Total No. of Questions : 7]

SEAT No. :

P389

[Total No. of Pages : 2

[5834] - 101
M.Sc - I
MICROBIOLOGY
MBCT - 111 : Microbial Systematics
(2019 Pattern) (CBCS) (Semester - I) (Credit System) (Revised)

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) ***Q.2 to Q7 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw Neat labelled diagram wherever necessary.***
6) ***Use of scientific calculator is allowed.***
7) ***Assume suitable data, if necessary.***

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

a) Define polyphasic Approach.

b) Write applications of Microarray in Microbial Diversity.

c) Define Molecular Evolution.

d) Give applications of DGGE in study of Microbial diversity.

e) What is co-evolution.

f) Define species concept in Eukaryotes.

Q2) Attempt the following.

a) Describe the importance of FAME profiling in Bacterial taxanomy. **[7]**

b) Enlist and explain any one approach to access the total number of Bacteria in Environment. **[5]**

Q3) Attempt the following:

a) Enlist culture independent molecular methods for identifying unculturable Bacteria and explain any one in detail. **[7]**

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

P.T.O.

Q4) Attempt the following.

a) Define molecular chronometer. Explain the significance of 16 S rRNA gene as molecular clock. **[7]**

b) From the given data calculate the Simpson's diversity index for the pond water sample Total number of colonies are 94×10^7. **[5]**

Sr.No	Type of colonies	Number of colonies
1	Pigmented colonies	51
2	Pinpoint colonies	40
3	Colonies larger than1mm	63

Q5) Attempt the following:

a) Describe the importance of phenetic and phylogenetic approach in Bacterial systematics. **[7]**

b) Explain r and k selection of evolution with suitable example. **[5]**

Q6) Attempt the following:

a) Describe the characteristics of Neo Darwinism and Neo Lamarckism. **[7]**

b) Explain with the help of flowchart metagenomic library construction. **[5]**

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

a) Unculturable Bacteria.

b) Selfish genes.

c) Alpha and Beta Diversity.

Total No. of Questions : 7]

SEAT No. :

P390

[Total No. of Pages :3

[5834] - 102
M.Sc. - I
MICROBIOLOGY
MBCT-112: Quantitative Biology
(2019 CBCS Pattern) (Semester - I) (Revised)

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) ***Q.2 to Q.7 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw Neat labelled diagram wherever necessary.***
6) ***Use of scientific calculators, logarithmic and statistical tables is allowed.***

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

a) What is population (census) method in statistics?

b) Enlist different types of sampling and explain any two.

c) Give the difference between graphs and diagrams.

d) Calculate the mean of the following data.

Sr. No.	Bonus	No. of Persons
1	500	1
2	600	3
3	700	5
4	800	7
5	900	6
6	1000	2
7	1100	1

e) Determine the standard deviation from the following data: 10, 15, 25, 30 and 50.

f) Define Variance.

P.T.O.

Q2) Attempt the following.

a) Mean soil temperature and germination days of wheat of 10 places are recorded. **[7]**

Mean soil temp. (°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]**

Q3) Attemp the following:

a) A complaint was registered stating 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 was selected from municipal school and average was found to be 29.5 kg. At alpha (0.05). Check whether this complaint is true or not by applying Z test. **[7]**

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

Q4) Attempt the following.

a) In a mutation breeding experiment, effect of gamma radiation on weight of 10 seeds was determined. Mean weight in grams per plant of bean variety is given. Analyze the data using t-test.

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. **[7]**

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

Q5) Attempt the following:

a) In F2 generation Mendel obtained 621 tall and 187 dwarf plants. Suggest by applying chi square test, whether this ratio is in accordance with the Mendel monohybrid ratio or it deviates from this ratio. **[7]**

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

Q6) Attempt the following:

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

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

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

b) If a chairman is to be selected from five persons with their profile as follows:

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

What is the probability that it would be female or a person over 30 years? **[5]**

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

a) In a town, 10 accidents take place in 50 days. Assuming its PD, 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: Type - I and Type - II errors.

♦ ♦ ♦

Total No. of Questions : 7]

SEAT No. :

P391

[Total No. of Pages :2

[5834] - 103
M.Sc. - I
MICROBIOLOGY
MBCT-113: Biochemistry and Metabolism
(Revised 2019 Pattern) (Semester - I) (CBCS)

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) ***Q.2 to Q7 carry equal marks.***
4) ***Draw Neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic scientific tables calculators, are allowed.***

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

a) What is the effect of a diet that lacks one or more of the essential amino acid at molecular level?

b) Which two methods are used to quantify PCR products by Real - Time PCR?

c) Name any Two model system used to study developmental biology.

d) A continuous system of membrane channel is believed to connect the nucleus with the cell membrane. Which organelles are prominent in this system?

e) Name the cell organelles which have digestive power.

f) Define : Motif and Domains in protein.

Q2) Attempt the following.

a) Describe super - secondary structure of proteins. **[7]**

b) Describe SDS - PAGE. **[5]**

P.T.O.

Q3) Attempt the following:

a) Why do amino acid placed on a cation exchange resin containing sulfonate group flow down the column at different rate? For each pair of amino acid listed determine which will be eluted first from column using buffer of pH-7.
Asp and lysine
Arg and Met
Glu and Valine
Gly and leu
Ser and ala **[7]**

b) Write short note on Hox-code. **[5]**

Q4) Attempt the following.

a) Explain Dorso - Ventral axis Formation in Droso phila. **[7]**

b) Determine the sequence of hexa peptide based on the following data. **[5]**
   i) Amino acid composition : (2R, A, S, V, Y).
   ii) N-terminal analysis of the hexapeptide :A.
   iii) Trypsin digestion : (R, A, V) and (R, S, Y).
   iv) Carboxypeptidase digestion: No digestion.
   v) Chymotrypsin digestion : (A, R, V, Y) and (R, S).

Q5) Attempt the following:

a) Justify - Cyclic changes in cdk activity triggers cell-cycle events. **[7]**

b) Explain Ion-torrent Method of sequencing. **[5]**

Q6) Attempt the following:

a) Describe signal Recognition Particle? How does it directs ER Signal Sequence to E.R membrane? **[7]**

b) Explain partial double bond nature of peptide bond. **[5]**

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

a) Describe structure and functions of E.R.

b) Define differentiation. Explain different types of differentiation with examples.

c) Describe the Non - covalent interactions in protein.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. :

P392

[Total No. of Pages :2

[5834] - 104
M.Sc. - I
MICROBIOLOGY
MBET-115 (MBTE-11) - Fungal Systematics and Extremophiles
(2019 Pattern) (Semester - I) (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) ***Question no. 2 to 5, carry equal marks.***
4) ***Figures to the right side indicate full marks.***
5) ***Draw neat labelled diagram wherever necessary.***

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

a) Write characteristics of thermophiles.

b) Draw general morphological structure of Ascomycetes.

c) How are halophiles classified on the basis of extent of their halotolerance?

d) Enlist at least four habitats of acidophiles.

e) Enlist two applications of thermophiles.

f) Give two examples of fungi belonging to Ascomycetes.

Q2) Attempt the following.

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

b) Write a note on cell membrane adaptation observed in halophiles. **[4]**

Q3) Attempt the following:

a) Write a note on survival mechanism of bacteria at high temperature. **[6]**

b) Draw life cycle of basidiomycetes. **[4]**

P.T.O.

Q4) Attempt the following.

a) Write a note on application of psychrophiles. **[6]**

b) Justify, Ascomycetes can be exploited in various fields. **[4]**

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

a) If a group of scientist want to study the bacteria present in the volcanic area, how should they carry out enrichment of sample and isolation of bacteria.

b) Write a note on sexual reproduction observed in Zygomycota.

c) Enlist two examples of fungi belonging to basidiomycota and its application.

Total No. of Questions : 5]

SEAT No. :

P393

[Total No. of Pages :2

[5834] - 105
M.Sc. - I
MICROBIOLOGY
(MBET-116) (MBTE-12) Expewrimental Design and Quantitative Approaches for Biologists
(2019 Pattern) (Semester - I) (CBCS) (Revised)

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

Instructions to the candidates:

1) ***Q.1 is compulsary.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question no. 2 to 5, carry equal marks.***
4) ***Figures to the right side indicate full marks.***
5) ***Draw neat labelled diagram wherever necessary.***

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

a) What are the models based on Hardy-Weinbeng equation?

b) Write about the population models of growth.

c) Explain the concept of hypothesis testing in a statistics.

d) Give significance of factorial design.

e) Write the importance of stochastic model.

f) What is mean by sampling error?

Q2) Attempt the following.

a) Write short note on simulation of bacterial growth. **[6]**

b) Explain plackett Burman design in detail. **[4]**

Q3) Attempt the following.

a) Give significance of survery design. **[6]**

b) Explain epidemiological model. **[4]**

P.T.O.

Q4) Attempt the following.

a) Describe data analysis which includes trends, goodness of fit and testing mathematical model. **[6]**

b) Write a short note on Hardy-Weinbeng equation. **[4]**

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

a) Goodness of fit.

b) Linear and Nonlinear models.

c) Cyclic processes of model construction.

Total No. of Questions : 5]

SEAT No. :

P394

[Total No. of Pages :2

[5834] - 106
M.Sc. - I
MICROBIOLOGY
MBET-117 (MBTE 13):Microbial Communication, Membrane Transport and Signal Transduction
(2019 CBCS Pattern) (Semester - I) (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) ***Q2 to Q5 carry equal marks.***
4) ***Figures to the right side indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***
6) ***Use of logarithmic tables and scientific calculators is allowed.***

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

a) What is the fate of psto cells in Dictyostelium?

b) What acts as an autoinducer for myxoamoebae of Dictyostelium?

c) What is autocrine signalling?

d) What is a phosphorelay?

e) What are ionophores?

f) What is active transport?

Q2) Attempt the following.

a) Describe the mechanism of biofilm formation with suitable example. **[6]**

b) Explain the structure of F-type AT Pase with the help of a diagram. **[4]**

Q3) Attempt the following:

a) Explain the molecular mechanism involved in bioluminescence production. **[6]**

b) Justify that cell-cell signalling plays an important role in lifecycle of myxobacteria. **[4]**

P.T.O.

Q4) Attempt the following.

a) Explain the mechanism of signal transduction in Dictyostelium. **[6]**

b) The following data (using arbitrary units) were obtained for the transmembrane movements of compounds A and B from outside to inside of a cell:

Extrace cellular concentration of compound A or B	Flux in to cell compound A	Flux in to cell compound B
2	1.2	4.5
5	3.4	6.2
10	6.2	7.5

Which compound enteres the cell by mediated transport? Explain. **[4]**

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

a) Comment on mechanism of anion transport.

b) Differentiate between ligan and voltage gated ion channels.

c) Comment on S-motility of myxobacteria.

Total No. of Questions : 8]

SEAT No. :

P8849

[Total No. of Pages : 2

[5834] - 11
M.Sc. (Part - II)
MICROBIOLOGY
MB - 802 : Molecular Biology - II
(2019 Pattern) (Semester - IV) (Credit System)

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

Instructions to the candidates:

1) ***Attempt any three questions from Q1 to Q4.***
2) ***Attempt any two questions from Q5 to Q8.***
3) ***All questions carry equal marks.***
4) ***Draw neat, labelled diagrams wherever necessary.***
5) ***Use of log tables, 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 the principle of pyrosefuencing method.

b) Elaborate gene imprinting with suitable example.

c) Explain the role of geromic variation in trade offs.

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

a) Give structural details of YAC and Enlist uses of YAC in cloning.

b) Enlist methods for gene transfer to host cell. Explain any one in detail.

c) Give the protocol of preparing genomic library.

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

a) How will you prepare ‘gum’ using RDT.

b) How will you produce novel antibiotics using RDT.

c) Explain the production of tryptophan using genetically modified microbes.

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

a) What is the correlation between SNP and certain diseases?

b) Explain protein engineering with suitable example.

c) Write a note on importance of production of high quality protein drug by unconventional microbial system.

P.T.O.

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

a) State the applications of GEMO in medicine.

b) Discuss why transgenic plants are better than their wild varieties.

c) Give advantages of transgenic animals.

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

a) Enlist various agricultural wastes that supply starch for the production of fructase. Explain use of genetically modified bacteria in the degradation of starch.

b) Give a stepwise protocol in the degradation of xenobiotic compounds.

c) Comment on silage production.

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

a) State salient features of HGP. How are they different from mouse genome project.

b) Give protocol of gene annotation.

c) What are the findings of rice genome project?

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

a) Comment on gene augmentation.

b) State the role of genetically modified Pseudomonas species in the degradation of Xenobiotics.

c) What are the applications of HGP?

Total No. of Questions : 7]

SEAT No. :

P395

[Total No. of Pages :2

[5834] - 201
M.Sc. - I
MICROBIOLOGY
MBCT-121: Instrumentation and Molecular Biophysics
(2019 CBCS Pattern) (Semester - II) (Revised)

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

Instructions to the candidates:

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

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

a) Enlist detectors for Gas chromatography.

b) Give two applications of infra red spectroscopy.

c) Define chemical shift in NMR spectroscopy.

d) What is the source and wavelength range of x-rays?

e) Give principle of confocal microscope.

f) What is FTIR?

Q2) Attempt the following.

a) Describe the construction and working of Gas chromatography comment on different types of detectors used in gas chromatography. **[7]**

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

Q3) Attemp the following:

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

b) If solution containing ATP is found to have absorbanle of 0.17 in 1cm cuvette and the molar extinction coefficient is 1.54×10^4 cmol dm^{-3} k^{-1} m^{-1} what is the concentration and transmission of ATP solution? **[5]**

P.T.O.

Q4) Attempt the following.

a) Explain chemical shift and spin spin coupling with respect to NMR. **[7]**

b) Give an overall approach to structure determination by 2-D NMR. **[5]**

Q5) Attempt the following.

a) Explain measurement of Radioactivity using scintillation counters. **[7]**

b) Explain Bathochromic shift and Hypochromic shift in detail. **[5]**

Q6) Attempt the following.

a) Give the schematic diagrammatical representation of single beam and double beam UV-Visible spectrophotometer. **[7]**

b) Give applications of Radio Tracer technique in biology. **[5]**

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

a) FRET

b) Miller indices

c) Fast protein liquid chromatography.

Total No. of Questions : 7]

SEAT No. :

P396

[Total No. of Pages :2

[5834] - 202
M.Sc. - I
MICROBIOLOGY
MBCT - 122: Molecular Biology
(2019 CBCS Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Q.1 is compulsary.***
2) ***Solve any five 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 side indicate full marks.***
6) ***Assume suitable data, if necessary.***
7) ***Use of scientific calculators is allowed.***

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

a) Give function of alkaline phosphatase.

b) Write about preparation of knock out mice.

c) What is FISH? Give its applications.

d) Define RNA interferance.

e) Differentiate between mi RNA and si RNA.

f) What is RNA splicing.

Q2) a) Explain how bacteriophages can be used as vectors. **[7]**

b) Comment on : Activity gel assay. **[5]**

Q3) a) What are expression vectors? Explain use of expression vectors with suitable examples. **[7]**

b) Describe how protein micro array system works. **[5]**

Q4) a) Describe techniques used in deciphering genome. **[7]**

b) Explain construction of cDNA library. **[5]**

P.T.O.

Q5) a) Justify: Western blotting helps in detection of protein of interest. **[7]**

b) A pre mRNA molecule produced from a coding gene has 300 bases long exon I followed by

150 bases intron I, 40 bases exon II,

100 bases intron II, 60 bases exon III and 200 bases adenylated tail.

i) Draw the diagram of pre mRNA molecule.

ii) Determine the size of full mature mRNA. **[5]**

Q6) a) Explain disease associated changes in gene expression using micro array. **[7]**

b) Explain use of adapters and linkers in genetic enegineering. **[5]**

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

a) Explain use of DNA ligase and T4 DNA polymerase as tools in genetic engineering.

b) Write a note on comparative genomics.

c) Write a note on protein tagging & purification.

Total No. of Questions : 7]

SEAT No. :

P397

[Total No. of Pages :2

[5834] - 203
M.Sc. - I
MICROBIOLOGY
MBCT - 123: Enzymology, Bioenergetics & Metabolism
(2019 Pattern) (Semester - II) (Credit System) (Revised)

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) ***Q2 to Q7 carry equal marks.***
4) ***Figures to the right side indicate full marks.***
5) ***Draw neat labelled diagram wherever necessary.***
6) ***Use of scientific calculators is allowed.***
7) ***Assume suitable data, if necessary.***

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

a) What are unsaturated fatty acids?

b) Define enthalpy.

c) State 2nd law of thermodynamics.

d) Give two examples of sugar acids.

e) Define allosteric enzymes.

f) What are sugar anomers?

Q2) Attempt the following.

a) Describe in detail synthesis of fatty acids. **[7]**

b) Draw secondary plots for non competitive inhibition. **[5]**

Q3) Attempt the following.

a) What are allosteric enzymes? Compare & contrast between KNF & MWC model. Derive kinetic equation for MWC model. **[7]**

P.T.O.

b) Calculate $\Delta G'$ for complete oxidation of lactic acid to CO_2 & H_2O given the information below. How many moles of ATP could be synthesized in the process at 40% efficiency? **[5]**

Given

i) Glucose $\rightarrow$ 2 lactic acid

$$\Delta G_1' = -52000 \text{ cal / mole}$$

ii) Glucose + $6O_2 \rightarrow 6CO_2 + 6H_2O$

$$\Delta G_2' = -686{,}000 \text{ cal / mole}$$

Q4) Attempt the following.

a) Discuss steps involved in king Altman approach to derive any two substrate enzyme catalysed reaction. **[7]**

b) Explain the steps involved in glucogeogenesis with structure. **[5]**

Q5) Attempt the following.

a) Discuss in detail steps involved in beta oxidation process. **[7]**

b) Calculate $\Delta G^{\circ'}$ values for the reaction given below $FADH_2$ + 2 Cytochrome

$$-C-Fe^{+3} \rightleftharpoons FAD + 2H^+ + 2e^-$$

(Given $E_0^1 = -0.18V$ & $E_0^1 = +0.25V$ F = 23, 063) **[5]**

Q6) Attempt the following.

a) Explain construction of purification chart with suitable example. **[7]**

b) Write a note on Atkinson's energy charge. **[5]**

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

a) Short note on nomen clature of fatty acids.

b) Short note on high energy compounds.

c) Short note on Hill plot.

Total No. of Questions : 5]

SEAT No. :

P398

[Total No. of Pages :2

[5834] - 204
M.Sc. - I
MICROBIOLOGY
MBTE-21: Bioinformatics and Bionanotechnology
(2019 Pattern) (Semester - II) (Credit System) (Revised) (MBET-125)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q. No. 2 to Q. No. 5.***
3) ***Question No s. 2 to 5 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary.***

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

a) How do magnetotatic bacteria sense magnetic field?

b) What is BLAST?

c) What are physical properties of nanoparticles?

d) Which scientists created the first Bioinformatics database.

e) Name two tools used in phylogenetic analysis.

f) Write principle of DLS (Dynamic Light Scattering)

Q2) Attempt the following.

a) Explain the concept of scoring matrices for aligning amino acid sequences. **[6]**

b) What are steps involved in FASTA. **[4]**

Q3) Attempt the following.

a) What is multiple sequence aligment? Explain with an appropriate diagram. **[6]**

b) Justify the role of plants in nanoparticle synthesis. **[4]**

P.T.O.

Q4) Attempt the following.

a) In detail describe any two characterization methods of nanoparticles. **[6]**

b) Explain the applications of nanoparticiles in detail. **[4]**

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

a) GENEBANK.

b) Scanning Probe Microscopy (SPM)

c) PDB

Total No. of Questions : 5]

SEAT No. :

P399

[Total No. of Pages :1

[5834] - 205
M.Sc. - I
MICROBIOLOGY
MBET-126:Molecular Biology Tools and Applications
(Revised 2019 CBCS Pattern) (Semester - II) (MBTE-22)

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

Instructions to the candidates:

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

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

a) Define FISH.
b) What are polyketide antibiotics?
c) Define foot print.
d) What are polyhydroxy alkonates?
e) What is CRISPR?
f) What is genome micro array?

Q2) a) What are biopolymers? Explain any one in detail. **[6]**
b) What is DNA microarray technique? Give its applications. **[4]**

Q3) a) Explain protein foot printing as a tool in molecular biology. **[6]**
b) Write a short note on methyl interference assay. **[4]**

Q4) a) Explain protein - protein interactions using yeast hybrid system. **[6]**
b) Write a short note on synthesis of ascorbic acid. **[4]**

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

a) Explain electrophoretic mobility shift assay.
b) Write an account on SLOT blot.
c) Write a short note on polyhydroxy alkanotes.

Total No. of Questions : 5]

SEAT No. :

P400

[Total No. of Pages :2

[5834] - 206
M.Sc. - I
MICROBIOLOGY
MBET - 127:Nitrogen Metabolism, Respiration and Photosynthesis
(Revised 2019 CBCS Pattern) (Semester - II) (Credit System)

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 side indicate full marks.***
6) ***Use of logarithmic tables and scientific calculators is allowed.***

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

a) Write down overall stoichiometry of light reactions.

b) Write down reaction carried by glutamine synthase.

c) Write balanced equation of calvin cycle.

d) What is full form of Rubisco?

e) What is nitrate respiration?

f) Name the precursor molecule used for Histidine biosynthesis.

Q2) Attempt the following.

a) Describe biochemistry of methanogenesis. **[6]**

b) Write short note on glutamate synthase. **[4]**

Q3) Attempt the following.

a) Give the pathway leading to the synthesis of pyrimidine nucleus. **[6]**

b) Explain the cycle flow of electrons in plant photosynthesis. **[4]**

P.T.O.

Q4) Attempt the following.

a) Justify, "most of the pathway of amino acid biosynthesis are regulated by feedback inhibition, in which the committed step is allosterically inhibited by the final product". **[6]**

b) Write short note on CAM pathway. **[4]**

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

a) Why is C_4 pathway valuable for tropical plants.

b) Which of the 20 amino acids can be synthesised directly from a common metabolic intermediate by a transamination reaction.

c) Write short note on energy generation pathway in bacteria where sulfate acts as terminal electron aceptor.

Total No. of Questions : 7]

SEAT No. :

P401

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[5834]-301

M.Sc. - II

MICROBIOLOGY

MBCT 231 : Immunology

(2019 Pattern) (Revised) (Semester - III) (Theory)

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) ***Q.2 to Q.7 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) Solve any five of the following : **[10]**

a) What are defensins?

b) What is the significance of negative selection?

c) What is the role of pathogen recognition receptors?

d) What are knockout mice?

e) Define lymphoma and give its types.

f) What is Hodgkin's disease?

Q2) Attempt the following :

a) Describe structure and function of B cell receptor. **[7]**

b) Discuss the role of intracellular signalling proteins in immune activation mechanisms. **[5]**

P.T.O.

Q3) Attempt the following :

a) What are transgenic animals? Give their significance in experimental immunology. **[7]**

b) Describe Elispot assay. Give its applications. **[5]**

Q4) Attempt the following :

a) Explain IL-2 pathway - JAK/STAT of signal transduction. **[7]**

b) Describe structure and function of TCR - CD3 complex. **[5]**

Q5) Attempt the following :

a) Discuss mechanisms of induction of immunological tolerance using transgenic animals. **[7]**

b) Comment on T cell Mediated Supression of immune response. **[5]**

Q6) Attempt the following :

a) Explain immunosurveillance theory. **[7]**

b) What are the methods used for diagnosis of tumours. **[5]**

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

a) Cancer therapy.

b) Tumour markers.

c) Regulation of classical pathway of complement activation.

Total No. of Questions : 7] **SEAT No. :**

P402 **[Total No. of Pages : 2**

[5834]-302

M.Sc. (Semester - III)

MICROBIOLOGY

MBCT - 232 : Molecular Biology (Rev. 2019)

(2019 Pattern) (Credit System)

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 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) Solve **any five** of the following : **[10]**

a) What is trade - off mechanism? Give an example.

b) Explain an example of SNP in humans.

c) Enlist the techniques used in gene sequencing.

d) Give 2 examples of amino acids with aromatic R groups.

e) Give 2 applications of proteomics.

f) Give 2 characteristics of Drosophila transposons.

Q2) Attempt the following :

a) Write the steps involved in separation and purification of proteins in a crude extract of microbial cells. **[7]**

b) Write the characteristics of Tn5 and Tn10. **[5]**

P.T.O.

Q3) Attempt the following :

a) Add a relative description of the replicative and non-replicative transposons. **[7]**

b) "Histone modification is an example of epigenetic change" explain. **[5]**

Q4) Attempt the following :

a) How do telomeres play a central role in gene aging? **[7]**

b) What is genetic trade-off mechanism? Write its significance. **[5]**

Q5) Attempt the following :

a) What are the important parts of gene casettes involved in integrons and also mention their roles? **[7]**

b) What are the essential steps involved in the study of metabolomics? **[5]**

Q6) Attempt the following :

a) The short DNA shown below is to be sequenced, using your knowledge of how the Sanger method works. Dideoxynucleotides (dd NTPs) are added in relatively small amounts. Asteris R represents radioactive label.

What length of strands will be synthesized on the $3' \rightarrow 5'$ template below

$*5'---3'OH$

$3'---ACGACGCAGGACATTAGA3-5'$

Nucleotide mixtures added in below,

dGTP, dATP, dTTP, dCTP, ddTTP **[7]**

b) What is alternative gene expression? Give examples. **[5]**

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

a) Social and ethical concerns of genetically modified organisms.

b) Regulation of E. coli. lac promoter.

c) Methods used in Protein structure analysis.

Total No. of Questions : 7]

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P403

[Total No. of Pages : 2

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M.Sc. (Semester - III)

MICROBIOLOGY

MBCT - 233 : Clinical Microbiology

(2019 Pattern) (Credit System) (Rev. 2019)

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 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 five** of the following : **[10]**

a) Enlist steps in the mechanism of bacterial pathogenecity.

b) Give characteristics of bacterial endotoxins with example.

c) What are bacterial mechanisms to overcome host phagocytic defence?

d) Enlist morphological forms in the life cycle of Ascaris lumbricoides.

e) Enlist various proteins in HIV which have role in the pathogenesis.

f) "Sulfur granules are pathogenic in nature" - Explain.

Q2) Attempt the following :

a) Describe morphological and cultural characteristics of Campylobacter jejuni. **[7]**

b) Describe membrane ruffling in bacterial pathogenesis. **[5]**

P.T.O.

Q3) Attempt the following :

a) Explain pathogenesis mechanism of hemorrhagic fever. **[7]**

b) Compare and Contrast between 'Susceptible Infectious Recovered' model and 'Susceptible Exposed Infectious Recovered' model. **[5]**

Q4) Attempt the following :

a) Discuss in detail. Pathogenesis mechanism of Candida albicans infection along with steps involved. **[7]**

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

Q5) Attempt the following :

a) Write a note on pathogenicity islands. Enlist their functions with suitable examples. **[7]**

b) Suggest diagnostic methods for biological sample collected from patient suffering from peptic ulcer. **[5]**

Q6) Attempt the following :

a) Describe virulence factors in Acinetobacter baumanii. **[7]**

b) Describe pathogenesis and clinical manifestations of amoebiasis. **[5]**

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

a) Germ tube test for diagnosis of Candida albicans.

b) Molecular techniques for detection of HIV antigens and viral nucleic acids.

c) Structure of Hepatitis B virus.

Total No. of Questions : 5]

SEAT No. :

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M.Sc.

MICROBIOLOGY

MBET - 235 : Cell Culture Techniques

(2019 Pattern) (Semester - III) (Credit System) (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) ***Q.2 to Q.5 carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right side indicate full marks.***
6) ***Use of logarithmic tables and scientific calculators is allowed.***
7) ***Assume suitable data if necessary.***

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

a) What are suspension cell cultures?

b) How CO_2 levels affect the cell growth in animal cell culture?

c) What are Secondary Cell cultures?

d) Give two examples of cell lines.

e) What are immunomodulators?

f) Mention two media used in animal cell culture.

P.T.O.

Q2) Attempt the following :

a) Explain cloned lymphoid cell lines. **[6]**

b) How does the environmental conditions affect the cell growth. **[4]**

Q3) Attempt the following :

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

b) Write the methodology to obtain primary lymphoid cell cultures. **[4]**

Q4) Attempt the following :

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

b) Explain the use of hybrid lymphoid cell lines in immunological studies. **[4]**

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

a) Role of immunomodulators.

b) Established cell lines.

c) Monolayer cultures.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

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S.Y. M.Sc. (Semester - III)

MICROBIOLOGY

MBET 236 : Bioremediation & Biomass Utilization

(2019 Pattern) (Credit System)

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 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) Give any two examples of microbes used for bioremediation.

b) Give any one disadvantage of bioremediation.

c) Draw structure of Xylene.

d) Enlist the components of lignocellulose.

e) Draw structure of cellobiose.

f) Enlist starch degrading enzymes.

P.T.O.

Q2) Attempt following :

a) Write a note on types of cellulases with their mode of action. **[6]**

b) What are the advantages of bioremediation? **[4]**

Q3) Attempt following :

a) How alterations in yeast transcription are useful for improvement of alcohol production? **[6]**

b) Write steps in commercial production of sweetner used in the manufacturing of foods & beverages. **[4]**

Q4) Attempt following :

a) Explain how manipulations by plasmid transfer is useful for aromatic compound degradation. **[6]**

b) Describe the isolation & manipulation of prokaryotic cellulase genes. **[4]**

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

a) Factors affecting bioremediation process.

b) Commercial production of alcohol from cellulose.

c) Camphor Degradation pathway.

Total No. of Questions : 5]

SEAT No. : ____

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M.Sc. - II (Semester - III)

MICROBIOLOGY

MBET - 237 : Microbial Virus Technology

(2019 Pattern) (Credit System) (Rev. 2019)

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 side 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 followings : **[5]**

a) What are bacteriophages?

b) What is MoI?

c) Define Eclipsed period in one step growth curve.

d) Enlist two examples of Mycoviruses.

e) What are algal viruses?

f) Write down formula to calculate EoP in bacterio phage growth kinetics.

P.T.O.

Q2) Attempt the followings :

a) Describe the life cycle of any bacteriophage. **[6]**

b) Explain the role of bacteriophages in the biocontrol of biofilms. **[4]**

Q3) Attempt the followings :

a) Explain use of bacteriophages as therapeutic agent. **[6]**

b) How Mycoviruses can be used to control fungal plant pathogens? **[4]**

Q4) Attempt the followings :

a) Explain the different methods of isolation of bacteriophages from sewage treatment plant. **[6]**

b) Describe in detail phage based technology for decontamination of Medical Waste Water. **[4]**

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

a) Lytic cycle of bacteriophage.

b) Taxonomy & occurrence of Mycoviruses.

c) Mycovirus-host interaction mechanism.

Total No. of Questions : 7]

SEAT No. : ____

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[5834]-401

M.Sc. (Semester - IV)

MICROBIOLOGY

MBCT - 241 : Pharmaceutical Microbiology

(Rev. 2019 Pattern) (Credit System)

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 labelled diagrams 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 : **[10]**

a) How do you improve water solubility of a drug?

b) Explain the term lead compound.

c) Justify - No drug is totally safe.

d) Explain briefly lethal dose-50 (LD_{50}) of a compound.

e) Give two examples of lead compounds derived from micro-organisms.

f) Briefly explain parenteral routes of drug administration.

Q2) Attempt the following :

a) Explain diagrammatically primary routes of drug administration and distribution in the body. **[7]**

b) Elaborate on role of High-through put screening in drug design. **[5]**

P.T.O.

Q3) Attempt the following :

a) Explain the significance of Phase-I and Phase-II reaction in drug metabolism. **[7]**

b) Justify - A safer drug has a very large lethal dose and very small effective dose. **[5]**

Q4) Attempt the following :

a) Explain the differences between preclinical and clinical trials and write objectives of Phase - I trials. **[7]**

b) Elaborate on at least two approaches used to resolve 3D structure of protein to facilitate drug design. **[5]**

Q5) Attempt the following :

a) What are stages of clinical development of a drug and elaborate on outcome of Phase - IV clinical trials in detail. **[7]**

b) How does pharmacopoeia help in maintaining uniformity and standards in pharmaceutical industry? **[5]**

Q6) Attempt the following :

a) Explain on toxicity studies in drug development. **[7]**

b) Explain with examples classification of drugs based-on mechanism of action and chemical structure. **[5]**

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

a) Role of FDA in drug development.

b) Lipinski's rule of five.

c) Placebo in clinical trials.

Total No. of Questions : 7]

SEAT No. :

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M.Sc. (Semester - IV)

MICROBIOLOGY

MBCT - 242 : Microbial Technology

(2019 Pattern) (Credit System) (Rev. 2019)

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) ***Q.2 to Q.7 carry equal marks.***
4) ***Draw neat diagrams wherever necessary.***
5) ***Figures to the right side indicate full marks.***
6) ***Use of logarithmic tables/scientific calculator is allowed.***
7) ***Assume suitable data if necessary.***

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

a) Define biosensor.

b) Define Reynold's number.

c) Give two applications of immobilized enzymes.

d) What are Non Newtonian fluids?

e) Define trademark.

f) Draw schematic diagram of CSTR.

Q2) a) What is kLa? Explain sulphite oxidation method for kLa determination. **[7]**

b) Describe role of cell immobilization in fermentation technology. **[5]**

P.T.O.

Q3) a) Describe submerged fermentation for Pullulan production. **[7]**

b) How patent application can be filed? **[5]**

Q4) a) For aerobic bioreactor system OTR > OUR, Justify. **[7]**

b) What are the environmental applications of fungi? **[5]**

Q5) a) In batch culture, growth rate decreases due to depletion of nutrients. Justify the statement. **[7]**

b) What are Chitinases? Explain their applications. **[5]**

Q6) a) Explain the effect of temperature on earth rheology. **[7]**

b) What is C crit? Explain its importance in aerated bioreactor. **[5]**

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

a) Explain the flow configuration in airlift bioreactor.

b) Explain the aeration system in the bioreactor.

c) Explain the downstream processing of Rifamycin.

Total No. of Questions : 5]

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M.Sc.

MICROBIOLOGY

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

(2019 Pattern) (Credit System) (Semester - IV)

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 side indicate full marks.***
6) ***Use of logarithmic tables and scientific calculators is allowed.***
7) ***Assume suitable data if necessary.***

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

a) What is GLP?

b) Define MBC.

c) What is ISO certification?

d) What is the importance of pyrogenicity testing?

e) What is the importance of CLSI guidelines?

f) Give any two examples of antimycobacterial agents.

P.T.O.

Q2) Attempt the following :

a) Enlist and explain Good manufacturing practices for pharmaceutical industry. **[6]**

b) Explain E test. **[4]**

Q3) Attempt the following :

a) Explain how mutagenicity test are performed for drugs? **[6]**

b) What is the importance of sterility testing of Pharmaceutical products? **[4]**

Q4) Attempt the following :

a) Explain the factors affecting susceptibility testing of antimicrobials. **[6]**

b) What is therapeutic ratio? Write its significance. **[4]**

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

a) Susceptibility testing for anti-protozoal agents.

b) Teratogenicity Testing.

c) Gradient Agar Plate Technique.

Total No. of Questions : 5]

SEAT No. :

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[Total No. of Pages : 2

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M.Sc. (Semester - IV)

MICROBIOLOGY

MBET - 245 : Advances in Microbial Technology

(Rev. 2019 Pattern) (Credit System)

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

Instructions to the candidates:

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

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

a) Define growth.

b) What do you mean by growth associated product?

c) Write expression for non-growth associated product.

d) What is yield coefficient?

e) What are the disadvantages of recovery of biopharmaceutical product from cadavar animals?

f) Which type of antigens are present in HBV?

P.T.O.

Q2) Attempt following :

a) Describe production of Erythropoitin. **[6]**

b) Derive expression to determine μ_{max} & K_s **[4]**

Q3) Attempt following :

a) Explain production of endonucleases in E. coli host using suitable example/s. **[6]**

b) What are challenges in production of endonucleases using natural isolate? **[4]**

Q4) Attempt following :

a) Explain different methods of gene therapy. **[6]**

b) Explain molecular mechanism of hybridoma selection. **[4]**

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

a) Applications of monoclonal antibodies.

b) Genetic engineering of Pseudomonas for production of lipase.

c) Challenges in HIV vaccine development.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5834]-405

M.Sc. - II (Semester - IV)

MICROBIOLOGY

MBET - 246 : Industrial Waste Water Treatment & Industrial Production of Vaccine

(Revised 2019 Pattern) (Credit System)

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 side 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 is F/M ratio in activated sludge treatment?

b) Define - first generation vaccines with one example.

c) In sludge digestion tank, if the moisture content of sludge is reduced from 90% to 80% then what is the percentage decrease in the volume of sludge?

d) Define BoD.

e) State two examples of excipients in Vaccine Production.

f) What is tertiary treatment of wastewater?

P.T.O.

Q2) Attempt the following :

a) Describe the process of flow equalization. Give it's advantages in waste water treatement. **[6]**

b) Justify that treating waste water minimizes BOD, COD & TSS of effluent. **[4]**

Q3) Attempt the following :

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

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

Q4) Attempt the following :

a) Describe Pilot & industrial scale production of vaccines. **[6]**

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

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

a) Peptide vaccines.

b) Physico-chemical properties of dyeing industry.

c) Activated sludge process.

Total No. of Questions : 5]

SEAT No. :

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[Total No. of Pages : 2

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M.Sc. (Semester - IV)

MICROBIOLOGY

MBET - 247 : Bioethics, Biosafety, Quality Control and Quality Assurance

(Rev. 2019 Pattern) (Credit System)

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 and labelled diagrams 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) Define quality control.

b) Give any two examples of pathogens belonging to risk group 1.

c) Enlist any two ethical theories.

d) Approval or rejection of starting materials, packaging materials and finished products is the responsibility of which quality department?

e) Which ethical principle is related to freedom of choice?

f) List any two criteria used for classification of microorganisms into risk groups.

P.T.O.

Q2) Attempt the following :

a) Describe the roles of the following regulatory bodies : **[6]**

i) IBSC.

ii) CDSCO.

b) A researcher tries to invent a new vaccine for Cancer and will further progress to synthesize a vaccine for preventing the occurence of fatal cancer. Which principle of ethics is applicable here? Why? **[4]**

Q3) Attempt the following :

a) Explain the ethical principle of non-maleficence with a suitable example. **[6]**

b) Justify : Good manufacturing practices require a defined manufacturing process and necessary facilities. **[4]**

Q4) Attempt the following :

a) Discuss the core principles of ISO. **[6]**

b) Give the significance of bioethics with respect to bioterrorism. **[4]**

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

a) Role of CPCB in water quality monitoring.

b) Classification of human pathogens using biological risk assessment.

c) Guiding principles of good laboratory practices (GLP).