Q1) Solve any five of the following. **[5]**

a) Give two examples of mycroviruses.

b) Define : EOP.

c) What is latent period in one step growth curve?

d) What is lytic cycle?

e) Name the media used in virus isolation.

f) Enlists the isolation methods of bacteriophages.

Q2) Attempt the following.

a) Discuss use of phage as biocontrol of biofilms on medical devices. **[6]**

b) Comment on occurance and taxonomy of mycoviruses. **[4]**

P.T.O.

Q3) Attempt the following.

a) Describe the different methods for isolation of bacteriophages from river sample. **[6]**

b) Comment on mycoviruses as biocontrol agent against Fungal plant pathogen. **[4]**

Q4) Attempt the following.

a) Explain one step growth curve of bacteriophages. **[6]**

b) Comment on use of bacteriophages. **[4]**

Q5) Write a short notes on any two: **[10]**

a) Bacteriophages as biocontrol agent in poultry.

b) Phage typing.

c) Eclipse period.

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Total No. of Questions :7]

SEAT No. : ____

PC3852

[Total No. of Pages :2

[6340]-401

M.Sc. (Part-II)

MICRO BIOLOGY

MBCT241: Pharmaceutical Microbiology

(2019 Pattern) (Semester- IV)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question 1 is compulsory .***
2) ***Solve any 5 questions from Q2 to Q7.***
3) ***Question 2 to 7 carry equal marks.***
4) ***Draw neat tabelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following **[10]**

a) Define a lead compound.

b) Write the principle of Ame's test.

c) Give examples of any 2 drugs targetting protein synthesis.

d) What is the role of protein crystallography in drug designing ?

e) Define "Pharmacovigillance".

f) What is the significance of clinical phase triab II.

Q2) Attempt the following. **[7]**

a) How do the drug molecules pass through the biological barriers in human body?

b) What is the regulatlory role of FDA in pharma ceuticals. **[5]**

Q3) Attempt the following .

a) Explain the formulation of pharmaceutical preparation as per IP with any example . **[7]**

b) What are the factors affecting drug absorption **.** **[5]**

P.T.O.

Q4) Attempt the following.

a) "Drug biotrans formation is a vital step in drug elimination'' explain.With example. **[7]**

b) What is ligand based reaptor based drug design process. **[5]**

Q5) Attempt the following.

a) Explain the steps involved in lead optimisation. **[7]**

b) What are the advantage of pharmacopia? **[5]**

Q6) Attempt the following :

a) What are the various factors affecting drug distribution? **[7]**

b) What is the first pass effect of a drug. **[5]**

Q7) Write short notes on any 2 of following. **[12]**

a) HITS.

b) Computer assisted Drug Design.

c) Toxic metabolites of drugs .

Total No. of Questions : 7]

SEAT No. : [ ]

PC3853

[Total No. of Pages : 2

[6340]-402
M.Sc. - II
MICROBIOLOGY
MBCT-242: Microbial Technology
(2019 Pattern) (Semester - IV)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Q.2 to Q.7 carry equal marks.***
4) ***Draw neat and well labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarthmic table / scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Solve any five of the following. **[10]**

a) Define crit.

b) What is power number?

c) Define cell immobilization.

d) What is IPR?

e) What are validation protocols?

f) Draw a schematic diagram for air-lift bioreactor.

Q2) Attempt the following.

a) What is volumetric mass transfer coefficient? Explain how is it determined by using gas out-gas in method. **[7]**

b) What is Reynolds number? Explain how does it affect the flow pattern. **[5]**

Q3) Attempt the following.

a) Write a note on upstream processing of Rifamycin. **[7]**

b) Explain the aeration process in a bioreactor where the cells used are sensitive to shear stress. **[5]**

P.T.O.

Q4) Attempt the following.

a) What is biosensor? Explain its role in environmental monitoring. **[7]**

b) Draw a flow chart for downstream processing of pullulan. **[5]**

Q5) Attempt the following.

a) What is SOP? Describe in detail the steps involved in SOP preparation. **[7]**

b) Write a note on applications of fungi in agricultural sector. **[5]**

Q6) Attempt the following.

a) For any aerobic process the oxygen transfer rate should be maintained higher than oxygen uptake rate, Justify the statement. **[7]**

b) Explain the concept of ISO certification. **[5]**

Q7) Attempt any two of the following. **[12]**

a) Explain fedbatch reactor.

b) What is Newtonian fluid? Explain it's relevance in a bioreactor.

c) Write a note on bioconversion.

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Total No. of Questions : 5]

SEAT No. :

PC3854

[Total No. of Pages : 2

[6340]-403

S.Y. M.Sc.

MICROBIOLOGY

MBET - 244 : Quality Assurance and Validation in Pharmaceutical Industry and Development of Anti-infectives

(2019 Pattern) (Semester - IV)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic tables and scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Attempt any five of the following. **[5]**

a) What is the objective of conducting teratogenicity testing of the drug.

b) Write the importance of ISO certification for pharmaceutical industry.

c) Define therapeutic ratio.

d) Write two examples of anti - viral agents

e) Write the principle of Kirby - bauer disc diffusion method.

f) What is quality assurance in pharmaceutical industry.

Q2) Attempt the following.

a) Describe the E - test. Write its advantages. **[6]**

b) Explain the good laboratory practices in pharmaceutical industry. **[4]**

Q3) Attempt the following.

a) Describe the susceptibility testing for antifungal agents. **[6]**

b) Explain why it is important to determine the MIC of an anti infective. **[4]**

P.T.O.

Q4) Attempt the following.

a) Describe the method for carrying out caracinogenicity testing of a drug. **[6]**

b) What is the role of WHO certification in pharmaceutical industry. **[4]**

Q5) Write short notes on any two of the following. **[10]**

a) Pyrogenicity testing of a drug

b) Stokes method

c) CLSI guidelines

Total No. of Questions : 5]

SEAT No. :

PC3855

[Total No. of Pages : 2

[6340]-404

M.Sc. II

MICROBIOLOGY

MBET 245 : Advances in Microbial Technology

(2019 Pattern) (Semester-IV)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from question 2 to question 5.***
3) ***Draw a neat diagrams wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic table/ scientific calculator is allowed.***
6) ***Question 2 to question 5 carry equal marks.***
7) ***Assume suitable data if neccessary.***

Q1) Attempt any five of the following. **[5]**

a) What is meant by primary growth metabolites?

b) Define growth kinetics.

c) What is microbial growth efficiency?

d) Define recombinant vaccine.

e) Which type of insulin is produced by genetically engineered bacteria?

f) Name any two DNA vectors used in gene therapy.

Q2) Attempt the following:

a) Describe production of HIV vaccine with suitable diagram. **[6]**

b) Explain effect of mycelia filamentous form on yield of the product. **[4]**

Q3) Attempt the following:

a) Explain production of reestriction endonucleases with suitable example. **[6]**

b) Write the applications of lipases **[4]**

P.T.O.

Q4) Attempt the following:

a) Explain steps in production of monoclonal antibody. **[6]**

b) Write limitations of gene therapy. **[4]**

Q5) Write a short note on any two of the following: **[10]**

a) Effect of shearing of cells on cell proliferation.

b) Nucleic acid based products.

c) HBV recombinant vaccine.

Total No. of Questions : 5]

SEAT No. :

PC-3856

[Total No. of Pages : 2

[6340] - 405
M.Sc.-II
MICROBIOLOGY
MBET-246: Industrial Waste Water Treatment and Industrial Production of Vaccines
(2019 Pattern) (Semester - IV) (CBCS) (Revised)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q. 2 to Q. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary***
5) ***Figures to the right side indicate full marks.***

Q1) **Solve any 5 of the following :** **[5]**

a) What is the significance of determining BoD.

b) Define: First generation vaccine. Give one example.

c) Give two examples of excipients in vaccine Production.

d) Name the disinfectants used in disposal of effluent of paper & Pulp industry.

e) Why BCG vaccine is first generation vaccine.

f) What is F/M ratio in inactivated sludge treatment?

Q2) **Attempt the following** :

a) Describe the large scale production of Hepatitis - B Vaccines. **[6]**

b) Justify: MBBR is most effective & efficient waste water treatment system. **[4]**

P.T.O.

Q3) **Attempt the following :**

a) Explain the role of DNA Vaccines in viral therapeutics. **[6]**

b) What are adjuvants. Explain their role in formulating Vaccine with examples. **[4]**

Q4) **Attempt the following :**

a) Describe the process of flow equilization. Give it's advantages in wastewater treatment. **[6]**

b) The BoD entering a wastewater treatment pond is 194 mg/L. If the BoD in the pond effluent is 45mg/L. What is the BoD Removal efficiency of the Pond. **[4]**

Q5) **Write note on any two :** **[10]**

a) Activated sludge process

b) Next generation vaccines

c) Idiotype vaccines.

Total No. of Questions : 5]

SEAT No. : ____

PC3857

[Total No. of Pages : 2

[6340]-406
M.Sc.- II
MICROBIOLOGY
MBET-247 : Bioethics, Biosafety, Quality Control and Quality Assurance
(2019 Pattern) (Semester - IV)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.No. 2 to Q.No.5.***
3) ***Q.2 to Q.5 carry equal marks.***
4) ***Draw neat and labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic tables and scientific calculators is allowed.***
7) ***Assume suitable data if necessary.***

Q1) Solve any five of the following. **[5]**

a) What do you understand by the term validation.

b) Which biosafety level is required to handle the COVID-19 virus in the laboratory?

c) Which international standard gives guidelines related to GMP and GLP?

d) Which Indian Act describes the regulations to handle genetically engineered organisms?

e) Name the Indian regulatory body that regulates food and water industries.

f) Mention any two bioethical theories proposed by ethical theorists.

Q2) Attempt the following:

a) Describe the roles and responsibilities of the following regulatory bodies:

i) BIS (Bureau of Indian standards)

ii) IBSC (Institutional Biosafety committee). **[6]**

P.T.O.

b) A pregnant woman give birth to a healthy boby at a hospital, but she suffered heavy bleeding due to placenta residue. Medical experts proposed a blood transfusion to save her lite, but she and her family refused the procedure because it was against their religious beliefs. The woman also submitted a signed application requesting that no blood or its derivatives be administered to her during her hospitalisation. As her condition started becoming worse, her obstetrician submitted a request to a trial court to allow blood transfusion. The court permitted the hospital to administer blood transfusions, and the woman recovered from her medical complication. But later the woman appealed to a higher court against the hospital's decision, and the higher court ruled in her favour. Which ethical principle was violated in the above case? Explain how. **[4]**

Q3) Attempt the following.

a) State the major differences between quality control and quality assurance. **[6]**

b) Justify : Biological weapons are a major ethical concern. **[4]**

Q4) Attempt the following.

a) Discuss the guidelines for the production and use of genetically modified organisms (GMOs) **[6]**

b) Justify : Standard operating procedures (SOPs) are an essential component of quality management. **[4]**

Q5) Write short notes on any two of the following. **[10]**

a) Significance of biosafety levels in laboratories.

b) Drugs and cosmetics regulation in India.

c) Beneficence and non-maleficience.

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