SEMESTER -I

MJC-1 (T): Phycology and Microbiology

Course Objective

This Course aims to enhance the knowledge of Algae and Microbes. Algae have significant importance in industry and also used as food and fodder. As microbes are everywhere and affect almost all aspects of our lives, the study of microbes is necessary.

Course Outcomes

After the completion of the course, the students will be able to:

CO1: Classify the plant kingdom
CO2: Describe the diversity, structure and importance of viruses and bacteria
CO3: Describe the general account of mycoplasma
CO4: Explain the thallus organization, economic importance and the life cycle of various algae

MJC-1 (T)	**Phycology and Microbiology (Theory : 4 credits)**	
Unit	**Topics to be covered**	**No. of Lectures**
1	Classification of Plant Kingdom and their important features (Whittaker1969)	02
2	Algae- General characteristics; Classification; Range of thallus organization and reproduction; Significant contributions of important Phycologists (F.E. Fritsch, G.M.Smith, H.D.Kumar, M.O.P. Iyengar); Structure, Life history and affinities of the following genera: *Nostoc, Volvox, Oedogonium, Chara, Vaucheria, Batrachospermum* and *Ectocarpus*; Economic Importance of Algae	14
3	Virus- Discovery and General structure, DNA virus (Bacteriophage)-Structure and its replication (Lytic and lysogenic Cycle), RNA virus-TMV, Corona virus (elementary idea); Economic importance of viruses	10
4	Bacteria – Discovery, Characteristics, Types- Archaebacteria and Eubacteria, Reproduction-vegetative, asexual and genetic recombination (conjugation, transformation and transduction); Economic importance of bacteria with reference to their role in agriculture and industry; Role of Microbes in Biological nitrogen fixation; General account of Mycoplasma.	14
	TOTAL	**40**

Suggested Readings:

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Prescott, L.M., Harley J.P., Klein D.A. (2005). Microbiology, McGraw Hill, India. 6th edition
3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
4. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.
5. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.
6. Vashishtha, B.R., Sinha, A.K. Singh,V.P. (2010). Botany for degree students: Algae, S.Chand & Company Ltd. 2nd edition
7. Srivastava, H.N. (2005). Algae, Pradeep Publication. 12th edition.
8. Dubey R.C., Maheshwari D.K.(2005). A Text Book of Microbiology, S. Chand & Company Ltd. 2nd edition.

MJC-1 (P)	Phycology and Microbiology (Practical: 2 credits)	Number of Classes
Practical 1. Electron micrographs/Models of viruses–T-Phage and TMV 2. Line drawings/Photographs of Lytic and Lysogenic Cycle 3. Types of Bacteria to be observed from photographs 4. Gram staining of bacteria. 5. Phycology: Study of vegetative and reproductive structures of the forms prescribed in the syllabus through temporary slides preparation.		**40**

SEMESTER -I

MIC-1 (T): Phycology and Microbiology

Course Objective

This Course aims to enhance the knowledge of Algae and Microbes. Algae have significant importance in industry and also used as food and fodder. As microbes are everywhere and affect almost all aspects of our lives, the study of microbes is necessary.

Course Outcomes

After the completion of the course, the students will be able to:

CO1: Classify the plant kingdom
CO2: Describe the diversity, structure and importance of viruses and bacteria
CO3: Describe the general account of mycoplasma
CO4: Explain the thallus organization, economic importance and the life cycle of various algae

MIC-1 (T) Phycology and Microbiology (Theory: 2 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	Algae: Characteristics, Morphology and life cycle of *Nostoc, Oedogonium* and *Chara*	07
2	Virus- Discovery and General Structure, DNA Virus (Bacteriophage)-Structure and its replication (Lytic and Lysogenic Cycle), RNA Virus (TMV), Economic importance of Viruses.	06
3	Bacteria – Discovery, Characteristics and cell structure, Reproduction- Vegetative, asexual and genetic recombination (Conjugation, Transformation and Transduction), Economic importance of Bacteria.	07
	TOTAL	**20**

Suggested Readings:

1. Lee, R.E. (2008).Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Prescott, L.M.,HarleyJ.P.,KleinD.A.(2005).Microbiology,McGrawHill,India.6th edition
3. Kumar,H.D.(1999).IntroductoryPhycology.AffiliatedEast-WestPress,Delhi.
4. Campbell, N.A., Reece J.B.,UrryL.A.,CainM.L.,WassermanS.A.MinorskyP.V.,JacksonR.B.(2008).Biology,Pearson Benjamin Cummings, USA. 8th edition.
5. Pelczar, M.J.(2001) Microbiology, 5th edition, Tata McGraw-HillCo, New Delhi.
6. Vashishtha, B.R.,Sinha, A.K. Singh,V.P.(2010). Botany for degree students: Algae, S. Chand & Company Ltd. 2nd edition
7. Srivastava, H.N.(2005).Algae, Pradeep Publication. 12th edition.
8. Dubey R.C., Maheshwari D.K. (2005). A Text Book of Microbiology, S. Chand & Company Ltd. 2nd edition.

MIC-1 (P) Phycology and Microbiology (Practical: 1 credit)	No. of Classes
(a) Algae- Study of Vegetative and reproductive structures of the forms prescribed in the syllabus through temporary slides preparation . (b) Models and microphotographs of viruses and bacteria.	**20**

SEMESTER -I

MDC-1 (T): Phycology and Microbiology

Course Objective

This Course aims to enhance the knowledge of Algae and Microbes. Algae have significant importance in industry and also used as food and fodder. As microbes are everywhere and affect almost all aspects of our lives, the study of microbes is necessary.

Course Outcomes

After the completion of the course, the students will be able to:

CO1: Classify the plant kingdom
CO2: Describe the diversity, structure and importance of viruses and bacteria
CO3: Describe the general account of mycoplasma
CO4: Explain the thallus organization, economic importance and the life cycle of various algae

MDC-1 (T) Phycology and Microbiology (Theory: 2 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	Algae: Characteristics, Morphology and life cycle of *Nostoc, Oedogonium* and *Chara*	07
2	Virus- Discovery and General Structure, DNA Virus (Bacteriophage)-Structure and its replication (Lytic and Lysogenic Cycle), RNA Virus (TMV), Economic importance of Viruses.	06
3	Bacteria – Discovery, Characteristics and cell structure, Reproduction- Vegetative, asexual and genetic recombination (Conjugation, Transformation and Transduction), Economic importance of Bacteria.	07
	TOTAL	**20**

Suggested Readings:

1. Lee, R.E. (2008).Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Prescott, L.M.,HarleyJ.P.,KleinD.A.(2005).Microbiology,McGrawHill,India.6th edition
3. Kumar,H.D.(1999).IntroductoryPhycology.AffiliatedEast-WestPress.Delhi.
4. Campbell, N.A., Reece J.B.,UrryL.A.,CainM.L.,WassermanS.A.MinorskyP.V.,JacksonR.B.(2008).Biology,Pearson Benjamin Cummings, USA. 8th edition.
5. Pelczar, M.J.(2001) Microbiology, 5th edition, Tata McGraw-HillCo, New Delhi.
6. Vashishtha, B.R.,Sinha, A.K. Singh,V.P.(2010). Botany for degree students: Algae, S. Chand & Company Ltd. 2nd edition
7. Srivastava, H.N.(2005).Algae, Pradeep Publication. 12th edition.
8. Dubey R.C., Maheshwari D.K. (2005). A Text Book of Microbiology, S. Chand & Company Ltd. 2nd edition.

MDC-1(P) Phycology and Microbiology (Practical: 1 credit)	No. of Classes
(c) Algae- Study of Vegetative and reproductive structures of the forms prescribed in the syllabus through temporary slides preparation . (d) Models and microphotographs of viruses and bacteria.	**20**

Semester-II

MJC-2 (T): Bio molecules and Cell Biology

Course Objective

Students should be able to understand the biological Micromolecules. The accurate measurement and monitoring of the concentration of specific Bio molecules in a living system are crucial to ensure the well-being of the cells and living organism.

Course Outcomes

After the completion of the course, the student will be able to:

- **CO1:** Describe the structure, properties and functions of bio molecules
- **CO2:** Explain the classification, properties and functions of enzymes
- **CO3:** Describe cell wall, cell membrane and the structure and functions of cellular organelles
- **CO4:** Explain the eukaryotic cell cycle, mitosis and meiosis

MJC-2 (T)	**Bio molecules and Cell Biology (Theory: 4 credits)**	
Unit	**Topics to be covered**	**No. of Lectures**
1	Biomolecules: Structure, classification and function of Carbohydrates, amino acids, proteins, lipids and nucleic acid	12
2	Enzymes: Classification, nomenclature, physico-chemical properties mechanism of action and regulation	10
3	Cell: Cell theory; Structure of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory); Cell wall and Cell membrane, structure and function of cell organelles: nucleus, mitochondria, ribosomes, golgi apparatus, endoplasmic reticulum, lysosomes, chloroplast and vacuoles; Structure of chromosome with nucleosome concept	14
4	Cell cycle; Cell division: Mitosis and meiosis	04
	TOTAL	**40**

Suggested Readings:

1. Camp bell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning.
2. Camp bell, PN and Smith AD(2011) Bio chemistry Illustrated, 4th ed., Published by Churchill Living stone.
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed.,W.H.Freeman
4. Berg JM , Tymoczko JL and Stryer L(2011) Bio chemistry, W.H. Freeman and Company.
5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H.Freeman and Company.
6. Karp ,G.(2010).Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
7. Hardin,J.,Becker,G.,Skliensmith,L.J.(2012).Becker's World of the Cell,Pearson Education Inc.U.S.A. 8th edition.
8. Cooper, G.M .and Hausman, R.E.(2009)The Cell: A Molecular Approach, 5th edition. ASM.
9. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G.P. (2009) The World of the Cell 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

MJC-2 (P)	Bio molecules and Cell Biology (Practical: 2 credits)	Number of Classes
Practical 1. Estimation of protein and sugar 2. Detection of tannin, alkaloid and flavonoid in the given plant sample 3. Separation of amino acids by paper chromatography technique 4. Study of cell and its organelles with the help of electron microphotographs 5. Study of different stages of mitosis and meiosis		**40**

SEMESTER -II

MIC-2 (T): Bio molecules and Cell Biology

Course Objective

Students should be able to understand the Micromolecules. The accurate measurement and monitoring of the concentration of specific Bio molecules in a living system are crucial to ensure the well-being of the cells and living organism.

Course Outcomes

After the completion of the course, the student will be able to:

CO1: Describe the structure and properties of bio molecules
CO2: Explain the classification, properties and functions of enzymes
CO3: Describe cell wall, cell membrane and the structure, chemistry and functions of cellular organelles
CO4: Explain the eukaryotic cell cycle, mitotic and meiotic cell divisions; and regulation of cell cycle

MIC 2 (T)	Bio molecules and Cell Biology (Theory: 2 credits)	
Unit	**Topics to be covered**	**No. of Lectures**
1	Bio molecules- Structure, classification and function of Carbohydrates, Amino acids, Protein	06
2	Enzymes- Nomenclature, Classification, mode of action	04
3	Cell Biology- a. Structure of the cell as seen under Electron Microscope a. Characteristics of Prokaryotic & Eukaryotic Cells b. Structure of Chromosome c. Mitosis and meiosis	10
	TOTAL	**20**

Suggested Readings:

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning.
2. Campbell, PN and Smith AD (2011) Bio chemistry Illustrated, 4th ed., Published by Churchill Living stone.
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Bio chemistry, W.H. Freeman and Company.
5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
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8. Cooper, G.M .and Hausman, R.E.(2009)The Cell: A Molecular Approach, 5th edition. ASM.
9. Becker,W.M.,Kleinsmith, L.J., Hardin.J. and Bertoni, G.P.(2009) The World of the Cell 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

MIC-2 (P) Bio molecules and Cell Biology (Practical: 1 credit)	No. of Classes
1. Estimation of Carbohydrates, Amino acid and Protein 2. Study of different stages of mitosis and meiosis	**20**

SEMESTER -II

MDC-2 (T): Bio molecules and Cell Biology

Course Objective

Students should be able to understand the Micromolecules. The accurate measurement and monitoring of the concentration of specific Bio molecules in a living system are crucial to ensure the well-being of the cells and living organism.

Course Outcomes

After the completion of the course, the student will be able to:

CO1: Describe the structure and properties of bio molecules
CO2: Explain the classification, properties and functions of enzymes
CO3: Describe cell wall, cell membrane and the structure, chemistry and functions of cellular organelles
CO4: Explain the eukaryotic cell cycle, mitotic and meiotic cell divisions; and regulation of cell cycle

MDC 2 (T)	Bio molecules and Cell Biology (Theory: 2 credits)	
Unit	**Topics to be covered**	**No. of Lectures**
1	Bio molecules- Structure, classification and function of Carbohydrates, Amino acids, Protein	06
2	Enzymes- Nomenclature, Classification, mode of action	04
3	Cell Biology- a. Structure of the cell as seen under Electron Microscope b. Characteristics of Prokaryotic & Eukaryotic Cells c. Structure of Chromosome d. Mitosis and meiosis	10
	TOTAL	**20**

Suggested Readings:

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning.
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3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Bio chemistry, W.H. Freeman and Company.
5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
6. Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A .6th edition.
7. Hardin, J., Becker, G.,S Kliensmith, L.J.(2012). Becker's World of the Cell, Pearson Education Inc. U.S.A. 8th edition.
8. Cooper, G.M .and Hausman, R.E.(2009)The Cell: A Molecular Approach, 5thedition. ASM.
9. Becker,W.M.,Kleinsmith,L.J.,Hardin.J.andBertoni,G.P.(2009)TheWorld of the Cell 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

MDC-2 (P) Bio molecules and Cell Biology (Practical: 1 credit)	No. of Classes
1. Estimation of Carbohydrates, Amino acid and Protein 2. Study of different stages of mitosis and meiosis	**20**

The question paper pattern of ESE shall consist of three parts-

Part A- Compulsory-consisting of objective type/multiple choice type each carrying two marks- 10x2= 20 marks

Part B- Short answer Type- Four questions to be answered out of six questions each carrying five marks- 04x5=20 marks

Part C- Long Answer Type- Three questions to be answered out of Five questions each carrying ten marks- 03x10=30