

MSE microbiology  
April 2015

नव - 001

Seat Number

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**MB 401**  
**Fermentation Technology**  
**(New)**

**P. Pages : 2**

**Time : Three Hours**

**Max. Marks : 80**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions carry equal marks.
5. Draw neat & labelled diagrams wherever necessary.

1. Answer in brief **any eight**. 16
  - a) Enlist any two factor affecting sterilization of media.
  - b) Explain - antifoam agent.
  - c) What is significance of pH -control system in bioreactor.
  - d) what is HPLC.
  - e) Explain - Liquid - Liquid extraction.
  - f) Enlist types of impellers used in bioreactor.
  - g) Explain - DPT.
  - h) What is means online analysis.
  - i) What is - thawing.
  - j) Explain mass transfer.
2. Answer **any two** of the following. 16
  - a) Define strain improvement? Discuss various approaches strain improvement.
  - b) Explain - large scale production of streptomycin antibiotics.
  - c) Explain - size exclusion chromatography.

3. Answer **any two** of the following. 16
- a) Discuss - biosafety aspects of tanding of infectious microbes.
  - b) Define bioreactor. Explain various criteria for bioreactor design.
  - c) Discuss fermentative production of citric acid.
4. Answer **any two** of following. 16
- a) Explain aeration & agitation strategies in fermentation process.
  - b) Explain **any two** approaches of product extraction.
  - c) Define IPR. Discuss - patents & copy rights.
5. Write short note **any four**. 16
- a) MMR vaccine.
  - b) Hyaluronic acid.
  - c) Sop.
  - d) Scale up of bioreactor.
  - e) Maintenance of aseptic condition.
  - f) Stoichiometry.

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**MB 101**  
**Microbial Diversity**

P. Pages : 2

Time : Three Hours

Max. Marks : 80

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Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Draw neat labelled diagram wherever necessary.
6. All questions carry equal marks.

1. Define **any eight**.

16

- a) Alginate.
- b) Prions.
- c) Acidophiles.
- d) Halophiles.
- e) Virus surveillance.
- f) RAPD
- g) Cancer.
- h) Dimorphic fungi.
- i) Alkalophiles.
- j) Capsids.

2. Describe **any two**. 16
- Write a note on nutritional requirement of algae.
  - What is ribotyping ? Write a note on it's applications.
  - Give the account of sexual reproduction in fungi.
3. Answer the following **any two**. 16
- Describe principle and application of DNA fingerprinting.
  - Write a note on disease caused by prions.
  - Explain different mode of reproduction in algae.
4. Explain **any two**. 16
- Describe the structure of various forms of algae.
  - Comment on roles of algae with their uses in food, fertilizer, cosmetics and animal feeds.
  - With the help of neat labelled diagram explain ultrastructure of algae.
5. Write a short note on **any four**. 16
- Applications of RAPD.
  - Role of algae as a therapeutic supplement.
  - Types of fungi based on nutrition.
  - Binary fission of algae.
  - Cultivation of animal viruses.
  - Draw the structure of Tobacco Mosaic virus.

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MB-301

## Applied and Environmental Microbiology

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Draw a neat labelled diagram wherever necessary.
5. All questions are compulsory and carry equal marks.

1. Attempt **any eight** of the following. 16
  - a) Draw a neat labelled diagram of it.
  - b) Ice-nucleation.
  - c) Explain composting.
  - d) Define lignocellulose.
  - e) Explain sedimentation.
  - f) Explain biostimulation.
  - g) What is biomarkers.
  - h) Discuss biomethanation.
  - i) What is viable count.
  - j) Describe bioluminescence gene.
  
2. Answer the following **any two**. 16
  - a) Explain preliminary and primary treatment process for sewage.
  - b) Bioremediation of xenobiotic compounds.
  - c) Give detail account on mycotoxin.

3. Answer the following **any two**. 16
- a) Explain in detail Biostimulation and Bioaugmentation.
  - b) Describe microbiological examination of milk.
  - c) Explain biomarker gene with suitable example.
4. Answer the following **any two**. 16
- a) Explain method of sampling.
  - b) Give microbiology and biochemistry of Biomethanation.
  - c) Explain anaerobic suspended growth treatment process.
5. Answer the following **any four**. 16
- a) Biological nitrogen removal.
  - b) Pond treatment process.
  - c) Explain rotating biological contractors.
  - d) Explain green florescent gene.
  - e) Write a note on food preservation.
  - f) Application of compost.

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**MB-201**  
**Microbial Genetics**

**P. Pages : 2****Time : Three Hours.****Max. Marks : 80****Instructions to Candidates :**

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All question are compulsory.
5. All question carry equal marks.
6. Draw neat labeled diagram where necessary.

**1. Define following terms Any Eight.**

**16**

- a) Point mutation
- b) Reverse transcription.
- c) Plasmid.
- d) Riboswitch.
- e) Quorum sensing.
- f) Euchromatin.
- g) Chromatin.
- h) Mutation rate.
- i) Null mutation.
- j) Mutagen.

**2. Answer any two of the following.**

**16**

- a) Explain mechanism of included mutation.
- b) Discuss - Conditional lethal mutation in viruses.
- c) Explain replication in RNA viruses.

3. Answer **any two** of the following. 16
- a) Discuss mechanism of plasmid segregation.
  - b) Explain role of DNA rearrangement in gene expression.
  - c) Explain role of restriction - modification system in DNA protection & repair.
4. Answer **any two** of the following. 16
- a) Explain gene regulation mechanism in lac operon.
  - b) Discuss isolation & purification of bacterial plasmid.
  - c) Discuss significance of mutants in industry & research field.
5. Write short note on **any four**. 16
- a) DNA dependent DNA polymerase.
  - b) Interrupted gene.
  - c) Genome of saccharomyces.
  - d) Transposons.
  - e) Plasmid curing.
  - f) Mutation probability.

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**MB-402**  
**Applied Molecular Biology**  
**(New)**

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

1. Answer the following in brief **any eight**. 16
- a) What are isoschizomers?
  - b) What are the sources of ligases?
  - c) Define replacement vectors.
  - d) What is disarming?
  - e) Define EST's?
  - f) Which immunochemical methods are used for confirmation of rDNA?
  - g) What is SAGE?
  - h) Define electroporation.
  - i) Name any two protein - ligand docking software applications.
  - j) Define primer extension.
2. Answer **any two** of the following : 16
- a) Explain colony & plaque hybridization for confirmation of rDNA.

- b) Explain genome mapping by conjugation.
- c) Elaborate the protocol involved in yeast & bacterial 2 - hybrid systems.

3. Answer **any two** of the following : 16

- a) Comment on use of 'Eukaryotic Vectors' in r DNA technology.
- b) Enlist various gene transfer techniques and explain any two of the following.
- c) Write a brief account on applications of genetic engineering.

4. Answer **any two** of the following : 16

- a) Explain the concept of CPG islands?
- b) Describe Sanger & Maxam Gilbert's method for DNA sequencing.
- c) Comment on plus and minus screening.

5. Write short notes on **any four**. 16

- a) Cosmids.
- b) Nested PCR
- c) Restriction mapping.
- d) Contigs.
- e) Protein ligand interactions.
- f) SNP identification.

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**MB-102**  
**Microbial Biochemistry**

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat and labelled diagram wherever necessary.

1. Answer in brief **any eight**.

16

- a) Give the classification of vitamins.
- b) Give the arrangement of mitochondrial ETC.
- c) Explain regulatory step in glyoxylate bypass.
- d) Define Translocation.
- e) Give the significance of Hydrogen bond
- f) Give the functions of carbohydrates.
- g) What is tertiary structure of protein?
- h) Pyruvate dehydrogenase.
- i) What are different fates of amino group?
- j) Define motifs and folds.

2. Answer the following **any two**.

16

- a) Explain binding protein transport system.
- b) Describe Na<sup>+</sup>/k<sup>+</sup> ATPase.
- c) Give the functions of proteins.

3. Answer the following **any two**. 16
- a) Describe the TCA cycle.
  - b) Describe C<sub>4</sub> pathway.
  - c) Describe features of fatty acid synthase.
4. Answer the following **any two**. 16
- a) Discuss urea cycle.
  - b) Describe the salvage pathway for nucleotide synthesis.
  - c) Give the properties of lipids.
5. Write short notes on **any four**. 16
- a) Ramachandran plot.
  - b) Bioenergetics of EMP pathway.
  - c) Response to stress.
  - d) Significance of HMP.
  - e) Regulation of pyrimidine nucleotide synthesis.
  - f)  $\beta$ -oxidation of fatty acid.

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MB-302

## Molecular Biology and Bioinformatics

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions carry equal marks.
5. Draw neat and labelled diagrams wherever necessary.

1. Answer in brief **any eight**.

16

- a) 70S ribosomes.
- b) Inverted repeats of DNA.
- c) Enlist nucleic acid databases.
- d) Draw labelled diagram of tRNA.
- e) tRNA synthetases.
- f) Zinc - finger motif.
- g) Define denaturation and renaturation of DNA.
- h) Promoter of transcription.
- i) Local alignment.
- j) Enlist elongation factors of eukaryotic translation.

2. Answer the following **any two**. 16
- a) Explain the process of mRNA splicing.
  - b) Write note on lysosomal protein targeting.
  - c) Explain BLAST and interpretation of results.
3. Answer the following **any two**. 16
- a) Discuss HSP and chaperons.
  - b) Explain Uniprot.
  - c) Describe the process of protein degradation.
4. Answer the following **any two**. 16
- a) Describe the process of translation in prokaryotes.
  - b) Give the mechanism of polyadenylation.
  - c) Explain the methods for phylogenetic analysis.
5. Write short note on **any four**. 16
- a) Gen Bank
  - b) Protein motifs.
  - c) RNA editing.
  - d) Write and twisting number.
  - e) 5' capping process of mRNA.
  - f) Translation Elongation.

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MB-202

**Microbial Enzymology**

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight**.

16

- a) Give the significance of  $V_{max}$ .
- b) Enlist the applications of cellulose.
- c) What is specific activity of enzyme?
- d) What is isoenzymes?
- e) What is Zymogen?
- f) Spot the differences between competitive & non - competitive inhibition.
- g) What is feed forward stimulation?
- h) Justify "all enzymes are not proteins."
- i) Define & explain ribozyme.
- j) What is oxidoreductases?

2. Attempt **any two**

16

- a) Explain the enzyme regulation by cAMP.

- b) Explain the kinetics of multisubstrate enzyme catalyzed reactions.
- c) Explain the effect of pH & temperature on enzyme activity.

3. Attempt any two.

16

- a) Give the nomenclature & classification of enzyme.
- b) Give the characteristics & biotechnological significance of psychrophilic enzymes.
- c) Give the source, significance & biotechnological applications of lipases.

4. Attempt any two

16

- a) Explain the concept & significance of enzyme turnover.
- b) Derive Michaelis - menten equation.
- c) Explain the effect of substrate concentration on enzyme activity.

5. Attempt any four

16

- a) Industrial applications of immobilization.
- b) Substrate specificity in enzymes.
- c) Covalent catalysis.
- d) Covalent modification of enzyme.
- e) Biotechnological application of process.
- f) Allosteric enzymes.

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**MB-403**  
**Agricultural Microbiology**  
**(New)**

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

1. Attempt **any eight**. 16
  - a) Types of siderophores.
  - b) Give two examples of PSM.
  - c) Give examples of bioreporter genes.
  - d) VAM.
  - e) What is phylloplane.
  - f) Define rhizosphere and rhizoplane.
  - g) Enlist the types of microbial interactions.
  - h) What is PGPR.
  - i) Give the list of methods use to quantitate microbial ecology.
  - j) Etiology and control of red rot of sugarcane.
  
2. Attempt **any two**. 16
  - a) Explain banana bunchy top.
  - b) Explain control of plant pathogens by genetic engineering.
  - c) Explain microbial pathogenicity mechanism in fungal pathogen.

3. Explain any two. 16
- a) Microbial production of BT.
  - b) Rhizodegradation and phytoremediation.
  - c) Nodulation process.
4. Attempt any two. 16
- a) Explain strategies for plant disease management.
  - b) Explain the role of PSM in integrated plant nutrition.
  - c) Explain structural plant defense mechanism.
5. Write notes on any two. 16
- a) Sigatoka disease of sugar cane.
  - b) Nitrogen fixation.
  - c) Microbial production of pseudomonas.
  - d) Types of biocontrol agents.
  - e) Genetic basis of plant pathogen interaction.
  - f) Bio reporter gene.

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MB-103

**Bio-Instrumentation**

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

1. Answer briefly the following **any eight**.

16

- a) What is the biological significance of Henderson – Hassel Balch equation?
- b) Where are EDTA buffers normally used?
- c) What are the tolerable dose of radiation by whole body & limbs?
- d) What is the greatest advantage of TLC?
- e) Define quenching. Enlist the types of quenching.
- f) Write salient features of specimen preparation in x-ray diffraction.
- g) Explain the principle of gel filtration.
- h) Define sedimentation coefficient.
- i) What is relative retention time?
- j) What is distribution coefficient?

2. Answer the following **any two**.

16

- a) Explain the principle & applications of gas chromatography.
- b) Explain the determination of molecular weight of small molecules by UV-Visible spectrophotometry.
- c) Describe the safety guidelines for radiolabelling techniques.

3. Answer the following **any two**. 16
- a) Explain the design of PAGE.
  - b) Explain colligative properties.
  - c) Explain image processing methods in microscopy.
4. Answer the following **any two**. 16
- a) Explain the determination of crystal structure by x-ray diffraction.
  - b) Describe the commonly used radioisotopes in biology.
  - c) Write a brief account of TEM.
5. Write short note on **any four**. 16
- a) Applications of isoelectric focussing.
  - b) Isoelectric pH.
  - c) Mass spectrometry.
  - d) Staining techniques for electron microscope.
  - e) Applications of HPLC.
  - f) Ultracentrifugation.

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MB-303

**Pharmaceutical Microbiology**

P. Pages : 2

Time : Three Hours

Max. Marks : 80

**Instructions to Candidates :**

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full marks.
6. Draw a neat labelled diagrams wherever necessary.

**1. Comment on any four.****16**

- a) F - value
- b) Interferons.
- c) Sulphonamides
- d) Types of microbial spoilage.
- e) FDA regulations.
- f) DNA vaccines.

**2. Attempt any two.****16**

- a) Explain the production of bacterial vaccines.
- b) Explain GMP in pharmaceuticals.
- c) Explain microbial contamination in pharmaceuticals.

3. Attempt any two. 16
- a) Explain reimbursement of drugs & biologicals.
  - b) Explain the mode of action & adverse reactions of Chloramphenicol.
  - c) Explain the concept of pro-drug & give it's applications.
4. Attempt any two 16
- a) Explain the mode of action & Prophylactic usage of Quinolones.
  - b) Explain the microbial spoilage & preservation.
  - c) Explain the production of asparaginase.
5. Write short notes on any four. 16
- a) Novel therapeutics.
  - b) Live recombinant virion subunit vaccines.
  - c) WHO process.
  - d) Biological indicators of sterility testing.
  - e) D - value.
  - f) Pharmacopeia.

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Seat Number

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**MB-203**  
**Immunology**

**P. Pages : 2****Time : Three Hours****Max. Marks : 80****Instructions to Candidates :**

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carries equal marks.
5. Figures to the right indicate full marks.
6. Draw neat labelled diagrams wherever necessary.

1. Attempt **any eight** of the following. 16
- a) Which organ destroys effete cells.
  - b) Which organ is known as mother of all cells.
  - c) What are vaccines? Give their types.
  - d) What is enzyme amplification.
  - e) MHC restriction.
  - f) What is autoimmunity.
  - g) Radio labelling of Ag in RIA.
  - h) Immunotolerance.
  - i) Cells involved in immunoregulation.
  - j) Atopy.
  - k) Structure of MHC.
  - i) Hypersensitivity - immediate and delayed.

2. Attempt following **any two**. 16
- a) Mechanism of immunotolerance.
  - b) MHC- structure properties and significance.
  - c) Cell mediates immunity.
3. Attempt following **any four**. 16
- a) Immunity to tumor Ags.
  - b) Structure of thymus.
  - c) T cell subtypes.
  - d) Properties of cytokines.
  - e) HLA typing.
  - f) Properties of Ag.
4. Attempt following **any two**. 16
- a) Perforin Granzyme pathway.
  - b) Graft rejection.
  - c) Activation of classical pathway.
5. Attempt following **any four**. 16
- a) Application of monoclonal ab.
  - b) Functions of macrophages.
  - c) Causes of autoimmunity.
  - d) Somatic gene rearrangement.
  - e) B cell activation by T independent Ag.
  - f) Autoimmune anaemia.

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