

**SYLLABUS**

**B. Sc. FORESTRY/ AGRICULTURE PROGRAMME 1ST YEAR**

**School of Sciences**

**EDITION 2014**

# SCHOOL OF SCIENCES

**B. Sc. FORESTRY/ AGRICULTURE Course 1st Year**

**Teaching & Examination Scheme**

**Edition 2014**

#### B. Sc. FORESTRY/AGRICULTURE Course 1st year Semester: I

|  |  |  |  |  |  |  |  |  |  |  |
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| **S.**  **No.** | **Course code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  | |  |  |  |
| 1 | EN 103 | English | 3 | 3 | 0 | 0 | | 3 | 30 | 70 |
| 2 | CP 103 | Fundamentals of Computers | 3 | 3 | 0 | 0 | | 3 | 30 | 70 |
| 3 | ES 101 | Environmental Studies | 2 | 2 | 0 | 0 | | 3 | 30 | 70 |
| 4 | SC 111 | Cytology | 3 | 3 | 0 | 0 | | 3 | 30 | 70 |
| 5 | SC 113 | Plant Biochemistry | 3 | 3 | 0 | 0 | | 3 | 30 | 70 |
|  |  | **B. Practicals**  **B. Practical & Sessional:** |  |  |  |  | |  |  |  |
| 6 | CP 161 | Computer Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
| 7 | SC161 | Cytology Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
| 8 | SC163 | Plant Biochemistry Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
| 9 | EN 161 | English communication Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
|  |  | **C. Discipline & Extra Curricular Activities** |  |  |  |  | |  |  |  |
| 10 | DC101 | Discipline and Extra Curricular Activities - I | 2 | 0 | 0 | 0 | | 0 | 100 | 0 |
|  |  | **Total** | **20** | **14** | **0** | **8** | |  |  |  |

**B. Sc. FORESTRY/ AGRICULTURE Course 1st year Semester: II**

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| **S.**  **No.** | **Course code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
| 1 | EN 104 | Communication Skill | 2 | 2 | 0 | 0 | 3 | 30 | 70 |
| 2 | SC 112 | Plant Physiology | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | SC114 | Plant Pathology | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | SC116 | Elementary Microbiology and Soil Microbiology | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | SC118 | Elementary Genetics | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 162 | Plant Physiology lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 7 | SC 164 | Plant Pathology Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 8 | SC 166 | Elementary Microbiology and Soil Microbiology lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 9 | SC 168 | Elementary Genetics lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  | **C. Discipline & Extra Curricular Activities** |  |  |  |  |  |  |  |
| 11 | DC 102 | Discipline and Extra Curricular Activities - II | 2 | 0 | 0 | 0 | 0 | 100 | 0 |
|  |  | **Total** | **20** | **14** | **0** | **8** |  |  |  |

#### EN103 ENGLISH C (L, T, P) = 3 (3, 0, 0)

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | **Phonetics and vocabulary - Transcription of phonetic symbols**  Word stress  Synonyms and antonyms  Word formation- Prefix, Suffix | 4 Hours |
| **II** | **Grammar and usage - Transformation of sentences**  Direct and indirect narration  Active and passive voice  Interchange of degrees of comparison | 4 Hours |
| **III** | Modals  Sequence of Tenses  Elements of a clauses (as discussed in quirk and greenbaum) | 4 Hours |
| **IV** | Following texts to be compiled by macmillan  William Blake The Little Black Boy  Sujata Bhatt Voice Of The Unwanted Girl  Lewis Carroll A Mad Tea Party  Ruskin Bond Night Train For Deoli  M.K.Gandi The Birth Of Khadi  J.L.Nehru A Tryst With Destiny  Martin L King I Have A Dream  A.P.J.Abdul Kalam Vision For 2020 | 4 Hours |
| **V** | Letter- Formal and Informal  CV’s and Job Application  Paragraph Writing | 4 Hours |

***Recommended books: -***

*Popular Short stories* Oxford University Press Penguin Book of Verse Penguin

Complete works of Chinua Achebe – AITBS publication

The Old Man and the sea – E Hemingway The Complete works of Leo Tolstoy.

Prose for pleasure and Comprehension – H G S Rao Oxford Publication.

*Oxford Companion to English Literature* O U P

*A glossary of literary terms* -M H Abrams

**CP 103 FUNDAMENTALS OF COMPUTERS C (L, T, P) = 3(3, 0, 0)**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | Introduction about System software and Application software with examples:  Introduction to Windows: Icon, Menu, Desktop.  Creating Folder and Shortcut, Searching Files and Folders in System, Creating Files, Copying, Moving and Deleting Files, Adding programs in Start Menu, Deleting Programs from Start Menu, Using Windows Explorer utility. | 6 Hours |
| **II** | Word Processing Package:  Introduction to MS Word, menu options, saving and creating document. Working with Tables, Mail Merge, AutoText and AutoShapes, Word Art and Clip art, Macros, Printing Documents. | 6 Hours |
| **III** | Spreadsheet Package:  Concept of Spreadsheet, MS Excel, Basic and Advanced Features of MS Excel, Sorting and Searching Data, Filtering Data, linking Workbooks, using Formulas, Protecting and Hiding Data, Formatting a worksheet, Creating Graphic Objects, Charts (Graphs), Sharing and Importing Data, Printing Worksheets, Macros, Pivot Table and Pivot Chart, Reports. | 6 Hours |
| **IV** | Presentation Package:  Introduction about MS Power Point, Creating and editing slides, Using Objects on slides, Putting Animation and Sound effects on slides, Transition effects on slides, Different views of Slides: Normal slide sorter, slide show and Notes Page, Printing slides, Using Macros, comparing and merging presentations, Autocorrect Options, Recording narrations, templates, introduction about Master Slides, Object Embedded Linking. | 6 Hours |
| **V** | Basic concepts of programming: languages, evolution of the major programming languages, types of programming languages, programming environments: Compiler, Interpreter, Assembler. Algorithm development: Steps in program development, Algorithms, Flow-charting, program coding, testing and debugging. | 6 Hours |

**Reference/ Text Books:**

Norton P., Introduction to Computers - TMH

Muller S., Upgrading and Repairing PC - QUE

Muller S., Upgrading and Repairing Network - QUE

Bott, Using MS Office 2000 – PHI

Kapoor VK and Gupta SC 'Fundamentals of Mathematical Statistics', S. Chand and Comp. Pvt. Ltd., New Delhi .

Goon AM, Gupta MK and Dasgupta V, 'Fundamentals of Statistics’ 1971, World Press Calcutta.

Agarwal BL 'Basic Statistics', New Age International Publishers, New Delhi, 1996.

Sundar Rao PHS, 'Introduction of Biostats', Prentice Hall, India.

Rohlf, FJ and Sokal, RR ‘Biometry: The principles and practice of Statistics in Biological Research', 1995 W.H. Freeman, New York.

**ES101 ENVIRONMENTAL STUDIES C (L, T, P) = 2 (2, 0, 0)**

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| **Units** | **Contents of the Course** | **Hours** |
| I | Man & Environment: Definition of Environment & its various components. Ecosystem concepts. Dependence of Man on nature for its various needs. Human population growth & its impacts on environment. Environment & human health. Environmental concerns including climate change, Global warming, Acid Rain, Ozone layer Depletion etc. Environmental ethics. Traditional ways of utilizing various components of environment. Sustainable developments. | 4 Hours | |
| II | Natural Resources: Forest resources, Mining, Dams & their effects on forests & tribal people. Water resources-over utilization of water, floods, droughts and conflicts over water resources. Mineral Resources- Use of various minerals for Human welfare & environmental effects of mining. Food resources -World food problem. Impacts of changing Agriculture practices on Environment. Energy Resources-Renewable and non renewable energy Resources & exploration of alternative energy sources. Land Resources- land degradation, soil erosion, desertification and soil contamination. | 4 Hours | |
| III | Ecosystems: Structure & function, energy flow, food chains, food webs, Ecological pyramids. Basics of forest grasslands, desert & aquatic ecosystem (Ponds, Streams, Lakes, Rivers, Oceans & Estuaries) | 4 Hours | |
| IV | Biological Diversity: Genetic, species & ecosystem diversity, Values of Biodiversity, Global, National & Local Biodiversity. Hot-spots of Biodiversity, threat to biodiversity. Endangered & endemic species of India. Conservation of biodiversity in situ & ex-situ | 4 Hours | |
| V | Environment pollution: Causes, effects & control of- Air pollution, Water pollution, Soil pollution, Noise Pollution, Thermal pollution & Nuclear Hazards. Solid wastes & their Management. Disaster Management-Flood, Drought, Earthquake, Landslides etc. | 4 Hours | |

#### Recommended Books

1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.

2. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad –

3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.

4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).

5. Cunningham WP, Cooper TH, Gorhani E & Hepworth MT, 2001. Environmental Encyclopaedia, Jaico Publishing House, Mumbai

6. De AK, Environmental Chemistry, Wiley Eastern Ltd.

7. Down to Earth, Center for Science and Environment (R)

8. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press,

#### SC111 Cytology C (L, T, P) = 3 (3, 0, 0)

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| **Units** | **Contents of the Course** | **Hours** |
| I | **Origin of Life :** History of earth, theories of origin of life nature of the earliest organism.Classification, Five kingdoms, viruses (TMV, HIV, Bacteriophage), Prokaryote (Bacteria-cell structure, nutrition, reproduction), Protista, Fungi, Plantae and Animalia. | 7 |
| II | Introduction to cell: Morphology, size, shape and characteristics of Prokaryotic, Eukaryotic, Plant and animal cells; cell-theory. Cell membrane: Characteristics of cell membrane transport molecules, fluid mosaic model of Singer and Nicolson, concept of unit membrane. Cell membrane transport: Passive (diffusion and osmosis facilitated (mediated) and active transport. | 7 |
| III | **Cell :** The cell concept, structure of prokaryotic and eukaryotic cells, plant cells and animal cells, cell membrances, cell organelles and their function. | 7 |
| IV | Tools and techniques used in cell study; ultrastructures and functions of different cell organelles of eukaryotes and prokaryotes (cell wall, plasmamembrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, golgi bodies, etc.). | 7 |
| V | Cell reproduction**,** Basic features of cell cycle, Mitosis, mitotic spindle and chromosome movement, Process and phases of meiosis and its significance , Cell divisions: cell cycles, mitosis phases. | 7 |
|  | **Total** | **35** |

#### Books Recommended:

1. Molecular Cell biology, Lodish, Berk and others. W.H. Freeman and Co., 2004, Fifth Edition.
2. Principles of Biochemistry, Garrette and Grisham, Saunders College Publishing, 1994.
3. Molecular Cell Biology, Harvey Lodish, Baltimore David *et al*., Scientific American Books, W.H.Freeman and Company, Third Edition, 1995.
4. Bohinski, R.C.(1987): Modern concepts in Biochemistry (Alllyn & Bascon Inc. Boston)
5. Caret et al.(1993): Inorganic, Organic and Biological Chemistry (WMC Brown Publ. USA).

#### SC 113Plant Biochemistry C (L, T, P) = 3 (3,0,0)

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| **Units** | **Contents of the Course** | **Hours** |
| I | **CONCEPT OF BIOCHEMISTRY**  Biomolecules (The primordial biomolecules, the origin of biomolecules, the fitness of biomolecules, Hierarchy of Biomolecules)  Discovery and structure of ATP  Hydrolysis of ATP and role of ATP in Biological reactions | 7 |
| II | **BIOMOLECULES (Carbohydrate)**  **Carbohydrates**- Simple sugars, reducing and non-reducing sugars.  Classification into monosaccharides, oliogsacharides and polysaccharides.  Mutarotation and inversion. | 7 |
| III | **BIOMOLECULES** (**Lipids**)  **Lipids**– Classification and structure of lipids  Fatty acids- saturated and unsaturated, triacyl glycerols, phospholipids and sphingolipids  Fatty acids biosynthesis  Oxidation of fatty acids | 7 |
| IV | **BIOMOLECULES** (**Nucleic acid)**- Bases, Nucleoside and Nucleotide  Phosphodiester bonds, Hydrogen bonding.  DNA structure: DNA double helix (Watson and Crick model),  Super-coiling, Properties of DNA  Denaturation  Structure of t-RNA | 7 |
| V | **BIOMOLECULES (Proteins)**  **Proteins**- Structure and classification of amino acids based on polarity  Zwitter ion nature; properties of amino acids  Peptide bond formation  Classification and Structure of proteins (Primary, secondary, tertiary and quaternary) Conformation and Denaturation | 7 |
|  | **Total** | **35** |

**Reference Books**

1. Berg, JM., Tymoczko, J.L., Stryer, L. 2006, ***Biochemistry 6th Edition***, W.H. Freeman and Company, New York.
2. Buchanan, B., Gruissem, W. and Jones, R. 2000 ***Biochemistry and Molecular Biology of Plants***  American Society of Plant Biologists.
3. Conn, E.E., Stumpf, P.K. and Bruening, G. 2006 ***Outlines of Biochemistry*** ***4th Edition,*** John Wiley and Sons Inc.
4. Donald Voet, Judith.G. Voet and Charlotte W. Pratt (2006) ***Fundamentals of Biochemistry***, 2nd Edition, John Wiley and Sons Inc.
5. Elliot 2009 ***Biochemistry and Molecular Biology*** Oxford Publishers.
6. Harper, 2003, ***Biochemistry,*** McGrawHill.
7. Keith Wilson and John Walker 2005 ***Principles and Techniques of Biochemistry and Molecular Biology(6th Edition)***, Cambridge University Press, USA
8. Nelson, D.L., Cox, M.M. 2004 ***Lehninger Principles of Biochemistry, 4th edition***, W.H. Freeman and Company, New York, USA.
9. Stryer, L., 2002, ***Biochemistry***, W.H. Freeman.
10. Voet & Voet, 2000, ***Biochemistry***, John Wiley, New York
11. Wilson K and Walker J., 2008 Principles ***and techniques of Biochemistry and Molecular Biology.*** Cambridge University Press.
12. Zubay, 1995, ***Biochemistry,*** Brown Publishers

**EN 104 COMMUNICATION SKILLS C (L, T, P) = 2(2, 0, 0) Total Lect.-20**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | Communication: Language and communication, differences between speech and writing, distinct features of speech, distinct features of writing. | 5 |
| **II** | Writing Skills; Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing. | 5Hours |
| **III** | Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided. | 5Hours |
| **IV** | Definition of Listening, Reading, Writing and Communicating, Barriers in the path of Communication, Signposting, Outlines, Rephrasing, Listening to conversation (Formal and informal), Techniques of reading, skimming, Scanning, SQ3R technique. | 5 Hours |
| **V** | Paragraph, Letter Writing, Essay writing, Memo, Circular, Notice, Cover Letter, Resume, Thesis, Summary, Précis, Speaking – How to converse with people, How to communicate effectively. | 5 Hours |

**Reference and Text books**

1. M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice Hall Reagents.

2. L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academic and professional purposes, Cambridge Univ. Press.

3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.

4. Daniel G. Riordan & Steven A. Panley: *“Technical Report Writing Today”* - Biztaantra.

#### SC112 PLANT PHYSIOLOGY C (L, T, P) = 3(3, 0, 0)

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| **Units** | **Contents of Course** | **Hours** |
| **I** | UNIT 1: **PLANT WATER RELATIONS**  Structure and properties of water Absorption of water (active and passive),  Ascent of sap; Pathway of water movement; concepts of symplast and apoplast,  Guttation and transpiration, Significance of transpiration Physiology role of stomata | **7 hrs,** |
| **II** | **MINERAL NUTRITION**  Macro and Micro nutrients; Role of essential nutrients in plant metabolism and their deficiency symptoms. Absorption of mineral elements-   1. Active and passive absorption 2. Simple and facilitated diffusion 3. Donnan equilibrium 4. Role of ATP, 5. Carrier systems, proton pump and ion flux | **7 hrs.** |
| **III** | **PHOTOSYNTHESIS**  Definition and Significance  Site of photosynthesis,  Photochemical phase   1. Electron transport chain. 2. Photophosphorylation- (cyclic and non cyclic) | **7 hrs.** |
| **IV** | **PHOTORESPIRATION**  Biosynthetic phase,   1. Benson and Calvin cycle 2. Hatch and Slack pathway, Photorespiration Significance | **7 hrs.** |
| **V** | **PLANT GROWTH AND DEVELOPMENT**  Physiological effect of Auxin. Cytokinins, Gibberellinsand Ethylene and their role in plant development.  Physiology of senescence and abscission  Brief outlines on   1. Photoperiodism 2. Vernalization. 3. Phytochrome | **7 hrs.** |
|  | **Total** | **35** |

**Books Recommended**

1. Daubenmier, R.F. 1970, ***Plant Communities***, Wiley Eastern Private Limited
2. Daubenmier, RF.1970. ***Plants and Environment: A text book of Plant Autoecology***, Wiley Eastern Private Limited
3. Dennis, D.T., Layzell, D.B., Lefebre, D.D. and Turpin, D.H. (1997) ***Plant Metabolism.*** Addison Wesley Longman.
4. Hopkins, W.G. and Huner, P.A. (2008) ***Introduction to Plant Physiology.*** John Wiley and Sons.
5. Kandya AK and Gupta A 2007 ***Advancing frontiers of Ecological Researches in India***
6. Kaul RP (2009) ***Plant Metabolism***. Swastik Publishers and Distributors.
7. Koromondy EJ 1996 ***Concepts of Ecology 4th Edition*** Prentice-Hall of India Pvt. Ltd. New Delhi
8. Misra KC 1988 ***Manuals of Plant Ecology (3rd Edition)*** Oxford and IBH Publishing Co., New Delhi.
9. Mukherjee S., Ghosh AK., 2006 ***Plant Physiology*** New Central Book Agency Calcutta
10. Nelson, D.L., Cox, M.M. (2004) Lehninger ***Principles of Biochemistry, 4th Edition***, WH Freeman and Company, New York, USA.
11. Odum EP 1983 ***Basic Ecology 5th Edition*** Thomson Business International Waldis Pvt Ltd. Baricahd
12. Odum, EP. (2008) ***Ecology***. Oxford and IBH Publisher.
13. Salisbury, F.B. and Ross, C.W. (1991) ***Plant Physiology,*** Wadsworth Publishing Co. Ltd.
14. Sharma, P.D. (2010) ***Ecology and Environment, (8th Edition)*** Rastogi Publications, Meerut.
15. Singh, JS., Singh, SP. and Gupta, S. 2006 ***Ecology Environment and Resource Conservation*** Anamaya Publications, New Delhi
16. Sinha RK., 2007 ***Modern Plant Physiology*** 2nd Edition Tata McGraw, New Delhi.
17. Taiz, L. and Zeiger, E. (2006) ***Plant Physiology,*** 4th Edition Sinauer Associates Inc. Publishers, Massachusetts, USA

#### SC 114 PLANT PATHOLOGY C (L, T, P) = 3 (3, 0, 0)

|  |  |  |
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| **Units** | **Contents of Course** | **Hours** |
| **I** | Definition and importance of plant pathology. Causes of plant diseases.  Classification of plant diseases according to cause and occurrence. | **7 hrs,** |
| **II** | Plant Pathogens:  **(a)** Fungi  (i) Economic importance and general characteristics.  (ii) Morphology of different vegetative structures (thallus, mycelium, haustoria, etc.)  (iii) Reproduction  (iv) Different types of spores.  (v) Levels of parasitism | **7 hrs.** |
| **III** | Diagnositic characters of the following genera, Phytophthora, Peronospora, Sclerospora, Ustilago, Sphacelotheca, Tolyposporium, Melampsora, alternaria, Cerospora, Fusarium, Helminthosporium Pyricularia, Rhizoctonia, Colletrotrichum. | **7 hrs.** |
| **IV** | **(b) Bacteria:**  (i) Brief history of bacteria as plant pathogens.  (ii) Morphology and Cell structure.  (iii) Vegetative reproduction.  (iv) Brief outline of classification of plant pathogenic bacteria. | **7 hrs.** |
| **V** | **( c)** A brief account of mycoplasma.  **(d)** Viruses  (i) Nature and properties.  (ii) Transmission of plant virus  (d) Phanerogamic parasites: Cucuta, Loranthuus, Orobanche and striga. | **7 hrs.** |
|  | **Total** | **35** |

#### Suggested Readings

#### Dhaliwal, G.S. and Arora, R. 2001. Integrated Pest Management – Concepts and Approaches. Kalyani publishers, New Delhi.

#### Dhaliwal. G. S. and Heinnchs, E. A. 1998. Crticial Issues in Integrated Pest Management. Common wealth publishes, New Delhi.

#### Nair, M. C. and Menon. M. R. 1985. Diseases of Crop Plants. Kerala Agricultural University . Thrissur

#### Pedigo, T. P. 1996. Entomology and Pest Management. Prentice – Hall of India, New Delhi

#### Santhakumari, P (ed) 2004. Advances in the Diseases of Plantation Crops and Spices, IDB Co., Lucknow

#### Singh. R. S 2002. Introduction to Principles of Plant Pathology.Oxford and IBH publishing co.pvt.ltd.bombay

#### SC116 Elimentary Microbiology and Soil Microbiology C (L, T, P) = 3 (3, 0, 0)

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| **Units** | **Contents of Course** | **Hours** |
| **I** | Definition and scope of microbiology – spotaneous generation theory contributions of Antonie Van Leeuwenhoek, Louis, Pasteur John Tyndall , Robert Koch joseph Lister, Winogradsky, Beijerinck, Fleming, Waksman and Frank Branches of microbiology. | **7 hrs,** |
| **II** | Microbiology - resolving power – numerical aperture, magnification – different types of microbiology and micrometry. Structure and organization of microbial cell : Prokaryotes and Eucaryotes, Various groups of microorganisms – bacteria , Fungi actinomycetes, algae, protozoa and virus. | **7 hrs.** |
| **III** | Methods of isolation and purification . Types of nutrional media – sterilization – principles of staining microorganisms. Preservation of microbial cultures. Nutritional types: autotroph, heterotroph, phototroph and chemolithotrophs.  Requirements for growth- Temperature, pH and other factors. Growth curve of bacteria –continuous culture and synchrous culture | **7 hrs.** |
| **IV** | Facters affecting microbial population in soil. Microbial decomposition of organic matter – organisms involved – carbon cycle – microbiology of compositing methane and methanogensis.  Nitrogen fixation symbiotic and non -symbiotic or free living and associative types | **7 hrs.** |
| **V** | Role of mycorrhizae in mobilization of macro and micronutrients role of mycorrhizae in  Role of biofertilizers in afforestation – types of  biofertilizers – bacterial biofertilizers – Rhizobium – Azospirillum , Azotobacter phoshobacteria – fungal biofertilizers and quality control | **7 hrs.** |
|  | **Total** | **35** |

**Suggested Readings**

Pelczar,M.J.,Chan, E.C.S.and Kreig, N.R. 1993*. Microbiology*. Tata McGraw Hill

Publishing Co., Ltd., New Delhi.

Stanier ,R.Y., Ingraham, Wheelis ,M.G. and Paintor ,P.R. 1986.*The Microbiology World.*

Prentice Hall, New Jersey.125

Tauro, P., Kapoor, K.K. and Yadav, K.S. 1989 . *An Introduction to Microbiology.* Wiley

Publications ,New Delhi.

Alexander, M. 1985. *Introduction to Soil Microbiology* .John Wiley & Sons , New York.

Subba Rao, N.S. 1999 .*Biofertilizers in Agricultural and Agroforestry* .Oxford & IBH ,

New Delhi.

Subba Rao , N.S. 1995.*Soil Microorganisms and Plant Growth* .Oxford & IBH , New

#### Delhi.

#### SC118 Elementary Genetic C (L, T, P) = 3(3, 0, 0)

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| **Units** | **Contents of Course** | **Hours** |
| **I** | Definition, significance and historical development in genetics. Mendel’s principles of heredity, deviation from Mendelian inheritance, pleiotropy, threshold characters, co-dominance | **7 hrs,** |
| **II** | Chromosome theory of inheritance, gene interaction: modification of monohybrid and dihybrid ratios. Multiple alleles, quantitative inheritance, linkage and crossing over, sex linked inheritance and characters | **7 hrs.** |
| **III** | Structure of DNA and its replication. Evidences to prove DNA as genetic material. Mutation and its classification. | **7 hrs.** |
| **IV** | Chromosomal aberrations: Changes in chromosome structure and number Genetic Code ,Transcription and Translation | **7 hrs.** |
| **V** | Microbial genetics- conjugation, Transformation, Transudation | **7 hrs.** |
|  | **Total** | **35** |

#### Suggested Readings

Gupta P K 1999 Cytogenetics Rastogi Publishers, Meerut

Lewin, B2005 Genes IX Oxford University Press, New York

Phundan Singh 1995Elements of genetics Kalyani Publishers, Ludhiana

Prasad, G. 1989 Introduction to Cytogenetics Kalyani Publishers, Ludhiana

Strickberger, M.W. 1996. Genetics(3rd edn.). Mac Millan Publishing Co., New Delhi

Swanson, C.P., Merz, T. and Young, J.1975 Cytogenetics Prentice Hall of India Private

Limited, New Delhi

Winchester A M 1967 Genetics (3 rd edn )Oxford and IBH Publishing Co New Delhi



**SYLLABUS**

**B. TECH. BIOTECHNOLOGY PROGRAMME 1ST YEAR**

**GYAN VIHAR SCHOOL OF ENGINEERING & TECHNOLOGY**

**EDITION 2014**

# GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY

**B. Tech. Biotechnology Course 1st Year**

**Teaching & Examination Scheme**

**Edition 2014**

#### B. Tech Biotechnology Course 1st year Semester: I

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.**  **No.** | **Course code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  | |  |  |  |
| 1 | CP 101 | Computer Systems & Prog. | 3 | 3 | 0 | 0 | | 3 | 30 | 70 |
| 2 | EN 101 | Engineering English | 3 | 3 | 0 | 0 | | 3 | 30 | 70 |
| 3 | CB101 | Fundamentals of Biotechnology | 4 | 3 | 1 | 0 | | 3 | 30 | 70 |
| 4 | LS101 | Life Science I | 4 | 3 | 1 | 0 | | 3 | 30 | 70 |
| 5 | ES 101 | Environmental Studies | 2 | 2 | 0 | 0 | | 3 | 30 | 70 |
| 6 | PY 101 | Engg. Physics | 4 | 3 | 1 | 0 | | 3 | 30 | 70 |
|  |  | **B. Practicals**  **B. Practical & Sessional:** |  |  |  |  | |  |  |  |
| 7 | CP 151 | Computer Programming Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
| 8 | CB 151 | Fundamentals of Biotechnology Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
| 9 | LS151 | Life Science I Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
| 10 | EN 151 | English Communication Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
| 11 | PY 151 | Engg. Physics Lab | 1 | 0 | 0 | 2 | | 2 | 60 | 40 |
|  |  | **C. Discipline & Extra Curricular Activities** |  |  |  |  | |  |  |  |
| 12 | DE 101 | Discipline and Extra Curricular Activities - I | 2 | 0 | 0 | 0 | | 0 | 100 | 0 |
|  |  | **Total** | **27** | **17** | **3** | **100** | |  |  |  |
|  |  | **Total Teaching Load** |  | **28** |  |  | |  |  |  |

1. **Tech Biotechnology Course 1st year Semester: II**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.**  **No.** | **Course code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
| 1 | MA102 | Engineering Mathematics | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | EN 102 | Communication Techniques | 2 | 2 | 0 | 0 | 3 | 30 | 70 |
| 3 | LB 102 | Tools and Techniques in Biotechnology | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 4 | LS 102 | Life Science II | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 5 | BE 102 | Biochemical Engineering | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 6 | CY102 | Engg. Chemistry | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
|  |  | **B. Practical & Sessional :** |  |  |  |  |  |  |  |
| 7 | EN 152 | Language Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 8 | LB152 | Tools and Techniques in Biotechnology Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 9 | LS 152 | Life Science II Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 9 | BE 152 | Biochemical Engineering Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 10 | CY 152 | Engg. Chem. Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  | **C. Discipline & Extra Curricular Activities** |  |  |  |  |  |  |  |
| 11 | DE 102 | Discipline and Extra Curricular Activities - II | 2 | 0 | 0 | 0 | 0 | 100 | 0 |
|  |  | **Total** | **28** | **17** | **3** | **10** |  |  |  |
|  |  | **Total Teaching Load** |  | **30** |  |  |  |  |  |

#### CP 101 COMPUTER SYSTEMS AND PROGRAMMING C (L, T, P) = 3 (3, 0, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | **Introduction**  Types of computers and generations  Basic architecture of computers and its building blocks Input-Output devices, Memories | 6 |
| II | **Number Systems**  Binary, octal, decimal and hexadecimal representation of numbers  Integers and floating point numbers  Representation of characters, ASCII and EBCDIC codes Binary Arithmetic: addition, subtraction, complements | 7 |
| III | **Classification of Computer Languages** Machine, assembly and high level languages Brief idea of operating system    **Programming in ‘C’**  Need of programming languages, Defining problems Flowcharts and algorithm development | 8 |
| IV | Data types, constants, variables, operators and expressions  Input and output statements, Conditional and control statements, Arrays | 8 |
| V | Structures and unions ; Pointers; File handling | 8 |
|  | **Total** | **37** |

**Reference books**

* 1. Let Us c : Yaswant Kanetaker
  2. Programming in c: Balaguruswami
  3. Computer fundamental: P.K. Sinha
  4. Programming in C: Lipschutz
  5. Programming in C: Kernighan Ritchie
  6. Computer System Programming : Naveen Hemrajani

#### EN 101 ENGINEERING ENGLISH C (L, T, P) = 3 (3, 0, 0)

|  |  |
| --- | --- |
| **Units** | **Contents of the Subject** |
| **I** | **Poems**   * Poetry Appreciation * Ode on Solitude- A Pope * Preludes- T S Eliot * On His Blindness- John Milton |
| **II** | **Poems**   * Solitary Reaper-W Wordsworth * The Sun Rising – John Donne * Death the Leveler- James Shirley * Voice of the Unwanted Girl-Sujata Bhatt |
| **III** | **Short stories**   * The Coffee House – Leo Tolstoy * Three Questions – Leo Tolstoy * Monal Hunt – Manohar Malgonkar * The Marriage is a Private Affair – Chinua Achebe |
| **IV** | **Essays**   * Of truth- Francis Bacon * Toasted English- R K Narayan * The Influence of Science – EN Dac Andrade and Julian Huxley * Our Civilization – C E M Joad. |
| **V** | **Novella**   * The Old Man and the sea – E Hemingway |

***Recommended books: -***

*Popular Short stories* Oxford University Press Penguin Book of Verse Penguin

Complete works of Chinua Achebe – AITBS publication

The Old Man and the sea – E Hemingway The Complete works of Leo Tolstoy.

Prose for pleasure and Comprehension – H G S Rao Oxford Publication.

*Oxford Companion to English Literature* O U P

*A glossary of literary terms* -M H Abrams

#### EN 151 ENGLISH COMMUNICATION LAB C (L, T, P) = 1 (0, 0, 2)

**One is required to study any 10 topics from the topics mentioned below.**

|  |  |
| --- | --- |
| **S No.** | **Contents of the Subject** |
| **1**  **2** | Phonetics  Phonetic symbols and transcription |
| **3** | Synonyms and Antonyms |
| **4** | Word forms |
| **5** | Affixes |
| **6** | Words commonly misspell |
| **7** | Homonyms |
| **8** | Homophones |
| **9** | One word substitution |
| **10** | Proverbs |
| **11** | Idioms and phrases |
| **12** | Reading comprehension |

**Recommended books:-**

*Reference books:-*

1. *Better English Pronunciation*- J D O’ Connor Cambridge University press
2. *A Textbook of English Phonetics for Indian Students*- T Balasubranian Macmillan Publication
3. *Spoken English* – J B Harrison & R K Bansal Macmillan Publication
4. *English prəˈnaʊntsɪŋ Dictionary* – Daniel Jones Cambridge University Press 5 *Oxford Advanced Learner’s Dictionary*

CB **101 FUNDAMENTALS OF BIOTECHNOLOGY C (L, T, P) = 4 (3, 1, 0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **CONTENTS OF THE COURSE** | **Hours** |
| **1** | Introduction to Biotechnology : Definition, scope and achievements. Tools used in biotechnology. Applications of Biotechnology in Agriculture, Medicine and Environment – an elementary knowledge.Prospects and public perception of Biotechnology | 6 |
| **II** | **Recombinant DNA Technology:** Introduction, Tools of rDNA Technology, Making Recombinant DNA, DNA Library, Introduction of Recombinant DNA into host cells, Identification of Recombinants, Polymerase Chain Reaction (PCR), DNA Probes, Hybridization Techniques, DNA Sequencing, Site-directed mutagenesis. Genomics and Bioinformatics | 6 |
| **III** | **Microbial Culture and Applications:** Introduction, Microbial Culture Techniques, Measurement and Kinetics of Microbial Growth, Scale up of Microbial Process, Isolation of Microbial Products, Strain Isolation and Improvement, Applications of Microbial Culture Technology, Bioethics in Microbial Technology. | 7 |
| **IV** | **Plant Cell Culture and Application:** Introduction, Cell and Tissue Culture Techniques, Applications of Cell and Tissue Culture, Gene Transfer Methods in Plants, Transgenic Plants with Beneficial Traits, Diagnostics in Agriculture and Molecular Breeding, Bioethics in Plant Genetic Engineering. | 6 |
| **V** | **Animal Cell Culture and Applications:** Introduction, Animal Cell Culture Techniques, Characterisation of Cell Lines, Scale-up of Animal Culture Process, Applications of Animal Cell Culture, Stem Cell Technology, Bioethics in Animal Genetic Engineering | 7 |
|  | **Total** | **32** |

#### Recommended Books

1. Cell Biology and Genetics. 9th edition. Starr, C. and Taggard; R. (2001) Thomson Learning USA.
2. Life Science of Biology 6th edition Purves W.K.; Sadava, D.; Orians, G.H. and Heller, H.C. (2001). W.H. Freeman & company, USA.
3. Basic Biotechnology. Ratledge, C. and Kristiansen, B. (2001) Cambridge University Press.
4. Basic Biotechnology. Ignacimuthu, S.J. (2002) Tata McGraw-Hill Pub., New Delhi
5. Genes VII Lewis Benjamin (2002). Oxford Univ. Press Oxford.
6. Biotechnology 3rd Edition. Smith, J.E. (2003) Cambridge University Press

#### LS 101 Life Science- I C (L, T, P) = 4 (3, 1, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | **Origin of Life :** History of earth, theories of origin of life nature of the earliest organism.Classification, Five kingdoms, viruses (TMV, HIV, Bacteriophage), Prokaryote (Bacteria-cell structure, nutrition, reproduction), Protista, Fungi, Plantae and Animalia. | 6 |
| II | **Cell :** The cell concept, structure of prokaryotic and eukaryotic cells, plant cells and animal cells, cell membrances, cell organelles and their function. Structure and use of compound microscope.  . | 6 |
| III | **Histology:** Maritimes (apical, intercalary, lateral) and their function; simple tissue (parenchyma, collenchymas, sclerenchyma); Complex tissue (xylem and phloem); Tissue systems (epidermal, ground, vascular); primary body and growth (root, stem, leaf); Secondary growth. Animal Epithelial tissue, connective tissue, muscle tissue and nervous tissue and their function in body. | 7 |
| IV | **Nutrition:** Autotrophic (Photosynthesis) Pigment systems, Chloroplast, light absorption by chlorophyll and transfer of energy, two pigment systems, photosynthetic unit, phosphorylation and electron transport system, Calvin-Benson Cycle (C3), Hatch Slack Pathway (C4), Crassulacan Acid Metabolism (CAM), factors affecting photosynthesis; Mineral Nutrition in plants. Heterotrophic - Forms of heterotrophic nutrition, elementary canal in humans, nervous and hormonal control of digestive systems, fate of absorbed food materials; Nutrition in humans, Reference values. | 6 |
| V | **Transport:** Plant water relationships, properties of water, diffusion, osmosis, imbibition, movement of water in flowering plants, uptake of water by roots, the ascent of water in xylem, apoplast symplast theory, Transpiration-structure of leaf and stomata in plants opening and closing mechanisim of stomata factors affecting transpiration, significance of transpiration | 7 |
|  | **Total** | **32** |

#### Books Recommended:

1. Molecular Cell biology, Lodish, Berk and others. W.H. Freeman and Co., 2004, Fifth Edition.
2. Principles of Biochemistry, Garrette and Grisham, Saunders College Publishing, 1994.
3. Molecular Cell Biology, Harvey Lodish, Baltimore David *et al*., Scientific American Books, W.H.Freeman and Company, Third Edition, 1995.
4. Bohinski, R.C.(1987): Modern concepts in Biochemistry (Alllyn & Bascon Inc. Boston)
5. Caret et al.(1993): Inorganic, Organic and Biological Chemistry (WMC Brown Publ. USA).
6. West, E.S. and Todd, W.R.,Mason H.S., and Bruggen J.T. (1963) : Text Book of Biochemistry (Macmilan Co. London.
7. Lehninger,A.H. et al (1993) : Principles of Biochemistry (Worth Publ. Inc. USA).
8. Montgomery, R. et al (1990): Biochemistry: A case Oriented Approach (The C.V. Mosby Co., St. Louis).
9. Rawn, J.D. (1989) : Biochemistry (Neil Patterson Publ. North Carolina).

#### ES101 ENVIRONMENTAL STUDIES C (L, T, P) = 2 (2,01, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | **Man & Environment:** Definition of Environment & its various components. Ecosystem  concepts. Dependence of Man on nature for its various various needs. Human population growth & its impacts on environment. Environment & human health. Environmental concerns including climate change, Global warming, Acid Rain, Ozone layer Depletion etc. Environmental ethics. Traditional ways of utilising various components of environment. Sustainable developments. | 6 |
| II | **Natural Resources:** Forest resources, Mining , Dams & their effects on forests & tribal  people. Water resources-over utilization of water, floods, droughts and conflicts over water resources. Mineral Resources- Use of various minerals for Human welfare & environmental effects of mining. Food resources -World food problem. Impacts of changing Agriculture practices on Environment. Energy Resources-Renewable and non renewable energy Resources & exploration of alternative energy sources. Land Resources- land degradation, soil erosion, desertification & soil contamination. | 6 |
| III | **Ecosystems:** Structure & function, energy flow, food chains, food webs, Ecological  pyramids. Basics of forest grasslands, desert & aquatic ecosystem (Ponds, Streams, Lakes, Rivers, Oceans & Estuaries) | 6 |
| IV | **Biological Diversity:** Genetic, species & ecosystem diversity, Values of Biodiversity, Global, National & Local Biodiversity. Hot-spots of Biodiversity, threat to biodiversity.  Endangered & endemic species of India. Conservation of biodiversity in situ & ex-situ | 6 |
| V | **Environment pollution:** Causes, effects & control of- Air pollution, Water pollution, Soil  pollution, Noise Pollution, Thermal pollution & Nuclear Hazards. Solid wastes & their Management. Disaster Management-Flood, Drought, Earthquake, Land slides etc. | 6 |
|  | **Total** | **30** |

**References**

1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.

1. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad – 380013, India. Email: [mapin@icenet.net](mailto:mapin@icenet.net)
2. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.
3. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).
4. Cunningham WP, Cooper TH, Gorhani E & Hepworth MT, 2001. Environmental Encyclopaedia, Jaico Publishing House, Mumbai, 1196pgs.
5. De AK, Environmental Chemistry, Wiley Eastern Ltd.
6. Down to Earth, Center for Science and Environment (R)
7. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, 473pgs.
8. Hawkins RE, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
9. Heywood VH, and Watson RT, 1995. global Biodiversity Assessment. Cambridge University Press 1140pgs.
10. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs.
11. Mckinney ML and Schoch RM, 1996. Environmental Science Systems and Solutions. Web enhanced edition, 639pgs.
12. Mhaskar AK, Matter Hazardous, Techno-Science Publications (TB)
13. Miller TG, Jr. Environmental Science, Wadsworth Publishing CO. (TB)
14. Odum EP, 1971. Fundamentals of Ecology. WB Saunders Co. USA, 574pgs.
15. Rao MN and Datta AK, 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd. 345pgs.

#### PY 101 ENGINEERING PHYSICS C (L, T, P) = 4 (3, 1, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of Course** | **Hours** |
| **I** | **Interference of light**   * Newton’s Rings: Theory and determination of diameters of dark and bright rings. * Michelson’s interferometer: Construction and working, Determination of wavelength of light and wavelength separation of two nearby wavelengths.   **Polarization of Light**   * Production of Plane, circular and elliptically polarized, Phase retardation plates, * Specific rotation and its measurement using the half shade and Bi-Quartz polarimeters. | **8 hrs,** |
| **II** | **Diffraction of Light :**   * Fraunhofer’s diffraction due to single Slit, * Theory of plane transmission grating and determination of wavelength of light * Resolving power: Reyliegh criterion, Resolving power of diffraction grating. | **6 hrs.** |
| **III** | **Lasers , Holography and Optical fiber**   * Theory , design and application of Ruby, He- Ne and semiconductor lasers * Construction and Reconstruction of Hologram * Introduction of optical fiber as wave guide * Numerical Apeture of an optical fiber | **6 hrs.** |
| **IV** | **Special Theory of Relativity**   * Postulates of special theory of relativity, Lorentz Transformations * Relativity of length , mass, and time. * Relativistic velocity addition , Mass- Energy relation | **6 hrs.** |
| **V** | **Electricity & Magnetism**   * Scalar and Vector Fields, Concepts of Gradient, Divergence and Curl, Maxwell’s electromagnetic Equations.   **Nuclear Radiation Detectors**   * Nuclear Binding Energy, Construction , working and properties of proportional , G.eiger M.uller and Scintillation counter | **7 hrs.** |
|  | **Total** | **33** |

**Books Recommended**

Optics by A.K. Ghatak (Tata McGraw-Hill)

Introductory Quantum Mechanics by Liboff (Pearson’s Publication) Quantum Mech. by A.Ghatak & S. Lokhathan (Tata McGraw-Hill A textbook of Optics: Brijlal and Subramanium. S. Chand Co. Ltd. Introduction to Modern Optics by G.R. Fowels

An introduction to Fiber Optics by R. Allen Shotwell, PHI

Elements of Electromagnetic Fields: S P Seth, Dhanpat Rai & Company.

Lasers Theory and Applications by Thyagarajan and Ghatak, Macmillan India Ltd. Elements of Electromagnetic by Mathew N.O. Sadiku, Oxford University Press.

Introductory University optics: Beynon, Prentice Hall of India Pvt. Ltd. An introduction to Fiber Optics by John M. Senior, PHI

Nuclear Physics by Burchem (Addision Weisly)

#### EN 102 COMMUNICATION TECHNIQUES C (L, T, P) = 4 (3, 1, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | **Grammar**   * Words and Sentences * Verbs / Tenses * Questions / Questions Tags * Modal Verbs * The Passive | **10** |
| II | **Grammar**   * The Infinitive and The ING form * Nouns and Articles * Determiners * Reported Speech * Adjectives and Adverbs | **08** |
| III | **Grammar**   * Prepositions * Verbs with Prepositions and Adverbs * Pronouns * Relative Clauses * Conditionals * Linking Words | **08** |
| IV | **Compositions**   * Essay and Report Writing * Review Writing | **03** |
| V | **Compositions**   * Applications, Letter and Précis Writing * Technical Proposal Writing | **03** |
|  | **Total** | **32** |

#### Recommended books:-

1 Communicative Grammar & Composition by R K Lidiya, Oxford University Press 2 A Textbook of General English by R P Bhatnagar, Popular Book Depot

#### Reference books:-

1 The Pocket Guide to English Language- John O’ Connor, Cambridge University Press 2 Modern English –N. Krishnaswamy, Macmillan publication

1. Oxford Guide to Writing and Speaking – John Selly Oxford University press
2. English Grammar for Today – Geoffrey Leech, Pearson Longman
3. University Grammar of English – Quirk & Greenbaum, Pearson Longman 6 Practical English Usages- Michael Swan, Oxford University Press

#### MA 102 ENGINEERING MATHEMATICS – II C (L, T, P) = 4 (3, 1, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | **Algebra**   * Convergence and Divergence of infinite series: Comparison test, Cauchy’s nth root test, D’alemberts ratio test, logarithmic ratio test, Raabi’s test, De’Morgan and Bertrand’s test,   Cauchy’s condensation test, Gauss test (without proof).   * Alternating Series: Leibniz’s test (without proof), Absolute convergence and Conditional convergence. * Fourier Series: Expansion of simple function’s in Fourier Series, Fourier Series of even and odd functions. Half range series, change of intervals, Harmonic Analysis. | 6 |
| II | **Matrices**   * Rank of a matrix, inverse of a matrix by elementary transformations. * Solution of simultaneous linear equations by matrix method. * Eigen values and Eigen vectors, Cayley- Hamilton theorem (without proof). * Diagonalization of matrix. | 6 |
| III | **Coordinate Geometry of Three Dimensions**   * Equation of a sphere. * Intersection of a sphere and a plane, tangent plane, normal lines. * Right circular cone. * Right circular cylinder. | 6 |
| IV | **Vector Calculus**   * Scalar and vector point functions, differentiation & integration of vector functions. * Gradient, Divergence, Curl and Differential Operator. * Line, Surface and volume integrals. * Green’s Theorem in a Plane, Gauss’ and Stoke’s Theorem (without proof) and their Applications. | 7 |
| V | **Partial Differential Equations**   * Partial Differential Equations of the First Order. * Non-linear Partial Differential Equations of order one: Standard forms. * Charpit’s Method. | 7 |
|  | **Total** | **32** |

#### Books Recommended:

1. Advanced Mathematics for Engineers by Erwin Kreszig.
2. Advanced Mathematics for Engineers by B.S. Griwal
3. Advanced Mathematics for Engineers by Chandrika Prasad
4. Engg. Mathematics Book 2 by Y.N. Gaur & C.L. Koul
5. Engg. Mathematics II by K.C. Jain & M.L. Rawat

#### LB 102 Tools and Techniques in Biotechnology C (L, T, P) = 4 (3, 1, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | **Microscopy**  General priciples of microscopy (concept of optics, Resolving power of microscope working distance.) Study of compound microscope & electron microscope, Basic principle and construction of - Dark field microscopy, Phase contrast Microscopy, Confocal Microscopy and Fluorescent microscopy. | 6 |
| II | **Electrophoresis**: Principles and types of electrophoresis and their applications for  Proteins, nucleic acids, including gradient gel and pulse-filed gel electrophoresis; gel matrices: polyacrylamide, agarose etc. Critical parameters for optimum separation and resolution, two dimensional electrophoresis (IEF) | 6 |
| I | **Colorimetry & Spectroscopy:** Basic principles, nature of electromagnetic radiation, Beer-Lambert laws, colorimetric methods & instruments, principles of spectroscopy, types of spectra-absorbance,single and double beam spectrophotometers, flame photometer, fluorimeters. | 7 |
| IV | **Centrifugation:** Principles & types simple & differential, ultracentrifugation-preparative & analytical.  **Ph, Buffers**: Principles and theory, ph meters. | 6 |
| V | **Chromatography:** Principles, methodology and applications of chromatography using paper, thin layer, column (gel filtration, ion exchange, affinity), gas and HPLC. | 7 |
|  | **Total** | **32** |

**Recommended Books:**

1. Analytical Biochemistry, D.J.Homie and Hazal Peck, Longman group,3rd edition, 1998.
2. Experimental Biochemistry, Robert Switzer and Liamgarrity, W.H.Freeman and Co., Third Edition, 1999.
3. Physical Biochemistry - Application of Biochemistry and Molecular Biology, David Friefelder, W.H.Freeman and Co., Second Edition, 1999.
4. Principles of Instrumental Analysis, Skoog/Leary, Saunders College Publishing, Fourth Edition, 1992.
5. Principles of Physical Biochemistry, Kensal E.Van Holde, W.Curtis Johnson, Harcourt Brace College Publishers, 1998

#### LS 102 Life Science – II C (L, T, P) = 4 (3, 1, 0)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | **Coordination and control:** Plant movements (Tactic, Tropic, Nastic), plant growth substances (Auxins, Cytokinins, Gibberellins, ABA, Ethylene), phytochrome and effect of light on plant development, vernalisation and flowering. Nervous system, parts of the nervous system, sensory receptors, structure and function of receptors, Endocrine system, role of hormones in growth and development of humans. | 6 |
| II | **Mendalian Analysis:** Experiments of Mendel, Simple mendalian genetics in humans, in agriculture, Variants and genetic dissection. | 6 |
| III | **Asexual Reproduction:** Apomixis, and other means of natural vegetative reproduction (Bulb, corm, rhizome, stolon, runner, tuber, tap roots, tillers), advantages and disadvantages of natural asexual reproduction. Artificial propagation - cutting, grafting, budding, layering, micropropagaion through tissue culture, advantages and disadvantages of micropropagation. | 7 |
| IV | **Sexual reproduction:** Life cycle of flowering plants, the parts of a flower (Dicot and monocot), microsporogenesis, in-vitro pollen culture, microgametogenesis, isolation of sperms, palynology, scope of palynology, development of ovule, types of ovule, megasporogenesis, megagametogenesis, embryosac, function of different cells of embryosac, pollination types of pollination, pollen-pistil interaction, self incompatibility, fertilization, double fertilization, post fertilization changes in ovule and embryo, seed formation, structure of seed and its importance. | 6 |
| V | **Economically Important Plants :** Classification systems, Important families (Fabaceae, Poaceae, Malvaceae, Cucurbitceae, Crucifereae, Leguminoseae), Cereals (wheat, rice maize), Beverages (tea, coffee, cocoa), Fibers (jute, linen, cotton), wood (pines, cedar, teak, sisham), rubber (para rubber), spices (turmeric, black pepper, cloves, coriander), medicinal plants (Ephedra, Taxus, Cinchona, Fox glove, Belladonna, Rauvolfia, Neem, Hemp.) | 7 |
|  | **Total** | **32** |

#### Books Recommended:

#### BE 102 Biochemical Engineering C (L, T, P) = 1 (0, 0, 2)

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | Amino Acids, Peptides and Proteins: Structure, Function, Methods of Characterization, Separation Techniques based on their structure and properties.Nucleic Acids: Nucleic Acids and Polynucleotides, Classification, Structure, Function, Separation and Characterization Techniques. | 6 |
| II | **Bioprocess/fermentation technology:** Bioreactor, Scale-up, Media design,  Technology for microbial, mammalian and plant cell culture, Downstream processing Media design.Technology for microbial, mammalian and plant cell culture, Downstream processing. | 6 |
| I | Enzyme Technology: Nature, Application, Genetic engineering & protein engineering,  Immobilised enzymes and Technology of enzyme production. | 7 |
| IV | Biopharmaceuticals: Introduction to genetic engineering, Antibiotics, Therapeutic proteins, Vaccines & monoclonal antibodies, Gene therapy.  Food and beverage technology: Introduction, Fermentation, Food processing,  Sweeteners, Food wastes, Rapid diagnostics, Public acceptance & safety. | 6 |
| V | Agricultural and forestry Biotechnology: Introduction, Plant biotechnology, Forestry, Biological control, Animal biotechnology, Diagnostics in agriculture, Bioremediation.  IPR, Safety, Social, moral and ethical aspects of Biotechnology | 7 |
|  | **Total** | **32** |

**Recommended books:-**

1. Enzyme Biotechnology by G. Tripathi
2. Enzyme Catalysis and Regulation by Hammes
3. Enzyme Reaction Mechanisms by Walsch
4. Enzyme Structure and Mechanism by Alan Fersht
5. Enzyme technology, M.F.Chapline and C.Buke, Cambridge University Press, First Edition, 1990.
6. Harper’s Biochemistry (25th edition). (Appleton and Lange Stainford Connecticut)
7. Lehninger,A.H. et al (1993) : Principles of Biochemistry (Worth Publ. Inc. USA)
8. Plant,Gene and Crop Bitechnol,M.J.chrispeel and D.E.Sadava ASPB 2003.
9. Economic Botany,S.L. Kocher.
10. Wastewater Engineering-Treatment,Disposal and Reuse,Metcall and Eddy,Inc.,Tala McGraw Hill,Delhi.

**CY 102 ENGINEERING CHEMISTRY C (L, T, P) = 4 (3, 1, 0)**

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Subject** | **Hours** |
| **I** | **Water:** Common impurities, Hardness, Determination of hardness by Clark’s and Complex metric  (EDTA) method, Degree of Hardness.  **Municipal Water Supply**: Requisites of drinking water, Purification of water. Sedimentation, coagulation, filtration, sterilization. Break point chlorination.  **Water for Steam Preparation:** Boiler Trouble, Carryover, Corrosion, Scale & Sludge and caustic embrittlement.  **Methods of Boiler Water Treatment:** Preliminary treatments, Preheating. Lime-Soda Process, Permutite or Zeolite process, Deionization or demineralization. Feed water Conditioning, Internal treatment, Blow down. Problems based on water treatment (Lime-Soda Process). | **7 hrs.** |
| **II** | **Corrosion:** Definition and its significance, Theories of corrosion. Galvanic Cell and concentration Cell, Pitting and Stress Corrosion. Protection against Corrosion, Protective Metallic Coating. **Lubricants:** Classification, Types, Properties: Viscosity, Viscosity Index, Flash and Fire point, Cloud and Pour point and Emulsification.  **Pollution:** Elementary idea of air and water pollution, Effect of air pollution. Depletion of ozone layer and its environmental impact. Greenhouse effect.  **Phase Rule:** Statement, Definitions. Application to one component system: Water and Sulphur. Study of two components: Lead-Silver. | **9 hrs.** |
| **III** | **New & Advanced Engineering Materials:**  Materials and Chemistry of  **Software & Hardware** industry: chip and integrated circuit manufacturing. Chemistry of **Electrical** Engineering materials.  **Electronics and Communication** industries: Materials for**, Mechanical** industries Materials for **Civil constructions**. | **7 hrs.** |
| **IV** | **Plastics:** Classification and constituents of plastics and their uses, preparation, properties and uses of  Polyethylene. Bakelite, Terylene and Nylon.  **Rubber :** Natural rubber, vulcanization, synthetic rubbers.  **Cement:** Manufacture of Portland cement, vertical shaft kiln technology, Chemistry of setting and  hardening.  **Refractories:** Definition, properties, classification, Manufacturing and Properties of Silica and Fireclay Refractories.  **Glass:** Preparation, varieties and uses,  **Explosive:** Introduction, classification, requisites of explosives. Plastic explosives, blasting fuses, application. | **7 hrs.** |
| **V** | **Chemicals Fuels:** Origin and classification fuels.  **Solid Fuels:** Coal**,** Calorific value ,Proximate and Ultimate analysis Determination of calorific value by Bomb Calorimeter.  **Liquid Fuel: Advantages**, petroleum and refining of petroleum, synthetic petrol, Cracking and Reforming, Knocking –Ant knocking Octane number, Cetane number.  **Gaseous Fuels:** Advantages, Manufacture, composition and calorific value of coal gas and oil gas, Determination of calorific value by Junker’s Calorimeter.  **Advanced fuel systems:** Elementary Non-conventional Energy Materials. | **7 hrs.** |
|  | **Total** | **37** |

**Books Recommended:**

* 1. Engg. Chemistry by Dr. G.N. Sharma and Dr. Shuchi Gupta
  2. Engg. Chemistry by K.D. Gupta and S.K. Jain
  3. Engg. Chemistry by K.L. Malaria and G.P. Goyal
  4. Engg. Chemistry by Vyas and Vyas
  5. Physical Chemistry by Glasstone
  6. Theory and Practicals of Engg. Chemistry by Shashi Chawla
  7. Applied Chemistry by Dr. G.N. Sharma and Dr. Shuchi Gupta

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**Syllabus**

**of**

**B.Sc in Fire Safety and Hazard Management**

**GYAN VIHAR SCHOOL OF SCIENCES**

Edition-2014

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**B.Sc in Fire Safety and Hazard Management**

1. **Introduction:**

Fire Safety has become important and integral part of our daily life. The growing number of accidents led the Government to enact and implement various Acts and Rules keeping the safety of workers & Jobbers as First and foremost objective.

Government is strictly implementing rules leading to workers safety in establishment. Thus as per safety is recruited compulsorily. This has opened new vistas for trained manpower requirement in the field of Fire & Industrial Safety Management.

Now a days, the global demand is more as compared to available tainted manpower, large number of career opportunities in the field of safety are available in India and aboard. After attaining B.Sc in Fire Safety and Hazard Management a fresher can also expect very handsome salary.

1. **Job Opportunities:**

After completing the program career opportunities are open career opportunities are open in the government sector, private, industrial & the service sector. In the private sector, insurance, manufacturing firms, chemical and petrochemical firms, public utilities and educational complexes, airports, five star hotels etc, employ candidates from this field. The course is suitable to prepare graduates for a professional career in fire safety with an emphasis in the management and operation of organizations to achieve fire safety solutions. The candidates may start their career as Fire & Safety management, Safety Auditor etc.

1. **Objectivities of the programs:**

This degree course is concerned with the study of fire, its development and prevention and the means by which its consequences may be reduced to a minimum in human, environmental and financial terms. The objectives of the program are:

1. To provide a programme of study to prepare graduates for a professional career in fire safety with an emphasis in the management and operation of organisations to achieve fire safety solutions.
2. To develop expertise in the application of management principles as they relate to fire safety to ensure safe working practises and environments.
3. To produce graduates with the ability to command and manage fire safety operations.
4. To provide the underpinning Science and Technology knowledge related to fire safety.
5. To enable graduates to assess risk and devise protection strategies as they relate to fire safety
6. To produce resourceful, competent, clear thinking graduates with a range of skills and experience relevant to modern industry and commerce and in particular to develop a range of competences and underpinning knowledge for practicing professionals in the field of Fire Safety.
7. To enable the graduates to apply their knowledge, understanding and skills to realistic situations and particularly in the context of the GCC region.
8. To develop skills in communication, independent study, team working, problem solving, management and critical thinking which will equip graduates for the world of work and lifelong learning.
9. **Eligibility:**
10. 10+2 pass in any stream with minimum 50% marks or equivalent grade.
11. The candidate who have obtained a Three year Diploma in Fire & Industrial Safety Engineering are eligible to get Direct admission in IIyear of B.Sc., under lateral entry scheme.

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**GYAN VIHAR SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for B.Sc in Fire Safety and Hazard Management (Three years program)**

**Edition 2014  
Year: I Semester: I**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
| 1. | EN 101 | Communicative English | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| 2. | FS 101 | Fundamentals of Fire Science | 4 | 4 | - | - | 3 | 30 | 70 |
| 3. | FS 103 | Fire Control Technology | 4 | 4 | - | - | 3 | 30 | 70 |
| 4. | FS 105 | Principals of Industrial Safety and Accident Prevention | 4 | 4 | - | - | 3 | 30 | 70 |
| 5. | ES 101 | Environmental Studies | 2 | 2 | 0 | 0 | 3 | 30 | 70 |
|  |  | **B. Practicals / Sessionals** |  |  |  |  |  |  |  |
| 6. | EN 151 | English Communication Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
| 7. | FS 151 | Fire Service Equipments & Appliances | 2 | - | - | 4 | 3 | 60 | 40 |
|  |  | **C. Discipline and Co-Curricular Activities** |  |  |  |  |  |  |  |
| 8. | DC 101 | Discipline and Co-Curricular Activities-I | 2 | - | - | - | - | 100 | - |
|  |  | **Total** | **22** | **17** | **-** | **06** |  |  |  |
|  |  | **Total Teaching Load** |  | **23** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation S = Seminar P = Practical ESE = End Semester Examination**

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**GYAN VIHAR SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for B.Sc in Fire Safety and Hazard Management (Three years program)**

**Edition 2014  
Year: I Semester: II**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
|  | EN 102 | Communication Techniques | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
|  | FS 102 | Risk Management and Hazard Control System | 4 | 4 | - | - | 3 | 30 | 70 |
|  | FS 104 | Industrial Safety | 4 | 4 | - | - | 3 | 30 | 70 |
|  | FS 106 | Fire Science-I | 2 | 2 | - | - | 3 | 30 | 70 |
|  | FS 108 | Emergency Planning & First AID | 2 | 2 | - | - | 3 | 30 | 70 |
|  |  | **B. Practicals / Sessionals** |  |  |  |  |  |  |  |
|  | EN 152 | Language Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
|  | FS 152 | Rescue Techniques | 2 | - | - | 4 | 3 | 60 | 40 |
|  |  | **C. Discipline and Co-Curricular Activities** |  |  |  |  |  |  |  |
| 8. | DC 102 | Discipline and Co-Curricular Activities-I | 2 | - | - | - | - | 100 | - |
|  |  | **Total** | **20** | **15** | **-** | **06** |  |  |  |
|  |  | **Total Teaching Load** |  | **21** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation S = Seminar P = Practical ESE = End Semester Examination**

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**GYAN VIHAR SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for B.Sc in Fire Safety and Hazard Management (Three years program)**

**Edition 2014**

**Year: II Semester: III**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
| 1. | FS 201 | Fire Science-II | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 2. | FS 203 | Security Management of Industrial Plants | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 3. | FS 205 | Organisation, Administration and  Management Responsibility | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 4. | FS 207 | Chemical & Environmental Hazards | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
|  |  | **B. Practicals / Sessionals** |  |  |  |  |  |  |  |
| 5. | FS 251 | Practical | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
|  |  | **C. Discipline and Co-Curricular Activities** |  |  |  |  |  |  |  |
| 6. | DC 201 | Discipline and Co-Curricular Activities-I | 2 | - | - | - | - | 100 | - |
|  |  | **Total** | **22** | **12** | **04** | **08** |  |  |  |
|  |  | **Total Teaching Load** |  | **24** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation S = Seminar P = Practical ESE = End Semester Examination**

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**GYAN VIHAR SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for B.Sc in Fire Safety and Hazard Management (Three years program)**

**Edition 2014**

**Year: II Semester: IV**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
| 1. | FS 202 | Industrial Psychology, Ergonomics and Accidents | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 2. | FS 204 | Industrial Noise and Noise Control | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 3. | FS 206 | Industrial Safety Analysis | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 4. | FS 208 | Safety in Power Plants | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
|  |  | **B. Practicals / Sessionals** |  |  |  |  |  |  |  |
| 5. | FS 252 | Practical | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
|  |  | **C. Discipline and Co-Curricular Activities** |  |  |  |  |  |  |  |
| 6. | DC 202 | Discipline and Co-Curricular Activities-I | 2 | - | - | - | - | 100 | - |
|  |  | **Total** | **22** | **12** | **04** | **08** |  |  |  |
|  |  | **Total Teaching Load** |  | **24** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation S = Seminar P = Practical ESE = End Semester Examination**

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**GYAN VIHAR SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for B.Sc in Fire Safety and Hazard Management (Three years program)**

**Edition 2014**

**Year: III Semester: V**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
| 1. | FS 301 | Radiation Hazards | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 2. | FS 303 | Safety Training for employees and HRD | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 3. | FS 305 | Social Security in Industries | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 4. | FS 307 | Occupational Health | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
|  |  | **B. Practicals / Sessionals** |  |  |  |  |  |  |  |
| 5. | FS 351 | Practical | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
|  |  | **C. Discipline and Co-Curricular Activities** |  |  |  |  |  |  |  |
| 6. | DC 301 | Discipline and Co-Curricular Activities-I | 2 | - | - | - | - | 100 | - |
|  |  | **Total** | **22** | **12** | **04** | **08** |  |  |  |
|  |  | **Total Teaching Load** |  | **24** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation S = Seminar P = Practical ESE = End Semester Examination**

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**GYAN VIHAR SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for B.Sc in Fire Safety and Hazard Management (Three years program)**

**Edition 2014**

**Year: III Semester: VI**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory** |  |  |  |  |  |  |  |
| 1. | FS 302 | Controlling Environmental Pollution | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 2. | FS 304 | Disaster Management | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| 3. | FS 306 | Energy Conservation & sustainable  Development | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
|  |  | **B. Practicals / Sessionals** |  |  |  |  |  |  |  |
| 5. | FS 352 | Practical | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
| 6. | FS 354 | Field Work | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
|  |  | **Total** | **20** | **12** | **04** | **08** |  |  |  |
|  |  | **Total Teaching Load** |  | **24** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation S = Seminar P = Practical ESE = End Semester Examination**

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**GYAN VIHAR SCHOOL OF SCIENCES**

**B.Sc in Fire Safety and Hazard Management (Three years program)**

**LIST OF COURSE OFFERED**

**Edition 2014**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course  Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam  Hrs.** | **Weight age  (in %)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| FS 101 | Fundamentals of Fire Science | 4 | 4 | - | - | 3 | 30 | 70 |
| FS 102 | Risk Management and Hazard Control System | 4 | 4 | - | - | 3 | 30 | 70 |
| FS 103 | Fire Control Technology | 4 | 4 | - | - | 3 | 30 | 70 |
| FS 104 | Industrial Safety | 4 | 4 | - | - | 3 | 30 | 70 |
| FS 105 | Principals of Industrial Safety and Accident Prevention | 4 | 4 | - | - | 3 | 30 | 70 |
| FS 106 | Fire Science-I | 2 | 2 | - | - | 3 | 30 | 70 |
| FS 108 | Emergency Planning & First AID | 2 | 2 | - | - | 3 | 30 | 70 |
| FS 151 | Fire Service Equipments & Appliances | 2 | - | - | 4 | 3 | 60 | 40 |
| FS 152 | Rescue Techniques | 2 | - | - | 4 | 3 | 60 | 40 |
| FS 201 | Fire Science-II | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 202 | Industrial Psychology, Ergonomics and Accidents | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 203 | Security Management of Industrial Plants | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 204 | Industrial Noise and Noise Control | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 205 | Organisation, Administration and  Management Responsibility | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 206 | Industrial Safety Analysis | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 207 | Chemical & Environmental Hazards | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 251 | Practical | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
| FS 252 | Practical | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
| FS 301 | Radiation Hazards | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 302 | Controlling Environmental Pollution | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 303 | Safety Training for employees and HRD | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 304 | Disaster Management | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 305 | Social Security in Industries | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 306 | Energy Conservation & sustainable  Development | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 307 | Occupational Health | 4 | 3 | 1 | 0 | 3 | 30 | 70 |
| FS 352 | Practical | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
| FS 354 | Field Work | 4 | 0 | 0 | 8 | 3 | 30 | 70 |
| EN 101 | Communicative English | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| EN 102 | Communication Techniques | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| EN 151 | English Communication Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
| EN 102 | Communication Techniques | 3 | 3 | 0 | 0 | 3 | 30 | 70 |
| EN 152 | Language Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
| ES 101 | Environmental Studies | 2 | 2 | 0 | 0 | 3 | 30 | 70 |
| DC 101 | Discipline and Co-Curricular Activities-I | 2 | - | - | - | - | 100 | - |
| DC 102 | Discipline and Co-Curricular Activities-II | 2 | - | - | - | - | 100 | - |
| DC 201 | Discipline and Co-Curricular Activities-III | 2 | - | - | - | - | 100 | - |
| DC 202 | Discipline and Co-Curricular Activities-IV | 2 | - | - | - | - | 100 | - |
| DC 301 | Discipline and Co-Curricular Activities-V | 2 | - | - | - | - | 100 | - |

**FS101 FUNDAMENTALS OF FIRE SCIENCE C (L,T,P) = 4(4,0,0)**

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| **UNIT** | **Course Contents** |
| **I** | History of fire service, Basic Physics, Guidelines for writing the units,  Force, resultant force, Laws of force, Laws of motion, Mass and weight, work, power, energy, Law of conservation of energy. |
| **II** | Mechanics – rest and motion, Distance and displacement, Speed and velocity, Acceleration, retardation, Acceleration due to gravity, Newton laws of motion, Machines and engines, Efficiency, Friction. |
| **III** | Basic Chemistry and physics of fire, Atomic structure, Elements, compounds, Pure substance and mixture, Physical and chemical changes, Condition for the changes, Energy changes, Effects of heat on matter, Combustion, Temperature, Specific heat capacity. |
| **IV** | Catalyst, Neutralization, Sublimation, Heat of decomposing, Chemical reaction, Exothermic reaction and endothermic reaction, Transmission of heat, Flash and fire point, Ignition temperature, Flammables and combustible chemicals, Spontaneous combustion, Triangle of combustion, Tetrahedron fire, Spread of fire. |
| **V** | Classification of fire, General Causes of fire, Detection of fire, Extinguishing methods, First aid fire fighting equipments, Fire bucket, Fire beater, hose real hose, Portable extinguisher, depends on weight, depends on operating method, depends on content, depends on position of nozzle, Construction, Operation, Maintenance, refilling, Fixed fire fighting installations using water ,Hydrant or fire water system, Classification of hydrant system, Sprinkling system, Major foam pourer system, Steam drenching system, Emulsification, Special fires and fire fighting, Air craft fire, Ships fire, Fixed fire fighting installations not using water, Complete CO2 flooding system, Complete DCP spraying system, Complete Halon flooding system, Investigation of fire, Point, Time and cause of ignition, Arson and detection of fires, Courseware to be provided by the institution, Reference books are enclosed in annexure 1. |

**FS 102 RISK MANAGEMENT AND HAZARD CONTROL SYSTEM C(L,T,P) = 4(4,0,0)**

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| **UNIT** | **Course Contents** |
| **I** | Hazards, Definition, Glossary of Terms, Risk Management, Hazards Control System, System safety, Job Hazard analysis, Hazop, Fault tree Analysis, Failure mode and effect Analysis. |
| **II** | Physical and chemical properties of hazardous materials, Introduction, Major industrial hazards,Types and consequences of major industrial hazard, Effects on human body, Precautions while fire fighting, Stages of combustion, Hazards of combustion, Stability and inflammability |
| **III** | BLEVE, Fire extinguishment, Flammable Solids, Liquids and Gas, Petrochemicals and other hydrocarbons, Tank fire – storage tank, trucks, service stations, High pressure pipe lines, Pressurized and liquefied gases, Natural gas, Petroleum gases ,Refrigerants etc. |
| **IV** | Acetylene, Metals, Non metals, Other hazardous properties, Harmful contamination of air and water, Toxicity, Corrosiveness, Radioactive hazards, Special precaution for handling |
| **V** | Emergency preparedness, Pesticides, Explosion, Deflagration and detonation of gas, Dust explosion, Confined and unconfined vapor cloud explosion, Safety Management and legislation,Functions of safety management, Factories Act 1948 (chapter 3,4,5),Workmen compensation Act 1923 (objectives and coverage’s). |

**FS 103 FIRE CONTROL TECHNOLOGY C(L,T,P) = 4(4,0,0)**

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| **UNIT** | **Course Contents** |
| **I** | Hose, Types of hose, Characteristic, Frictional lose, Material used, Cause and prevention of mildew, Causes and prevention of shock, Causes and prevention of rubber acid, Care and maintenance, Types of hose fittings, Couplings, Component parts of inter locking couplings, Suction coupling wrenches, Branches, nozzles and branch holders, Foam making branches, Nozzles, Collecting head and suction hose fittings, Breechings, Adapters, Maintenance of hose fittings. |
| **II** | Fire alarm, Introduction of Electronics and Electricity, Semi conductor Physics, Circuit Control And Protective Devices, Transistors, Principles of fire detectors, Parts of fire alarm unit, Control panel, Type of detectors, Automatic fire detection, Classification of detector, Control and indicating equipment. |
| **III** | Trouble shooting and maintenance, Intruder alarms, Courseware to be provided by the institution, Reference books are enclosed in annexure 1**,** Rope, Lines, knots and ladders, Introduction, Manufacturing materials, Types of ropes and size, Cordag, Causes of deterioration of ropes and lines, Different type of knots, Different type of lines, Purpose of knots, Ladders, Introduction, Hook ladder, escape ladder, turn table and extension ladder, Hook ladder belts. |
| **IV** | SCBA and foam making equipment, Physiology of respiration, Effects of respiration, Essential fetchers of BA set, Description and technical details, Care and maintenance various BA sets, Advantage and disadvantage of various BA set, Foam & foam making equipments, Definition, Different type of foam concentrate, Storage, Characteristics, Foam branch and its type, Mechanical foam generator  Pumps, primers, tenders and water relay, Introduction, definition, Deferent types of pump, Deferent types of primers. |
| **V** | Working principle of various pumps primers, Maintenance and trouble shooting, Testing of pumps, Advantages and disadvantages, Water relay system, Open circuit system, Closed circuit system, Different type of tenders and Fire alarm system, Operation and maintenance of various tenders, Water, foam, Co2, DCP and emergency tenders. |

**FS 104 INDUSTRIAL SAFETY C(L,T,P) = 4(4,0,0)**

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| **UNIT** | **Course Contents** |
| **I** | Physical hazards, Chemical hazards, Mechanical hazards, Biological hazards, Ergonomic hazards, Noise hazards, Chemical safety, Toxicity, IDLH (Immediate Danger to Life and Health), Chemicals - Storage, Handling and Transportation, Preventive measures for chemical spillage, Transport Emergency Card. (TREM Card). |
| **II** | What is electricity, Safety in use of electricity, Dangers from electricity, Importance of safety equipments in design and use of switches, switch, fuses, circuit breakers and isolating lines, Over load and short circuit protection, Earth fault protection, Earthing of electrically driven equipments, ELCB, Precautions, Static electricity, Electrical shock treatment, Points to be checked at the electrical system. |
| **III** | Hand tools and Power tools, safety while using Grinding stone, Welding and gas cutting safety, Dangerous points, Lubrication Safety. |
| **IV** | Hazard Study, Job safety analysis, Fault tree analysis, Event tree analysis, Failure modes and effects analysis, Relative ranking techniques, Monitoring of Safety Performance, Statistics of accidents, Frequency rate and severity rate, Frequency severity incidence, Safe – T – score. |
| **V** | Petroleum Refineries, Refinery Process, Classification of Petroleum Products, Storage Tanks  House Keeping: Definition, Need for housekeeping, Importance in view of safety, Methods  Safety Inspections: Safety Audit, Safety Survey, Plant safety inspection, Safety tour, Safety samplings |

**FS 105 PRINCIPILES OF INDUSTRIAL SAFETY AND ACCIDENT PREVENTION C(L,T,P) = 4(4,0,0)**

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| **UNIT** | **Course Contents** |
| **I** | Introduction to Safety, Goals, Need, History of Safety, Importance of Industrial Safety, Accident Causation, Definition, Case study, Theories and principles of accident Causation, The effect of accident, Unsafe Act, Unsafe condition. |
| **II** | Unpredictable performance, Consequences of accident., Accident prevention programmes, Cost analysis and Accident Prevention, Direct accident, Indirect accident, Accident Prevention Methods, Accident Investigation, Accident Reporting, Accident Investigation, Accident Investigation Report, Promotion Role. |
| **III** | Pre- accident Strategy and Health Policy, Safety Department, Safety Committee and Function, Physical hazards, Chemical hazards, Mechanical hazards, Housekeeping and Importance, Advantages of good housekeeping, Post Accident strategy. |
| **IV** | First Aid, Fire fighting, Accident Investigation. Role of government, Management, workers and trade unions, promoting safety in industry, First Aid, Introduction, Body structure and functions. |
| **V** | Position of causality, The unconscious casualty, Fracture and dislocation, Injuries to muscles and joints, Resuscitation, Bleeding, Management of shock, Burns, scalds and accidents caused by electricity, Rescue and transport of casualty. |

**FS 106 FIRE SCIENCE-I C(L,T,P) = 2(2,0,0)**

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| --- | --- |
| **UNIT** | **Course Contents** |
| **I** | **Analysis and interpretation of data**  Extract and tabulate given data and express that data in the form of:-   1. Graphs 2. Histograms and bar charts 3. Circular diagrams (pie charts)   Obtain median, mean and norm values from given data  Extend graphs to:-   1. Project values from given data (extrapolate) 2. Deduce values from missing data (interpolate) |
| **II** | Define the SI system of units in terms of basic and derived units,  Describe and carry out simple calculations involving the equations of motion,  Describe Newton’s Laws of Motion,  Use vector quantities to find resultant values,  Apply vector methods to force and motion problems,  Calculate moments around a fulcrum including the use of levers and parallel force,  Carry out calculations involving centres of gravity and buoyancy,  Define stress strain, describe Hooke’s Law and carry out calculations involving these terms,  Apply the calculations of work, power, density and efficiency to practical examples,  Describe and calculate the friction force between two surfaces in contact  **Hydraulics**  Define the following terms and demonstrate the relationship between them:-   1. Density 2. Specific gravity 3. Pressure in fluids   Solve problems involving the terms referred , Define “streamline flow”. |
| **III** | Show how the principle of atmospheric pressure is used in pumping systems either as an aid to flow or as a means of measuring flow, Use the laws of friction to calculate energy losses in piped water supplies, In relation to pumps, define water power, brake power and efficiency. Carry out basic calculations involving these terms.  Explain the relationship between velocity and discharge of water through hose of differing diameters, Discuss the purpose and design of branches and nozzles, Calculate the theoretical and the effective height of a jet  **Electricity:** Describe electric current as a flow of electrons,Describe how electrical energy is generated and distributed**,** Explain the characteristics of alternating and direct current  Describe the operation and characteristics of a step-up and step-down transformer,Explain Ohm’s Law and calculate the relationship between resistance, amperage and voltage in simple circuits (parallel and series),Use Ohm’s Law to solve problems. |
| **IV** | Explain the magnetic and chemical effects of electrical currents and show how these phenomena are applied in:-   1. Electric motors 2. Primary and secondary electric cells   Describe the function and method of operation of fuses and circuit breakers,  Define and solve problems involving resistance variation with temperature and resistivity,  Apply the concept of power to electrical circuits. |
| **V** | **Heat**  Define and calculate:-   1. Specific heat capacity 2. Latent heat of vaporization   Apply the use of calculations involving the transfer of heat,  Calculate linear, superficial and volumetric expansion using the relevant coefficients,  Apply the Gas Laws to calculations involving changing conditions of heat. |

**FS 108 EMERGENCY PLANING & FIRST AID C (L,T,P) = 3(3,0,0)**

|  |  |
| --- | --- |
| **UNIT** | **Course Contents** |
| **I** | On site Emergency Planning: On-site Emergency Plan, Emergency Alarm System, Emergency Control Room.  Key personnel, Emergency Control Program. |
| **II** | Off site Emergency Planning: Off-site Emergency Plan, Mutual Aid Scheme, Emergency Evacuation, Security and Media management. |
| **III** | Hazard Communication: Safe Handling of hazardous substance, Material Safety Data Sheet (MSDS)  Use of hazardous and Toxic substance, Storage and Handling, Transportation of Hazardous substance. |
| **IV** | Introduction: Action at Emergency, The practice of First Aid, Principles of First Aid, Training i9n First Aid, General rules of First Aid.  Shocks, Electrical Shock. Artificial Respiration, Cardio Pulmonary Resuscitation, Chocking, Fainting, Poisoning, Open Wounds. |
| **V** | Control of bleeding, Burns and Scalds, Heart Attack, Resuscitation. Disorder of respiratory system. Disorder of Circulation.  Wound & Bleeding, Disorders of consciousness, Bone, Joint & Muscle injury, Burns & Scalds.  Effect of heat & cold, Foreign bodies, Poisoning.  Dressing & Bandages, Handling & transport of injured, Emergency First Aid. |

**FS 151 FIRE SERVICE EQUIPMENTS & APPLIANCES C (L,T,P) = 2(0,0,2)**

|  |  |
| --- | --- |
| **UNIT** | **Course Contents** |
| **I** | **Perform Fire Fighting Hose Drill:**  Hose Drill Actions: Lifting hose, Lowering hose, Carrying hose, Laying hose,  Connect hose, Disconnect hose, Under running, Remove the kink, Rolling.  Identification of different types of hose fittings and their uses. |
| **II** | **Perform Hydrant Drills:**  3 -man Hydrant Drill: Drill procedure with application of Hose and Hydrant  Fittings: Add one length of hose, Remove one length of hose, Replace the burst Hose,  Divide one line into two line using Dividing Breeching, Collect two line into one line  using Collecting Breeching, Hydrant Gears and its operation. |
| **III** | **Perform Hydrant Drills:**  4 -man Hydrant Drill: Drill procedure with application of Hose and Hydrant  Fittings: Add one length of hose, Remove one length of hose, Replace the burst Hose,  Divide one line into two line using Dividing Breeching, Collect two line into one line  using Collecting Breeching, Hydrant Gears and its operation, |
| **IV** | **Identification, Selection, Operation And Maintenance Of Fire Extinguishers:**  Identification of different types of Fire Extinguishers {Water Expelling type, Foam  type, DCP type, CO2 type} With respect to constructional feature, capacity operation  and use. in fires, It's effective application in extinguishment, Recharging procedure,  Care and Maintenance, Performance test, Hydraulic test Inspection procedure -  Weekly,  monthly, quarterly, half yearly, yearly. |
| **V** | **To Identify The Use Of Fire Service Ladders**  Types of ladders, their construction, uses, identification of parts, care and maintenance  of ladders. |
| **VI** | **To Carry Out Four Men Drill**  Formation of crew, individual working procedure on get to work command, ladder  pitching, climbing, rescue operation, fire fighting, ventilation procedure, ladder  carrying, drill report. |
| **VII** | **To Carry Out Standard Tests of Ladder**  String test, round test, standard line test, acceptance test, deflection test. |
| **VIII** | **Fire Tender Drill**  6 -man Water Tender Drill: Mounting procedure, Dismounting procedure,  Individual working procedure like -working with ladder, Application of different types  of signals applied during pump operation, working with B.A. set, Soft suction, Hard  suction. |
| **IX** | **Identify Foam Making Branch Pipes**  Protein Foam, Aqueous Film Forming Foam ( AFFF), Foam Making Branch 5X (FB  5X) , Foam Making Branch 10 X (FB 10X) , Inline inductor, Pick -up -tube. |
| **X** | **To Study Breathing Apparatus Set**  Study, working, identification of different parts of BA, Donning Procedure, Pre-Entry  Test, BACO, Tally, Searching operation procedure with Guide Line and Personnel Line,  Entrapped Procedure, Use of Y manifold. |
| **XI** | **Study Of Small Gears Used In Fire Service**  Grouping of Small Gears with examples – Fireman Axe, Ceiling Hook, Drag Hook, Fire  Beater, Door Breaker, Steel shod lever, Pad Lock Remover, Persuader, Spreader,  Cutter, Bending Bar, Quick Release Knife, Shears, Bolt cutter, Search light, Focusing  light.  Study of hydraulically operated small gears and their use in Rescue Operation Care and  Maintenance of small gears. |

**FS 152 RESCUE TECHNIQUES C (L,T,P) = 2(0,0,4)**

|  |  |
| --- | --- |
| **UNIT** | **Course Contents** |
| **I** | **To Study Breathing Apparatus Set**  Study, working, identification of different parts of BA, Donning Procedure, Pre-Entry  Test, BACO, Tally, Searching operation procedure with Guide Line and Personnel  Line, Entrapped Procedure, Use of Y manifold. |
| **II** | **Study Of Small Gears Used In Fire Service**  Grouping of Small Gears with examples – Fireman Axe, Ceiling Hook, Drag Hook,  Fire Beater, Door Breaker, Steel shod lever, Pad Lock Remover, Persuader, Spreader,  Cutter, Bending Bar, Quick Release Knife, Shears, Bolt cutter, Search light, Focusing  light.  Study of hydraulically operated small gears and their use in Rescue Operation Care  and Maintenance of small gears |
| **III** | **Bandages And Their Respective Uses**  Rolling Bandages: Width of roller bandage, application – Simple spiral, Reverse  spiral, Figure of Eight, Triangular bandages – for the scalp, for the forehead, Eye,  cheek or any part which is found in shape, Front or back of the chest, for the  shoulder, for the elbow, for the hand, fore the hip and groin, for the knee, for the foot,  stump, types of slings and its application, Arm sling, Collar and cuff sling, Triangular  Sling, improvised Sling. |
| **IV** | **Resuscitation Procedures**  Methods of artificial Respiration like – Holger Nielson Method.  Schaefer’s Method, Sylvester’s Method, Mouth to Mouth, Eve’s rocking stretcher  Method, Emerson Method. |
| **V** | **To Perform Drill For Transportation Of Casualties**  4-man Stretcher Drill – Objectives, Equipment, Drill procedure by individual No.1 to  No.4 Rescuer, Loading Casualties to the Ambulance |

**Reference Books List for I year :**

1. Industrial Safety Management- N.K. Tara Fdar, K.J Tara Fdar.
2. Fire Service First Responder - Daniel Limmer, Michael Grill, IFSTA Senior Editor-Michael A Wieder.
3. Safety A personal Focus - David L Bever.
4. Fire Equipment- David L. Bever.
5. Industrial Safety - National Safety Council of India.
6. Hand book of fire and Explosion Protection Engineering Principles for Oil, Gas, Chemical and Related, Facilities- Dennis. P. Nolan, PE.
7. Engineering Chemistry- Jain & Jain.
8. Industrial Management - Jain & Bawa.
9. Thermodynamics - Aroma & Domkundwar.
10. Hand book of Hazardous Air pollutions - Dennis P Nolan P.E.
11. Remediation and Treatment Technologies, Dennis P Nolan P.E.
12. Fire Technology - R.S. Gupta.
13. Major hazard control- l Inter National Labor Office.
14. Encyclopedia of occupational health and safety - Inter National Labor Office.
15. Safety, health and working condition in the transfer of technology- Inter National Labor Office.
16. Radiation protection- Inter National Labor Office.
17. Fire service Manual (4 volumes).
18. TAC and NBC rule- Kerala Fire Force.
19. Publications from Inter National standard organizations like ISO, OSHA, IOSH, NEBOSH etc.
20. Industrial Safety, Health and environment Management systems, RK Jain and Sunil S Rao.
21. HMSO- Fire fighting Drill Manual.
22. NFSC- Fire Fighting Drill Manual.
23. NFSC- Practical Fire Safety And Ground Command Tips.
24. A.S. Khan- Fire Fighters Drill Manual, Agni Seva Prakashan, Shikohabad.

**EN 101 COMMUNICATIVE ENGLISH C (L, T, P) = 3 (3, 0, 0)**

|  |  |
| --- | --- |
| **UNIT** | **CONTENTS** |
| UNIT-I **GRAMMAR** | * Tense * Question Tags * Modal Verbs |
| UNIT-II **COMPOSITION** | * Report Writing * Essay Writing * Review Writing |
| UNIT-III **SHORT STORIES** | * The Last Leaf by O’ Henry * The Fortune Teller by Karel Capek * The Three Dancing Goats by Anonymous |
| UNIT- IV **ESSAYS & SHORT PLAYS** | * Of Studies by Francis Bacon * On The Rule Of The Road by A. G. Gardiner * The Monkey’s Paw by W.W. Jacobs |
| UNIT –V **POEMS** | * The Character Of A Happy Life by Sir Henry Wotton * Night Of The Scorpion by NIssim Ezekiel * Death The Leveller byJames Shirley |

**Recommended books**

1. Communicative Grammar and Composition by Rajesh K. Lidiya,2008 Oxford Uni. Press, New Delhi

2. Communicative Grammar and Composition, by Rajesh K. Lidiya,2013 OUP, New Delhi

3. Effective Technical Communication by M. Ashraf Rizvi 2005 ,Tata McGrew Hill New Delhi

4. Technical Communication by Meenakshi Raman & Sangeeta Sharma ,2008 OUP New Delhi

5. Business Communication by Meenakshi Raman & Prakash singh, OUP, New Delhi

6. A Practical Course for developing Writing Skills In English by J.K. Gangal PHI Learning Pvt. Ltd. New Delhi

7. Oxford Companion to English Literature U P

8. A glossary of literary terms -M H Abrams

**EN 102 COMMUNICATION TECHNIQUES C (L, T, P) = 3 (3, 0, 0)**

|  |  |
| --- | --- |
| **UNIT** | **CONTENTS** |
| UNIT-I GRAMMAR | * Active & passive * Nouns and Articles * Conditionals |
| UNIT-II COMPOSITION | * Letter Writing * .Application Writing * Technical proposal writing |
| UNIT-III COMMUNICATION | * Definition, Meaning * Objectives & its significance * Characteristics, principles & purpose |
| UNIT- IV MODERN COMMUNICATION | * Communication devices * Communication structure in an organization * Email messages & Etiquettes |
| UNIT –V SKILLS OF COMMUNICATION | * Professional communication * Interpersonal Communication * Methods to improve it |

***Recommended books***

1. Modern English –N. Krishnaswamy, Macmillan publication
2. Oxford Guide to Writing and Speaking – John Selly Oxford University press
3. Communicative Grammar and Composition by Rajesh K. Lidiya,2008 Oxford Uni. Press,

New Delhi

4. Communicative Grammar and Composition, by Rajesh K. Lidiya,2013 OUP, New Delhi

5. Effective Technical Communication by M. Ashraf Rizvi 2005 ,Tata McGrew Hill New Delhi

6. Technical Communication by Meenakshi Raman & Sangeeta Sharma ,2008 OUP New Delhi

7. Business Communication by Meenakshi Raman & Prakash singh, OUP, New Delhi

8. A Practical Course for developing Writing Skills In English by J.K. Gangal PHI Learning Pvt. Ltd. New Delhi.

**EN 151** **ENGLISH COMMUNICATION LAB** **C (L, T, P) = 1 (0, 0, 2)**

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|  |  |
| --- | --- |
| S.No. | Contents of subject |
| 1 | Phonetics |
| 2 | Phonetic Symbol & Transcription |
| 3 | Synonyms and Antonyms |
| 4 | Affixes |
| 5 | One word substitution |
| 6 | Paper presentation |
| 7 | Seminar presentation |
| 8 | Reading comprehension |
| 9 | Group Discussion |
| 10 | Personal Grooming & Etiquettes |

**Reference books:-**

1 Working with Emotional Intelligence-Daniel Goldman

2 Emotional Intelligence- Daniel Goldman

3 Stress Management-Vera Pfeiffer

4 Self hypnosis- Valerie Austin

5 Memory Boosters- Hamlyn

6 The 7 Habits of highly *Effective People*- Stephen R. Covey

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EN 152** | | **LANGUAGE LAB** | **C (L, T, P) = 1 (0, 0, 2)** | |
| **S.No.** | | **Contents of subject** | | |
| 1 | | Communication | | |
| 2 | | Verbal & Non verbal Language | | |
| 3 | | Essentials of personality development | | |
| 4 | | Body Language | | |
| 5 | | Team building | | |
| 6 | | Time Management | | |
| 7 | | Interview skills | | |
| 8 | | Practical lesson on personality development | | |
| 9 | | Speaking & listening skills | | |
| 10 | | Presentation skills | | |

**Reference books:-**

1. Working with Emotional Intelligence-Daniel Goldman.
2. Emotional Intelligence- Daniel Goldman.
3. Stress Management-Vera Pfeiffer.
4. Self hypnosis- Valerie Austin.
5. Memory Boosters- Hamlyn.
6. The Habits of highly Effective People- Stephen R. Covey.

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| --- | --- | --- | --- | --- | --- |
| **ES101** | | **ENVIRONMENTAL STUDIES** | **C (L, T, P) = 2 (2,01, 0)** | | |
|  |  |  |  |  |  |
| **Units** |  | **Contents of the Course** |  | **Hours** |  |
| I | **Man & Environment:** Definition of Environment & its various components. Ecosystem | | | 6 |  |
|  | concepts. Dependence of Man on nature for its various various needs. Human population | | |  |  |
|  | growth & its impacts on environment. Environment & human health. Environmental | | |  |  |
|  | concerns including climate change, Global warming, Acid Rain, Ozone layer Depletion etc. | | |  |  |
|  | Environmental ethics. Traditional ways of utilising various components of environment. | | |  |  |
|  | Sustainable developments. | |  |  |  |
| II | **Natural Resources:** Forest resources, Mining , Dams & their effects on forests & tribal | | | 6 |  |
|  | people. Water resources-over utilization of water, floods, droughts and conflicts over water | | |  |  |
|  | resources. Mineral Resources- Use of various minerals for Human welfare & environmental | | |  |  |
|  | effects of mining. Food resources -World food problem. Impacts of changing Agriculture | | |  |  |
|  | practices on Environment. Energy Resources-Renewable and non renewable energy | | |  |  |
|  | Resources & exploration of alternative energy sources. Land Resources- land degradation, | | |  |  |
|  | soil erosion, desertification & soil contamination. | |  |  |  |
| III | **Ecosystems:** Structure & function, energy flow, food chains, food webs, Ecological | | | 6 |  |
|  | pyramids. Basics of forest grasslands, desert & aquatic ecosystem (Ponds, Streams, Lakes, | | |  |  |
|  | Rivers, Oceans & Estuaries) | |  |  |  |
|  |  | | |  |  |
| IV | **Biological Diversity:** Genetic, species & ecosystem diversity, Values of Biodiversity, | | | 6 |  |
|  | Global, National & Local Biodiversity. Hot-spots of Biodiversity, threat to biodiversity. | | |  |  |
|  | Endangered & endemic species of India. Conservation of biodiversity in situ & ex-situ | |  |  |  |
| V | **Environment pollution:** Causes, effects & control of- Air pollution, Water pollution, Soil | | | 6 |  |
|  | pollution, Noise Pollution, Thermal pollution & Nuclear Hazards. Solid wastes & their | | |  |  |
|  | Management. Disaster Management-Flood, Drought, Earthquake, Land slides etc. | |  |  |  |
|  |  |  | **Total** | **30** |  |
| **References** | |  |  |  |  |

1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.
2. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad – 380013, India. Email: [mapin@icenet.net](mailto:mapin@icenet.net).
3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.
4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).
5. Cunningham WP, Cooper TH, Gorhani E & Hepworth MT, 2001. Environmental Encyclopaedia, Jaico Publishing House, Mumbai, 1196pgs.
6. De AK, Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Center for Science and Environment (R).
8. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, 473pgs.
9. Hawkins RE, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood VH, and Watson RT, 1995. global Biodiversity Assessment. Cambridge University Press 1140pgs.
11. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs.
12. Mckinney ML and Schoch RM, 1996. Environmental Science Systems and Solutions. Web enhanced edition, 639pgs.
13. Mhaskar AK, Matter Hazardous, Techno-Science Publications (TB).
14. Miller TG, Jr. Environmental Science, Wadsworth Publishing CO. (TB).
15. Odum EP, 1971. Fundamentals of Ecology. WB Saunders Co. USA, 574pgs.
16. Rao MN and Datta AK, 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd. 345pgs.

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**SCHOOL OF SCIENCES**

**SYLLABUS**

**B. Sc. (Chemistry, Botany and Zoology)**

**SEMESTER SYSTEM**

**(** **w.e.f. Session 2014-15)**

**Program Aims and Objectives:**

The B.Sc. (Biology) program of Suresh Gyan Vihar University, Jaipur is designed keeping in view the latest trends in the field of Chemistry, Botany & Zoology. The students are given an overview of the various subjects of all the three disciplines during the tenure of their program. The various papers that are put to study during the program include study of plants, animals and physical, organic and inorganic chemistry in details. Therefore after completion of the biology program, the students are well versed with the entire area of all the three disciplines and their application in the current scenario.

**Undergraduate Programmes**

Undergraduates majoring in Biological Sciences will develop a broad base of general knowledge, focused primarily in the biological sciences, and capped with in-depth knowledge specific to their particular major program.

Biological Sciences majors will also obtain broad knowledge in mathematics, Biological sciences, and natural sciences, coupled with analytical, oral and compositional skills, to promote good citizenship and the capacity for life-long learning.

Our students are expected to demonstrate a breadth of knowledge across the sub-disciplines that comprise Biological Sciences. The curriculum for biology majors meets the needs of students with three post-graduation ambitions: graduate school, professional school, or work in industry or government without further training.

**Learning Objectives**

As Biological Sciences is an integrative discipline, students are required to demonstrate appropriate proficiency in Chemistry, Mathematics and Physics in order to apply this knowledge to the study of Biology (Botany/Zoology).

Students will acquire a breadth of knowledge in Biology (genetics, physiology, anatomy, ecology, evolution, cell- or biochemistry, and microbiology).

Students will acquire a broad knowledge in mathematics, biological sciences, and natural sciences, coupled with analytical, oral and compositional skills, to promote good citizenship and the capacity for life-long learning.

Students will develop and apply oral and written skills, problem-solving skills in developing experimental design and analysis, and participate in individualized hands-on field and laboratory exercises.

Students will be prepared with a sufficient depth of knowledge in their specific major program to assure their admission to graduate or professional school or be prepared for entry-level employment.

The study of biology can have a multitude of aims and objectives. Largely, it is studied to allow a person to enter a specific field of employment. Other aims for studying biology are intellectual, ethical and pragmatic: to increase knowledge about all aspects of organisms, to encourage greater benevolence in the relationship between humans and the natural environment and to implement biological factors into various technologies or management techniques.

**Understanding Living Systems and Critical Thinking:**

The study of biology aims to increase understanding of living systems and to allow you to consider the systems in relationship to the self and other organisms in the natural environment. The goal is to be able to test theories developed about living things by utilizing the scientific method and then to apply the new information in a beneficial way.

Field Biology, Health Care and Education

Biology has many applications, both in the natural environment and the environment of health and education. Studying biology allows health care workers to understand the living systems of the body and to apply the knowledge in direct ways to recover and maintain the physical health of both animal and human patients. Educators rely on biology to teach the study of life to future generations. Field biologists use biology to understand relationship between living organisms and to notice what’s beneficial and what is imbalanced and dangerous



SCHOOL OF SCIENCES

Teaching and Examination Scheme for B.Sc. Pass course (Regular) 3 Year Course EFFECTIVE FROM ACADEMIC SESSION 2014-15

Year: I Semester: I

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | ES101 | Environmental Studies | 2 | 2 |  | - | 3 | 30 | 70 |
| 2 | EN101 | English | 3 | 3 |  |  | 3 | 30 | 70 |
| 3 | CY111 | Fundamentals of Chemistry - I | 4 | 4 |  | - | 3 | 30 | 70 |
| 4 | BY111 | Botany – I  Systematics and Plant Diversity | 4 | 4 |  | - | 3 | 30 | 70 |
| 5. | ZY111 | Zoology – I  Systematics and Animal Diversity | 4 | 4 |  | - | 3 | 30 | 70 |
|  |  | **B. Practical & Sessional** |  |  |  |  |  |  |  |
| 6 | ZY161 | Zoology Lab – I | 2 |  |  | 3 | 4 | 60 | 40 |
| 7 | BY161 | Botany Lab - I | 2 |  |  | 3 | 4 | 60 | 40 |
| 8 | CY161 | Chemistry Lab – I | 2 |  |  | 3 | 4 | 60 | 40 |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 9 | DC101 | Discipline and Co- Curricular Activities | 2 |  |  |  |  | 100 |  |
|  |  | **Total** | **25** | 17 |  | 9 |  | **-** | **-** |

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**



SCHOOL OF SCIENCES

Teaching and Examination Scheme for B.Sc. Pass Course (Regular) 3 Year Course EFFECTIVE FROM ACADEMIC SESSION 2014-15

Year: I Semester: II

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | EN 102 | Communication Skill | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | CP 102 | Fundamentals of Computer | 3 | 3 |  |  | 3 | 30 | 70 |
| 3 | CY 112 | Fundamentals of Chemistry - II | 4 | 4 |  | - | 3 | 30 | 70 |
| 4 | BY 112 | Botany – II  Microbiology and Plant Pathology | 4 | 4 |  | - | 3 | 30 | 70 |
| 5. | ZY 112 | Zoology – II  Cell Biology and Biochemistry | 4 | 4 |  | - | 3 | 30 | 70 |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | ZY162 | Zoology Lab – II | 2 |  |  | 3 | 4 | 60 | 40 |
| 7 | BY162 | Botany Lab - II | 2 |  |  | 3 | 4 | 60 | 40 |
| 8 | CY162 | Chemistry Lab – II | 2 |  |  | 3 | 4 | 60 | 40 |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 9 | DC 102 | Discipline and Co- Curricular Activities | 2 |  |  |  |  | 100 |  |
|  |  | **Total** |  |  |  |  |  | **-** | **-** |
|  |  | **Total Teaching Load** | **26** | 18 |  | 9 |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**Semester I 2014-15**

**ES101 ENVIRONMENTAL STUDIES C (L, T, P) = 2 (2, 0, 0) Total Lect.-20**

|  |  |  |
| --- | --- | --- |
| **Units** | **Contents of the Course** | **Hours** |
| I | Man & Environment: Definition of Environment & its various components. Ecosystem concepts. Dependence of Man on nature for its various needs. Human population growth & its impacts on environment. Environment & human health. Environmental concerns including climate change, Global warming, Acid Rain, Ozone layer Depletion etc. Environmental ethics. Traditional ways of utilizing various components of environment. Sustainable developments. | 4 Hours | |
| II | Natural Resources: Forest resources, Mining, Dams & their effects on forests & tribal people. Water resources-over utilization of water, floods, droughts and conflicts over water resources. Mineral Resources- Use of various minerals for Human welfare & environmental effects of mining. Food resources -World food problem. Impacts of changing Agriculture practices on Environment. Energy Resources-Renewable and non renewable energy Resources & exploration of alternative energy sources. Land Resources- land degradation, soil erosion, desertification and soil contamination. | 4 Hours | |
| III | Ecosystems: Structure & function, energy flow, food chains, food webs, Ecological pyramids. Basics of forest grasslands, desert & aquatic ecosystem (Ponds, Streams, Lakes, Rivers, Oceans & Estuaries) | 4 Hours | |
| IV | Biological Diversity: Genetic, species & ecosystem diversity, Values of Biodiversity, Global, National & Local Biodiversity. Hot-spots of Biodiversity, threat to biodiversity. Endangered & endemic species of India. Conservation of biodiversity in situ & ex-situ | 4 Hours | |
| V | Environment pollution: Causes, effects & control of- Air pollution, Water pollution, Soil pollution, Noise Pollution, Thermal pollution & Nuclear Hazards. Solid wastes & their Management. Disaster Management-Flood, Drought, Earthquake, Landslides etc. | 4 Hours | |

**Reference Books:**

1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.

2. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad –

3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.

4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).

5. Cunningham WP, Cooper TH, Gorhani E & Hepworth MT, 2001. Environmental Encyclopaedia, Jaico Publishing House, Mumbai

6. De AK, Environmental Chemistry, Wiley Eastern Ltd.

7. Down to Earth, Center for Science and Environment (R)

8. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press,

9. Hawkins RE, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)

10. Heywood VH, and Watson RT, 1995. global Biodiversity Assessment. Cambridge University Press

11. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi

12. Mckinney ML and Schoch RM, 1996. Environmental Science Systems and Solutions. Web enhanced edition.

13. Mhaskar AK, Matter Hazardous, Techno-Science Publications (TB)

14. Miller TG, Jr. Environmental Science, Wadsworth Publishing CO. (TB)

15. Odum EP, 1971. Fundamentals of Ecology. WB Saunders Co. USA,

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**2014-15**

**EN101 ENGLISH C (L, T, P) = 3(3, 0, 0) Total Lect.-30**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | **Phonetics and vocabulary - Transcription of phonetic symbols**  Word stress  Synonyms and antonyms  Word formation- Prefix, Suffix | 5 Hours |
| **II** | **Grammar and usage - Transformation of sentences**  Direct and indirect narration  Active and passive voice  Interchange of degrees of comparison | 5 Hours |
| **III** | Modals  Sequence of Tenses  Elements of a clauses (as discussed in quirk and greenbaum) | 5Hours |
| **IV** | Following texts to be compiled by macmillan  William Blake The Little Black Boy  Sujata Bhatt Voice Of The Unwanted Girl  Lewis Carroll A Mad Tea Party  Ruskin Bond Night Train For Deoli  M.K.Gandi The Birth Of Khadi  J.L.Nehru A Tryst With Destiny  Martin L King I Have A Dream  A.P.J.Abdul Kalam Vision For 2020 | 5 Hours |
| **V** | Letter- Formal and Informal  CV’s and Job Application  Paragraph Writing | 5 Hours |

**Reference Books:**

1. Sasikumar ,V. Dutta And Rajeevan, A course In Listening And Speaking-I Foundation Books,2006.
2. Sawhney, Panja and Verma Eds. English At The Workplace Macmillan 2003.
3. Singh,R.P., Professional Communication, OUP 2004.
4. Judith Leigh. CV’s and Job Applications, OUP 2004.
5. Arthur Waldhorn and Arthur Zeiger, English Made Simple, Rupa and Co.
6. Gunashekar Ed. A Foundation Enhlish Course For Undergrautes, Bookiciefi, Hyderabad.
7. Quirk and Greenbaum, A University Grammar of English Longman 1973.

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**2014-15**

**CY111 Fundamentals of Chemistry - I C (L, T, P) = 4(4, 0, 0) Total Lect.-40**

**(Common for Mathematics and Biology Streams )**

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| **Unit** | **Description of Content**  **Inorganic Chemistry-**1 (40 Lectures) | **No. of Hrs** |
| I | **Atomic Structure: Recapitulation** of: Bohr’s theory de-Broglie’s relation, Heisenberg Uncertainty principle. Need of a new approach to Atomic structure. Time independent Schrodinger equation (H Ψ = EΨ). Significance of Ψ and Ψ 2 , Schrodinger equation for hydrogen atom. Transformation of Cartesian coordinates (x,y,z) into polar coordinates (r,θ,φ). Radial and angular parts of the hydogenic avefunctions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals. (Only graphical epresentation), Radial and angular nodes and their significance. Radial distribution functions (1s and 2s atomic orbitals). Significance of quantum numbers, orbital angular momentum and quantum numbers mr and ms. Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms). Electronic configurations of the atoms. Concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations. | 8 |
| II | **Chemical Bonding and Molecular Structure Ionic Bonding** : Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Born-Lande equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan’s rules, bond moment, dipole moment and percentage ionic character. Covalent bonding :VB Approach : Concept of hybridization and VSEPR theory . Resonance and resonance energy : study of some inorganic and organic compounds. Molecular Orbital Approach : LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combination of atomic orbitals, non- bonding combination of orbitals ,MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of s-p mixing) and heteronuclear diatomic molecules such as CO, NO and NO+ | 8 |
| III | **Fundamentals of Organic Chemistry** :Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules : Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Huckel’s rule | 08 |
| IV | **Stereochemistry**  :Conformations w.r.t. ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newman, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; nantiomerism, Diastereomerism and Meso compounds) . Threo and erythro; D and L; cis - trans omenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems). | 08 |
| V | **Aliphatic Hydrocarbons**  Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Alkanes: (Upto 5 Carbons) Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe’s synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation. Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff’s rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. KMnO4) and trans-addition (bromine). Add | 08 |

**Reference Books**

1. J. D. Lee : A new Concise Inorganic Chemistry, E L. B. S.

2. James E. Huheey, Ellen Keiter and Richard Keiter : Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Publication.

3. I. L. Finar : Organic Chemistry (Vol. I & II), E. L. B. S.

4. R. T. Morrison & R. N. Boyd : Organic Chemistry, Prentice Hall.

5. Arun Bahl and B. S. Bahl : Advanced Organic Chemistry, S. Chand

6. Peter Sykes : A Guide Book to Mechanism in Organic Chemistry, Orient Longman.

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**2014-15**

**BY111 BOTANY 1: SYSTEMATICS AND PLANT DIVERSITY**

**C (L, T, P) = 4(4, 0, 0) Total Lect.-40**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | **Plant Taxonomy**  Principles of classification, nomenclature; comparative study of different classification systems, viz. Linnaeus, Bentham & Hooker, Engler & Prantl, Hutchinson, and Cronquist. Herbarium techniques and important Botanic Gardens. | 8 Hours |
| **II** | **Algae**- General characters, classification (upto classes) and economic importance;  important features and life-history (excluding development) of Volvox, Oedogonium (Chlorophyceae), Vaucheria (Xanthophyceae), Ectocrpus (Phaeophyceae) and Polysiphonia (Rhodophyceae). | 8 Hours |
| **III** | **Fungi** General characters, classification (upto classes) and economic importance; important features and life-history of Phytophthora (Mastigomycotina), Mucor (Zygomycotina), Penicillium (Ascomycotina), Puccinia, Agaricus (Basidiomycotina), Colletotrichum (Deuteromycotina); General account of Lichens. | 8 Hours |
| **IV** | **Bryophytes and Pteridophytes**   * Important Characteristics and Classification up to classes * Habit, Habitat and life cycle patterns. * Ecological and Economic importance of Marchantia (Hepaticopsida),   Anthoceros (Anthocerotopsida), Funaria (Bryopsida), Rhynia (Psilopsida),  Selaginella (Lycopsida), Equisetum (Sphenopsida) and Pteris (Pteropsida). | 8Hours |
| **V** | **Gymnosperms and Angiosperms**   * Important Characteristics and Classification up to classes, * Life cycle patterns (Saprophyte and gametophyte). * Ecological and Economic importance of Cycas and Pinus | 8 Hours |

**Reference Books:**

1. Rastogi V.B. Organic Evolution. Rastogi Publication.

2. Clifton A., Introduction of Bacteria, McGrawHill Co. Ltd. New York 1985.

3. Kaushik P. Microbiology, Emkay Publication, 2001.

4. Pelczer, Chan and Kruig. Microbiology. McGraw Hill Co., London, 1995.

5. De Robertis & De Robertis Cell and Molecular Biology. Lippincott Williams and Wilkins.

6. P.K. Gupta, Cell and Molecular Biology.Rastogi Publication.

7. C.B. Powar – Cell Biology,Himalaya Publishing House.

8. V.B. Rastogi – Cell Biology.Rastogi Publications.

9. Dube, H.C. Fungi, Rastogi Publication, Merrut, 1989.

10. Vashishtha P.C. Gymnosperm, S. Chand Company.

11. Singh Pandey Jain, A text Book of Botany, Rastogi Publication.

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**2014-15**

**ZY111 ZOOLOGY I- SYSTEMATICS AND ANIMAL DIVERSITY**

**C (L, T, P) = 4(4, 0, 0) Total Lect.-40**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | **Criteria for classification of multicellular animals**  Taxonomy and classification: General principles of taxonomy - Binomial nomenclature, -Trinomial nomenclature, Rules of nomenclature, Concept of Five kingdom, concept of protozoa, metazoan and levels of organization. Basis of Classification: symmetry, coelom, segmentation and embryology. | 8 Hours |
| **II** | **Non–Chordates: General characters and Outline Classification upto class, Economic importance**   * Protozoans - Entamoeba histolytica * Poriferans - Skeleton and canal system of sponges. * Coelenterates - Coral and coral reefs * Platyhelminths - Parasitic adaptations * Aschelminthes - Nematodiasis. | 8 Hours |
| **III** | **Non–Chordates: General characters and Outline Classification up to class, Economic importance**   * Annelids - Vermiculture * Arthropods - Larval forms. * Molluscs - Pearl culture * Echinoderms - Water vascular system | 8 Hours |
| **IV** | **Hemichordata :** Classification (up to class) and Habit, habitat, distribution and General characters.   * Protochordates: Urochordates, Cephalochordates * Cyclostomes | 8 Hours |
| **V** | **Chordates: General characters and Outline Classification up to order, Economic importance of**   * Fishes * Amphibian * Reptiles * Birds * Mammals | 8 Hours |

**Reference Books**

1. R .L.Kotpal :Modern text book of biology – Invertebrate –(Rastogi Publication, Meerut).
2. Jordan, E. L. : Invertebrate Zoology ( S. Chand Co. New Delhi.).
3. Dhami and Dhami : Invertebrate Zoology ( S. Chand & Co. New Delhi).
4. Shrivastava, : Economic Zoology. ( Commercial Pub.brue,N.Delhi).
5. Vishwapremi K.K., : Economic Zoology (Akashdeep Pub.House,New Delhi).
6. V.P.Agrawal and L. D.Chaturvedi: A text book of Invertebrate Zoology –(Jagmander

Book Agency, New Delhi).

1. R.L.Kotpal :Modern text book of biology –Vertebrate –(Rastogi Publication, Meerut).
2. Young, J.Z. : Life of Vertebrate.(E L B S) 1983.Oxford.
3. Dalela, R.C. : A text book of Chordate Zoology, (Jai Prakash Nath publications, Meerut.).
4. Newman, H.H. : The phylum Chordate, (Satish Book Enterprise, Agra).
5. Jordon, E.L. : Vertebate Zoology, ( S.Chand and Co., New Delhi.).

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**Semester II 2014-15**

**EN 102 COMMUNICATION SKILLS**

**C (L, T, P) = 3(3, 0, 0) Total Lect.-30**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | Communication: Language and communication, differences between speech and writing, distinct features of speech, distinct features of writing. | 5 Hours |
| **II** | Writing Skills; Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing. | 5 Hours |
| **III** | Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided. | 5Hours |
| **IV** | Definition of Listening, Reading, Writing and Communicating, Barriers in the path of Communication, Signposting, Outlines, Rephrasing, Listening to conversation (Formal and informal), Techniques of reading, skimming, Scanning, SQ3R technique. | 5 Hours |
| **V** | Paragraph, Letter Writing, Essay writing, Memo, Circular, Notice, Cover Letter, Resume, Thesis, Summary, Précis, Speaking – How to converse with people, How to communicate effectively. | 5 Hours |

**Reference and Text books**

1. M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice Hall Reagents.

2. L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academic and professional purposes, Cambridge Univ. Press.

3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.

4. Daniel G. Riordan & Steven A. Panley: *“Technical Report Writing Today”* - Biztaantra.

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS, Semester 2014-15**

**CP 102 FUNDAMENTALS OF COMPUTER**

**C (L, T, P) = 3(3, 0, 0) Total Lect.-30**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | Introduction about System software and Application software with examples:  Introduction to Windows: Icon, Menu, Desktop.  Creating Folder and Shortcut, Searching Files and Folders in System, Creating Files, Copying, Moving and Deleting Files, Adding programs in Start Menu, Deleting Programs from Start Menu, Using Windows Explorer utility. | 5 Hours |
| **II** | Word Processing Package:  Introduction to MS Word, menu options, saving and creating document. Working with Tables, Mail Merge, AutoText and AutoShapes, Word Art and Clip art, Macros, Printing Documents. | 5 Hours |
| **III** | Spreadsheet Package:  Concept of Spreadsheet, MS Excel, Basic and Advanced Features of MS Excel, Sorting and Searching Data, Filtering Data, linking Workbooks, using Formulas, Protecting and Hiding Data, Formatting a worksheet, Creating Graphic Objects, Charts (Graphs), Sharing and Importing Data, Printing Worksheets, Macros, Pivot Table and Pivot Chart, Reports. | 5Hours |
| **IV** | Presentation Package:  Introduction about MS Power Point, Creating and editing slides, Using Objects on slides, Putting Animation and Sound effects on slides, Transition effects on slides, Different views of Slides: Normal slide sorter, slide show and Notes Page, Printing slides, Using Macros, comparing and merging presentations, Autocorrect Options, Recording narrations, templates, introduction about Master Slides, Object Embedded Linking. | 5 Hours |
| **V** | Basic concepts of programming: languages, evolution of the major programming languages, types of programming languages, programming environments: Compiler, Interpreter, Assembler. Algorithm development: Steps in program development, Algorithms, Flow-charting, program coding, testing and debugging. | 5 Hours |

**Reference/ Text Books:**

1. Norton P., Introduction to Computers - TMH
2. Muller S., Upgrading and Repairing PC - QUE
3. Muller S., Upgrading and Repairing Network - QUE
4. Bott, Using MS Office 2000 – PHI
5. Kapoor VK and Gupta SC 'Fundamentals of Mathematical Statistics', S. Chand and Comp. Pvt. Ltd., New Delhi .
6. Goon AM, Gupta MK and Dasgupta V, 'Fundamentals of Statistics’ 1971, World Press Calcutta.
7. Agarwal BL 'Basic Statistics', New Age International Publishers, New Delhi, 1996.
8. Sundar Rao PHS, 'Introduction of Biostats', Prentice Hall, India.
9. Rohlf, FJ and Sokal, RR ‘Biometry: The principles and practice of Statistics in Biological Research', 1995 W.H. Freeman, New York.

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**2014-15**

**CY 112 Fundamentals of Chemistry - II**

**C (L, T, P) = 4(4, 0, 0) Total Lect.-40**

**(Common for Mathematics and Biology Streams )**

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| **Unit** | **Description of Content** | **Hours** |
| I | **Chemical Thermodynamics** What is thermodynamics? State of a system, state variables, intensive and extensive variables, concept of heat and work, thermodynamic equilibrium, thermodynamic properties, various types of systems and processes. First Law of thermodynamics. Calculation of work (w), heat (q), changes in internal energy (∆U) and enthalpy (∆H) for expansion or compression of ideal gases under isothermal and adiabatic conditions for both reversible and irreversible processes. Calculation of w, q, ∆U and ∆H for processes involving changes in physical states. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. | 8 |
| II | **Chemical Equilibrium** Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ∆G and ∆Gѳ, Le Chatelier’s principle. Relationships between Kp, Kc and Kx for reactions involving ideal gases. | 8 |
| III | **Ionic Equilibria :**Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect, Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. | 8 |
| IV | **Aromatic hydrocarbons** Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions : (Case benzene) : Electrophilic substitution: nitration, halogenation and sulphonation. FrieCraft’s reaction (alkylation and acylation). (Upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (Upto 4 carbons on benzene). Unit 5. Alkyl and Aryl Halides Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (SN2, SN1 and SNi) reactions. Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile & iso-nitrile formation. Williamson’s ether synthesis: Elimination vs substitution. | 8 |
| V | **Alcohols, Phenols and Ethers (Upto 5 Carbons)** Alcohols: Preparation: Preparation of 1 3 alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO4, acid. dichromate, con. HNO3). Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement. Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer - Tiemann Reaction, Gattermann-Koch Reaction, | 8 |

**Suggested Readings**

1 Barrow, G. M. Physical Chemistry Tata McGraw-Hill (2007).

2. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).

3. Mahan, B. H. University Chemistry 3rd Ed. Narosa (1998).

4. I. L. Finar : Organic Chemistry (Vol. I & II), E. L. B. S.

5. R. T. Morrison & R. N. Boyd : Organic Chemistry, Prentice Hall.

6. Arun Bahl and B. S. Bahl : Advanced Organic Chemistry, S. Chand

7. Peter Sykes : A Guide Book to Mechanism in Organic Chemistry, Orient Longman.

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**2014-15**

**BY 112 BOTANY II MICROBIOLOGY AND PLANT PATHOLOGY**

**C (L, T, P) = 4(4, 0, 0) Total Lect.-40**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | **History and scope of Microbiology**  Position of microorganisms in the living world; morphological, metabolic and molecular criteria for the classification of bacteria | 8 Hours |
| **II** | **Prokaryotic cell structure**  Bacterial cell structures: capsule and slime, flagella, cell wall, cell membrane,chromosome, plasmid and endospore | 8 Hours |
| **III** | **Bacteriophages and genetic recombination**  Structure ofBacteriophagesbelonging to 'T' series  Lysogenic and lytic cycles  A brief account of genetic recombination in bacteria (transformation, conjugation and transduction) | 8 Hours |
| **IV** | **Economic importance of microorganisms**  Role of microorganisms in cycling of carbon and nitrogen.  Microorganisms and the production of alcoholic beverages, antibiotics and single cell protein | 8 Hours |
| **V** | **Plant pathology**  General symptoms of viral, bacterial and fungal diseases of plants.  The study of the following plant diseases: Tobacco mosaic, citrus canker, late blight of potato, powdery mildew of pea, loose smut of wheat, covered smut of barley and wilt of pigeon pea | 8 Hours |

Reference books

1. Pelczar, M.J. (2001) Microbiology, 5thedition, Tata Mc Graw-Hill Co, New Delhi.
2. Presscott, L. Harley, J. and Klein, D. (2005) Microbiology, 6 th edition, Tata Mc Graw-Hill Co. New Delhi.

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**SCHOOL OF SCIENCES**

**B.Sc. (Chemistry, Botany & Zoology)**

**DETAILED SYLLABUS**

**2014-15**

**ZY 112 ZOOLOGY II CELL BIOLOGY AND BIOCHEMISTRY**

**C (L, T, P) = 4(4, 0, 0) Total Lect.-40**

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| **I** | Introduction to cell: Morphology, size, shape and characteristics of Prokaryotic, Eukaryotic, Plant and animal cells; cell-theory. Cell membrane: Characteristics of cell membrane molecules, fluid mosaic model of Singer and Nicolson, concept of unit membrane. Cell membrane transport: Passive (diffusion and osmosis facilitated (mediated) and active transport. | 8 Hours |
| **II** | Tools and techniques used in cell study; ultrastructures and functions of different cell organelles of eukaryotes and prokaryotes (cell wall, plasmamembrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, golgi bodies, etc.). | 8 Hours |
| **III** | Cell reproduction**,** Basic features of cell cycle, Mitosis, mitotic spindle and chromosome movement, Process and phases of meiosis and its significance , Cell divisions: cell cycles, mitosis phases. | 8 Hours |
| **IV** | Protein classification and biological significance, Amino acids, zwitterion, properties of peptide bond, General properties, Major classes and classification of enzymes, Mechanism of enzyme action | 8 Hours |
| **V** | Carbohydrates and lipid Classification, biological significance, Structure and physiochemical Properties of Monosaccharides, Oligosaccharides (disaccharides) and polysaccharides, Lipids, Wax, Glycerol and Triacyl Glycerol. | 8 Hours |

**Reference Books**

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6thEdition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8thedition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5 thedition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. 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.
5. Buchanan, B., Gruissem, W. and Jones, R. (2000) Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.
6. Elliot (2009) Biochemistry and Molecular Biology. Oxford Publishers.
7. Nelson, D.L., Cox, M.M. (2004) Lehninger Principles of Biochemistry, 4thEdition, WH Freeman and Company, New York, USA

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**SYLLABI**

**1. M. Sc. BIOCHEMISTRY**

**2. M. Sc. BIO TECHNOLOGY**

**3. M. Sc. MICROBIOLOGY**

**GYAN VIHAR SCHOOL OF SCIENCES**

**EDITION 2014**

**GYAN VIHAR SCHOOL OF SCIENCE**

**M.Sc. Biotechnology/Microbiology/Biochemistry**

**1. Need objectives and main features of curriculum**

Curriculums of M.Sc. Biochemistry/Biotechnology/Microbiology are designed to provide Biochemist, Biotechnologist, Microbiologist and a good Researcher to the science world & society at large. .It would not only provide an understanding but would also add on to their knowledge. The application of various tool and techniques in the field of Biochemistry/Biotechnology/Microbiology. The objective of designing this curriculum for the student is to update student’s knowledge about:

1. Living system and their interaction with technology to generate things of utility of mankind.

2. Encouraging students to develop intellectual independence, critical thinking skills and versatility.

3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data; the ability to suggest experiments to support theoretical concepts and clinical diagnosis.

4. Molecular mechanisms of gene expression and regulation, the principles of genetic engineering and their application in medicine, agriculture, environment and food industries.

5. Biochemical and microbial basis of environmental health hazards and their remedial process and detoxication of xenobiotics

6. Inherited &disorders related to metabolism, microorganism, their pathology and possible cure

7. Molecular concepts of body defence and their application in medicine.

8 Infective micro-organisms of the human body and parasite interaction.

9. To acquire knowledge of antimicrobial agents for treatment of infection, scope of

Immunotherapy and different vaccines available for prevention of communicable diseases

10. To be acquainted with methods of disinfection and sterilization to control and prevent hospital and community acquired infections

11. To conserve, map and sustainably use bioresources.

12. To disseminate general awareness for the optimum utilization of biotechnology in various sectors.

13. To optimally focus resources for R&D in biosciences.

14. To create centers of excellence as high quality support services to biotech industries.

15. To promote the field of bioinformatics.

16. To suitably address highly pertinent issues like intellectual property rights (IPR) protection, biosafety and bioethics.

**2. Role of curriculum in national development**

Bioscience has an important role to play in future social and economic well-being, on a national and international scale. It can lead to major following benefits:

1. Advances in agriculture and crop technology can help fight world starving population.

2. Innovations in food and nutritional science can lead to everyday improvements in health and hygiene.

3. Innovative technology can boost the leading role of Indian commerce specially food & dairy, pharmaceutical, agriculture and FMCG.

4. Producing things using biotechnology and contributing towards national economy and GDP

5. Designing new drugs with the help of r DNA technology for curing diseases.

6. Finding cure for various genetic disorders and adding health benefits to Indian society.

**3. Global trends reflecting in the curriculum**

The profession of scientist has pious mandatory duty to undertake research and develop new products using micro organisms, stem cell, restriction enzymes, genome etc. in various field of bioscience which attribute to human welfare ,directly or indirectly . The current science is rapidly advancing by the efforts of the biochemist, biotechnologist and microbiologist. Present course have been developed to educate the student not only about the advancement in the field of biosciences but also to give them exposure of these requisites.

**4. Possibility, motivation and scope for self learning**

Knowledge of Biosciences helps identity various areas where the application of r-DNA technology, genetic engineering, biochemical and microbiological technique could be utilized. The products like new drugs, vaccines, GMF, transgenic animal, transgenic plant, diseases diagnostic kits, biopesticides etc. could be generated in the benefit of mankind and society. This field need good level scientific input from scientists trained across various disciplines including analytical biochemistry, clinical biochemistry, molecular biology, genetic engineering, Nano-technology , bioprocess technology, microbiology etc.

**5. Placement opportunities**

A wide range of career opportunities are available for students of Bioscience. There are numerous opening available to choose from one they have attained education. Those include:

Agriculture, Agrochemical Companies, Clinical and Forensic Science Laboratories, Corporate Firms, Food /Beverages Industries, Hospitals, Pharmaceutical Industry, Research and Educational Institutions, Clinical Research, Management, Manufacturing, Marketing, Quality Control, Information Science ,Technical Writing and Editing. Besides this students can also opt for teaching in the respective field.

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**SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for M.Sc Biochemistry (Regular) 2Year Course**

**EFFECTIVE FROM ACADEMIC SESSION 2014-15**

**Year: I Semester: I**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 501 | Cell Biology | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 503 | Immunology and Virology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 505 | Biochemical Techniques | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 507 | Molecular Biology and Genetics | 3 | 3 |  | - | 3 | 30 | 70 |
| **5.** | **HS 509** | **Soft Skills-I** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 551 | Practical -I | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 501 | Seminar - I | 2 |  | 4 |  |  | 100 | - |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 8 | DC 501 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**Year: I Semester: II**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 502 | Chemistry of Biomolecules | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 504 | Enzyme Technology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 506 | Biochemistry of Hormones and Vitamins | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 508 | Genetic Engineering | 3 | 3 |  | - | 3 | 30 | 70 |
| **5.** | **HS 516** | **Soft Skills-II** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 552 | Practical-II | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 502 | Seminar - II | 2 |  | 4 |  |  | 100 | - |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 8 | DC 502 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

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**SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for M. Sc Biochemistry (Regular) 2Year Course**

**EFFECTIVE FROM ACADEMIC SESSION 2014-15**

**Year: II Semester: III**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 601 | Plant Biochemistry and Biotechnology | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 603 | Biostatistics and Bioinformatics | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 605 | Microbial Biochemistry | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 611 | Advanced Clinical Biochemistry | 3 | 3 |  | - | 3 | 30 | 70 |
| **5** | **HS 623** | **Soft Skills-III** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 651 | Practical -III | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 601 | Seminar - III | 2 |  | 4 |  |  | 100 | - |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 8 | DC 601 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**Year: II Semester: IV**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Practical & Sessional:** |  |  |  |  |  |  |  |
| 1 | DI 602 | Dissertation/ Project work | 20 |  |  | - | 2 |  | 100 |
|  |  | **Total** | **20** |  |  |  | **-** | **-** | **-** |
|  |  | **Total Teaching Load** |  |  |  |  |  |  |  |

Note:-Practical exercises will be based on theory papers taught in the respective semester

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

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**SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for M.Sc Biotechnology (Regular) 2Year Course**

**EFFECTIVE FROM ACADEMIC SESSION 2013-14**

**Year: I Semester: I**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 501 | Cell Biology | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 503 | Immunology and Virology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 505 | Biochemical Techniques | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 507 | Molecular Biology and Genetics | 3 | 3 |  | - | 3 | 30 | 70 |
| **5.** | **HS 509** | **Soft Skills-I** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 551 | Practical-I | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 501 | Seminar - I | 2 | - | 4 |  |  | 100 | - |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 8 | DC501 | Discipline and Co- Curricular Activities | 2 |  |  |  |  | 100 |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**Year: I Semester: II**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 508 | Genetic Engineering | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 510 | Environmental Biotechnology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 512 | Biochemistry | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 514 | Microbial Diversity and Physiology | 3 | 3 |  | - | 3 | 30 | 70 |
| **5.** | **HS 516** | **Soft Skills-II** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 554 | Practical II | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 502 | Seminar - II | 2 |  | 4 |  |  | 100 | - |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 8 | DC 502 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

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**SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for M.Sc Biotechnology (Regular) 2Year Course**

**EFFECTIVE FROM ACADEMIC SESSION 2014-15**

**Year: II Semester: III**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 603 | Biostatistics and Bioinformatics | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 607 | Plant Biotechnology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 621 | Bioprocess Technology | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 617 | Animal Biotechnology | 3 | 3 |  | - | 3 | 30 | 70 |
| **5** | **HS 623** | **Soft Skills-III** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 653 | Practical -III | 6 |  |  | 12 | 8 | 60 | 40 |
|  |  |  |  |  |  |  |  |  |  |
| 7 | SM 601 | Seminar - III | 2 |  | 4 |  |  | 100 | - |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 8 | DC 601 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**Year: II Semester: IV**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 1 | DI 602 | Dissertation/ Project work | 20 |  |  |  | 2 |  | 100 |
|  |  | **Total** | **20** |  |  |  | **-** | **-** | **-** |
|  |  | **Total Teaching Load** |  |  |  |  |  |  |  |

Note:-Practical exercises will be based on theory papers taught in the respective semester

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

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**SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for M. Sc Microbiology (Regular) 2Year Course**

**EFFECTIVE FROM ACADEMIC SESSION 2014-15**

**Year: I Semester: I**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 501 | Cell Biology | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 503 | Immunology and Virology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 505 | Biochemical Techniques | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 507 | Molecular Biology and Genetics | 3 | 3 |  | - | 3 | 30 | 70 |
| **5.** | **HS 509** | **Soft Skills-I** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 551 | Practical-I | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 501 | Seminar - I | 2 | - | 4 |  |  | 100 | - |
|  |  | **C.DCCA** |  |  |  |  |  |  |  |
| 8 | DC 501 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**Year: I Semester: II**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 508 | Genetic Engineering | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 510 | Environmental Biotechnology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 512 | Biochemistry | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 514 | Microbial Diversity and Physiology | 3 | 3 |  | - | 3 | 30 | 70 |
| **5.** | **HS 516** | **Soft Skills-II** | **3** | **3** |  |  | **3** | **30** | **70** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 554 | Practical -II | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 502 | Seminar - II | 2 |  | 4 |  |  | 100 | - |
|  |  | **C. DCCA** |  |  |  |  |  |  |  |
| 8 | DC 502 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

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**SCHOOL OF SCIENCES**

**Teaching and Examination Scheme for M.Sc Microbiology (Regular) 2Year Course**

**EFFECTIVE FROM ACADEMIC SESSION 2014-15**

**Year: II Semester: III**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **A. Theory Papers** |  |  |  |  |  |  |  |
| 1 | SC 603 | Biostatistics and Bioinformatics | 3 | 3 |  | - | 3 | 30 | 70 |
| 2 | SC 609 | Medical Microbiology | 3 | 3 |  | - | 3 | 30 | 70 |
| 3 | SC 613 | Bioprocess Technology | 3 | 3 |  | - | 3 | 30 | 70 |
| 4 | SC 619 | Food Microbiology | 3 | 3 |  | - | 3 | 30 | 70 |
| **5** | **HS 623** | **Soft Skills-III** | **3** | **3** |  |  | **3** | **30** | **70** |
|  | **B.** | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 655 | Practical -III | 6 |  |  | 12 | 8 | 60 | 40 |
| 7 | SM 601 | Seminar - III | 2 |  | 4 |  |  | -100 | - |
|  |  | **C.DCCA** |  |  |  |  |  |  |  |
| 8 | DC 601 | Discipline and Co- Curricular Activities | **2** |  |  |  |  | **100** |  |
|  |  | **Total** | **25** | **15** | **4** | **12** |  | **-** | **-** |
|  |  | **Total Teaching Load** |  | **31** |  |  |  |  |  |

**Year: II Semester: IV**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | **B. Practical & Sessional:** |  |  |  |  |  |  |  |
| 1 | DI 602 | Dissertation/ Project work | 20 |  |  | - | 2 |  | 100 |
|  |  | **Total** | **20** |  |  |  | **-** | **-** | **-** |
|  |  | **Total Teaching Load** |  |  |  |  |  |  |  |

Note:-Practical exercises will be based on theory papers taught in the respective semester

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

**GYAN VIHAR SCHOOL OF SCIENCES**

**LIST OF COURSES OFFERED**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| SC 501 | Cell Biology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 502 | Chemistry of Bio-molecules | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 503 | Immunology and Virology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 504 | Enzyme Technology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 505 | Biochemical Techniques | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 506 | Biochemistry of Hormones and Vitamins | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 507 | Molecular Biology and Genetics | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 508 | Genetic Engineering | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 510 | Environmental Biotechnology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 512 | Biochemistry | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 514 | Microbial Diversity and Physiology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 551 | Practical I (M.Sc. Micro / Bio Tech / Bio Chem.) | 6 | **-** | - | 12 | 8 | 60 | 40 |
| SC 552 | Practical II (M.Sc. Bio Chemistry) | 6 |  | - | 12 | 8 | 60 | 40 |
| SC 554 | Practical II (M.Sc. Bio Tech / Microbiology) | 6 | **-** | - | 12 | 8 | 60 | 40 |
| SC 601 | Plant Biochemistry and Biotechnology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 603 | Biostatistics and Bioinformatics | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 605 | Microbial Biochemistry | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 607 | Plant Biotechnology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 609 | Medical Microbiology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 611 | Advanced Clinical Biochemistry | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 613 | Fermentation Technology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 617 | Animal Biotechnology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 619 | Food Microbiology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 621 | Bioprocess technology | 3 | 3 | - | - | 3 | 30 | 70 |
| SC 651 | Practical III (M.Sc. Bio Chemistry) | 6 | - | - | 12 | 8 | 60 | 40 |
| SC 653 | Practical III (M.Sc. Bio Technology | 6 | - | - | 12 | 8 | 60 | 40 |
| SC 655 | Practical III (M.Sc. Microbiology) | 6 | **-** | **-** | 12 | 8 | 60 | 40 |
| SM 501 | Seminar – I | 2 | - | 4 | - | - | 100 | - |
| SM 502 | Seminar – II | 2 | - | 4 | - | - | 100 | - |
| SM 601 | Seminar – III | 2 | - | 4 | - | - | 100 | - |
| HS 509 | Soft Skills-I | 3 | 3 |  |  | 3 | 30 | 70 |
| HS 516 | Soft Skills-II | 3 | 3 |  |  | 3 | 30 | 70 |
| HS 623 | Soft Skills-III | 3 | 3 |  |  | 3 | 30 | 70 |
| DC 501 | Discipline and Co- Curricular Activities | 2 |  |  |  |  | 100 |  |
| DC 502 | Discipline and Co- Curricular Activities | 2 |  |  |  |  | 100 |  |
| DC 601 | Discipline and Co- Curricular Activities | 2 |  |  |  |  | 100 |  |
| DI 602 | Dissertation/ Project work | 20 | - | - | - | 2 | - | 100Semester |

**L = Lecture T = Tutorial CE = Continuous Evaluation**

**S = Seminar P = Practical ESE = End Semester Examination**

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry/Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 501 CELL BIOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

|  |  |
| --- | --- |
| **CLASS I Sem M.Sc. BioChemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

|  |  |  |
| --- | --- | --- |
| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Plasma membrane: Ultrastructure of cell, cell theory, exceptions of cell theory. Membrane bilayer - Composition and structure: Models, fluidity, Liposomes. Membrane associated receptors.  Membrane proteins – types, Flippases, protein of RBC membrane, RBC ghost, porins and aquaporin. and membrane transport system. | 8 Hours |
| II | Cell organelles and secretion: Golgi, endoplasmic reticulum, lysosomes, peroxisomes. Internalization of macromolecules and particles: endo and exocytosis.  Mitochondrial structure and oxidative phosphorylation. Chloloplast and Photo phosphorylation.  Nucleus : Nuclear envelope, nucleolus, chromosomes and their structural organization, Ribosomes | 8 Hours |
| III | Cell division and cell cycle: Cell cycle and its regulation, regulation of cell division Go-G1 transition check points in cell cycle, chromosome movements.  Mutation and its types, molecular basis of mutation.  Cytoskeleton . topography, microtubules, microfilaments | 8 Hours |
| IV | Signal transduction: Cell Cell signaling, Signal Transduction cascades. Receptor triggerd phosphorylation cascade, G protein, G protein coupled receptor, functions of cell surface receptor, pathways of intracellular signal transduction.  Cascade, cyclic CAMP as a second messenger, Protein kinases, receptor mediated hydrolysis of phosphotidyl inositol, IP3, Diacyl glycerol. | 8 Hours |
| V | Cancer : Properties of tumor cells, tumor suppressor genes and carcinogenic effects of chemical and radiations  Apoptosis, difference between necrosis and apoptosis, pathways, regulation and effectors in apoptosis  Cell cell interaction,cell – cell adhesion, specialized junction, desmosomes, gap junction, adhesion molecules, cadherins and connexins | 8 Hours |

**References**

1. Molecular Cell biology, Lodish, Berk and others. W.H. Freeman and Co., 2004, Fifth Edition.
2. Principles of Biochemistry, Garrette and Grisham, Saunders College Publishing, 1994.
3. Molecular Cell Biology, Harvey Lodish, Baltimore David *et al*., Scientific American Books, W.H.Freeman and Company, Third Edition, 1995.
4. Bohinski, R.C.: Modern concepts in Biochemistry (Alllyn & Bascon Inc. Boston)
5. Caret et al.(1993): Inorganic, Organic and Biological Chemistry (WMC Brown Publ. USA).
6. West,E.S. and Todd, W.R.,Mason H.S.,and Bruggen J.T. (1963):Text Book of Biochemistry(Macmilan Co. London.
7. Lehninger,A.H. et al (1993) : Principles of Biochemistry (Worth Publ. Inc. USA).
8. Montgomery, R. et al (1990): Biochemistry: A case Oriented Approach (The C.V. Mosby Co., St. Louis).
9. Rawn, J.D. (1989) : Biochemistry (Neil Patterson Publ. North Carolina).

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry**

**DETAILED SYLLABUS**

**2014-15**

**SC 502 CHEMISTRY OF BIOMOLECULES C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS II Sem M.Sc. Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours. Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | **Carbohydrate: -**Chemistry and classification of carbohydrates. Structure and physiochemical Properties of Monosaccharides,Disaccharides,Polysaccharides,proteoglycans,and glycoproteins. **Metabolism of carbohydrates**- Glycolysis, Citric Acid cycle, Pentose phosphate pathway, , gluconeogenesis, glyoxylate cycle, glycogenesis and glycogenolysis. Regulation of glycolysis and gluconeogenesis. | 8 Hours |
| II | **Lipids:-**Chemistry and Classification of lipids. Fatty acids-structure, types and their physiochemical propertie. Structure and biological role of TAG, phospholipids, sphingolipids, Gangliolipids and cholesterol. Bile acids and bile salts. Structure and biological role of lipoproteins, prostaglandins,  **Metabolism of lipids**: Biosynthesis and Regulation of fatty acids , triacylglycerols., phospholipids sphingolipids prostaglandins, and their biological functions. Biosynthesis of cholesterol, its regulation . alpha, beta and gamma oxidation of fatty acids. Formation of ketone bodies. | 8 Hours |
| III | **Protein :-**Chemistry and Physiochemical properties of the amino acids, peptide bond ,Peptides &Peptide Synthesis – Solution and solid phase methods Proteins structure- primary, Secondary structure – Alpha Helix, Beeta Sheet, 310, Pie helix, Super secondary structure. Ramchandran plot. Tertiary and quaternary structure. Effect of temperature, salts, acids and alkali solution on protein structure. .Protein sequencing ,determination of the N and C terminal residues of a protein, Introduction to DNA- protein interaction . | 8 Hours |
| IV | **Protein metabolism –** General reactions of amino acid metabolism - Transamination, decarboxylation, oxidative & non-oxidative deamination of amino acids. . Urea cycle and its regulation. Biosynthesis of amino acids: precursor families of amino acids biosynthesis Biosynthesis of aromatic amino acids, Histidine, Peptides synthesis, protein metabolism in prolonged fasting.  **Porphyrins –** Biosynthesis and degradation of porphyrins. Production of bile pigments | 8 Hours |
| V | **Nucleic acid: -** Chemistry of Nucleic acids. Structure and composition of nucleic acids. Types of DNA (B, A, C and Z forms). Forces stabilizing nucleic acid structure. DNA bending –wedge and junction model, super coiled forms of DNA. Effect of temperature, salts, acid, alkali and enzymes on nucleic acid structure. Cruciform structure and its stability. Types of RNA- Secondary and tertiary structure. Nucleoproteins. DNA – Protein interaction. Fractionation and analysis of nucleic acids. Solution methods, chromatography, electrophoresis, centrifugation, blotting techniques and auto radiographic methods.  **Metabolism of nucleotides**– Biosynthesis and degradation of purine and pyrimidine nucleotides and its regulation (De-novo & salvage pathway.) inhibitors of nucleic acid biosynthesis. Disorders in purine and pyrimidine metabolism | 8 Hours |

1. **References**
2. Lehninger,A.H. et al (1993) : Principles of Biochemistry (Worth Publ. Inc. USA)
3. Montgomery, R. et al (1990) : Biochemistry: A case Orientede Approach (The C.V. Mosby Co.,St. Louis)
4. Practical Biochemistry by Plummer.
5. Practical Biochemistry by Sawhney and R. Singh
6. Protein Biotechnology, Gary Walsh and Denis Headon, John Wiley and Sons, 1994.
7. Proteins Biochemistry and Biotechnology, Gary Walsh, John Wiley & Sons Ltd. 2002

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry/Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 503 IMMUNOLOGY AND VIROLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS I Sem M.Sc. Microbiology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all; taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | History and scope of immunology - types of immunity - anatomy of lymphoid organs; primary and secondary lymphoid organs - immunoglobulin structure -Function and synthesis; memory cells, idiotypic network, lymphocyte differentiation. Cells of the immune system. | 8 Hours |
| II | Antigens and Antibodies  Antigen - isolation, purification and characterization of various antigens and haptens -antibodies - production, purification and quantification of immunoglobulin’s; antigen -antibody reaction; hybridoma and monoclonal antibody production; immuno-diagnosis and applications - human monoclonal antibodies; catalytical antibodies -complement fixation - assessment of immune complexes in tissues.Biology and assay of cytokines .Vaccine technology including DNA vaccines | 8 Hours |
| III | Biology of complement systems - structure and function of MHC class I and II molecules - antigen recognition and presentation - humoral and Cell mediated immune responses - hypersensitivity reaction - immune suppression and immunetolerance - auto immune disorders  Immunological techniques and their principles. | 8 Hours |
| IV | **General Virologyand Introduction of Viruses** : Brief outline on discovery of viruses, nomenclature and classification of viruses : distinctive properties of viruses; morphology & ultra structure; capsid & their arrangements; types of envelope and their composition-viral genome, their types and structures; virus related agents (Viroids, Prions)  Viral vaccines (conventional vaccines, genetic recombinant vaccines used in national immunisation programmes with examples, new generation vaccines including DNA Vaccines with examples) Interferons and antiviral drugs. | 8 Hours |
| V | **General methods of Diagnosis :** Cultivation of viruses in embryonated eggs, experimental animals , cell cultures, Primary & secondary cell cultures, suspension cell cultures and monolayer cell cultures, cell strains, cell lines and transgenic systems; assay of viruses physical and chemical methods (Protein, nucleic acid, radioactivity tracers, electron microscopy)-Infectivity assay ( plaque method, end point method)- Infectivity of plant viruses | 8 Hours |

**Reference Books**

1. Kuby Immunology,4th Edition-R.A. Goldsby,Thomas J.Kindr.Barbara,A.Osbarne,(Freeman) & Co.New York.
2. Immunology-A short course,4th Edition-Eli Benjamini,Richard Coico,Geoffrey Sunshine,(Wiley-Liss).
3. Roitt,I.M.(1998) Essentials of Immunology,ELBS,Blackwell Scientific publishers,London.
4. Immunology byA. K. Abbas.
5. Morag C and Timbury M.C.(1994) Medical virology-X Edition. Churchill Livingstone,London.
6. Dimmock Nj,Primrose SB(1994).Introduction to Modern Virology,IV Edition,Blackwell Scientific Publications,Oxford.
7. Conrat HF,Kimball PC and Levy JA(1994)virology-III Edition Prentice Hall,Englewood cliff,New jersey.
8. Matews,RE.,(1992)Functionals of plant virology,Academic press,San Diego.

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry**

**DETAILED SYLLABUS**

**2014-15**

**SC 504 ENZYME TECHNOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS II Sem M.Sc. Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours . Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100[ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | **Enzyme:** Historical aspects, classification and nomenclature, EC number. Mechanism of enzyme action-Acid base catalysis,covalent catalysis.proximity, orientation effect. Strain &distortion theory. Sub cellular localization and organization of enzymes. Methods of enzyme assay: turnover number; specific activity , Active site. | 8 Hours |
| II | **Enzyme Kinetics:** Concept of ES complex, activation energy **,**Derivation of Michaelis-Menten equation. Different plots for the determination of Km and Vmax. and their significances. Affecting factors of rate of enzyme reaction .Classification of multi substrate reaction, ping-ping, random &ordered Bi-Bi mechanism.Enzyme inhibition: reversible and irreversible inhibition, their type, inhibitor constant and its significance. | 8 Hours |
| III | **Enzyme Regulation** - General mechanisms of enzyme regulation, product inhibition. Reversible and irreversible . covalent modifications of enzymes. Feed back inhibition Allosteric enzymes, qualitative description of “concerted” & “sequential” models for allosteric enzymes. Half site reactivity, positive and negative co-operativity with special reference to aspartate transcarbamoylase & phosphofructokinase. Protein-ligand binding ,Hill and Scatchard plots. Metallo-enzymes | 8 Hours |
| IV | **Enzyme purification techniques:** objectives and strategy; methods of homogenization; method of isolation; purification and crystallization Criteria of purity and tabulation of purification data; stable storage of enzymes Characterization of purified enzyme. Coenzymes, Cofactors and Isoenzymes | 8 Hours |
| V | **Enzyme immobilization;** Immobilization of Enzymes by chemical and physical methods. Large scale production of enzymes, Enzyme reactors,. Application of Immobilized Enzymes .Enzymes in Medical diagnosis and enzyme therapy. Biosensors. | 8 Hours |

**Reference Books**

1. Enzyme Assays: A Practical Approach by Eisenthal and Danson
2. Enzyme Biotechnology by G. Tripathi
3. Enzyme Catalysis and Regulation by Hammes
4. Enzyme Reaction Mechanisms by Walsch
5. Enzyme Structure and Mechanism by Alan Fersht
6. Enzyme technology, M.F.Chapline and C.Buke, Cambridge University Press, First Edition, 1990.
7. Fundamentals of Enzymology, Nicholas C.Price and Lewis Stevens, Oxford Univ. Press, Third Edition, 1999.

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry/Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 505 BIOCHEMICAL TECHNIQUES C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **I Sem M.Sc. Biochemistry/Microbiology/Biotechnology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours. Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100[ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| I | Electrophoretic techniques : Principle, types and affecting factors. Instrumentation and application of paper, gel, SDS- PAGE, Isoelectric focusing, 2-DGel electrophoresis, Pulsed field gel electrophoresis and capillary electrophoresis. Membrane filtration and dialysis | 8 Hours |
| II | Centrifugation techniques: Principle and technique of preparative and analytical centrifugation, Differential centrifugation, Density gradient centrifugation, ultracentrifuge and its application .Introduction to Tracer techniques. | 8 Hours |
| III | Chromatographic Techniques –  Principle, technique and applications of Paper, TLC, Ion-Exchange, molecular sieve, affinity chromatography and adsorption chromatography,. Gas chromatography, HPLC | 8 Hours |
| IV | Spectroscopic technique –  Basic principles, instrumentation and applications of UV, Visible , spectroflourimetry and IR spectrophotometers. Optical Rotatory Dichroism and Circular Dichroism. Nuclear Magnetic Resonance ESR, X-Ray Crystallography and Mass Spectrometry. Flame Photometry. | 8 Hours |
| V | Radio chemical methods - Nature of radioactivity, types of radioactivity, radioactive decay, units of radioactivity. Radioisotopes: Detection and measurement of radioactivity. Geiger counters, scintillation counters, autoradiography. Microscopy: light, phase-contrast, fluorescence and electron microscopy. | 8 Hours |

**Reference Books**

1. Analytical Biochemistry, D.J.Homie and Hazal Peck, Longman group,3rd edition, 1998.
2. Experimental Biochemistry, Robert Switzer and Liamgarrity, W.H.Freeman and Co., Third Edition, 1999.
3. Physical Biochemistry - Application of Biochemistry and Molecular Biology, David Friefelder, W.H.Freeman and Co., Second Edition, 1999.
4. Principles of Instrumental Analysis, Skoog/Leary, Saunders College Publishing, Fourth Edition, 1992.
5. Principles of Physical Biochemistry, Kensal E.Van Holde, W.Curtis Johnson, Harcourt Brace College Publishers, 1998

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry**

**DETAILED SYLLABUS**

**2014-15**

**SC 506 BIOCHEMISTRY OF HORMONES & VITAMINES C (L,T,P) = 3(3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc. Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours . Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100[ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Course Contents** | **Total**  **Contact**  **Hrs.** |
| **I** | **Introduction to endocrine gland**. Hormone classification on the basis of chemical nature and mechanism. Mechanism of hormone action, hormone receptors, role of second messengers, hormone and homeostasis, local hormones and feedback regulation of hormone. | **8** |
| **II** | **Pituitary gland –**Endocrine hypothalamus- secretion and physiological roles of hypothalamic releasing and inhibitory factors. Biosynthesis, mechanism of action, physiological roles and regulation of anterior and posterior pituitary hormones. Pituitary endocrinal disorders. Pineal gland –synthesis, mechanism of action and functions of melatonin. | **8** |
| **III** | **Thyroid gland –** Biosynthesis, mechanism of action, regulation and physiological role of thyroid hormones. Hypothyroidism and hyper thyroidism. Parathyroid gland –biosynthesis, regulation and physiological role of parathyroid hormones. Hormonal regulation of calcium metabolism.  **Endocrine pancreas –** Chemistry, mechanism of action and physiological roles of insulin, glucagon, somatostatin and pancreatic peptide. Hormones of Gastrointestinal tract | **8** |
| **IV** | **Adrenal gland-** Biosynthesis, mechanism of action, regulation and physiological roles of adrenal hormones. Adrenal hormones disorders.  **Reproductive Endocrinology** – Male sex hormones –synthesis, mechanism of action, regulation and physiological roles of androgens.  **Female sex hormones** –Biosynthesis, mechanism of action, physiological roles and regulation of ovarian hormones. Placental hormones, hormonal regulation of pregnancy, menstrual cycle and lactation. | **8** |
| **V** | **Vitamins:** Classification. Structure and physiological role of fat and water soluble vitamins. Vitamins related metabolic Disorders. | **8** |

**Reference Books**

### 1. [Clinical Endocrinology 2012 (The Clinical Medicine Series)](http://www.amazon.com/Clinical-Endocrinology-Medicine-Series-ebook/dp/B004I5BU9S/ref=sr_1_1?s=books&ie=UTF8&qid=1334997523&sr=1-1) by M.D., C. G. Weber

### 2. [Harrison's Endocrinology, Second Edition](http://www.amazon.com/Harrisons-Endocrinology-Second-Edition-Jameson/dp/0071741445/ref=sr_1_4?s=books&ie=UTF8&qid=1334997523&sr=1-4) by J. Jameson (May 18, 2010)

### 3. [Basic Medical Endocrinology, Fourth Edition](http://www.amazon.com/Basic-Medical-Endocrinology-Fourth-Edition/dp/0123739756/ref=sr_1_6?s=books&ie=UTF8&qid=1334997523&sr=1-6) by [H. Maurice Goodman](http://www.amazon.com/H.-Maurice-Goodman/e/B001HCX7F0/ref=sr_ntt_srch_lnk_6?qid=1334997523&sr=1-6) (Sep 1, 2008)

### 4. [Endocrinology (6th Edition)](http://www.amazon.com/Endocrinology-6th-Edition-Mac-Hadley/dp/0131876066/ref=sr_1_7?s=books&ie=UTF8&qid=1334997523&sr=1-7) by Mac Hadley and Jon E. Levine (Nov 3, 2006)

### 5. Textbook of Medical Physiology, Guyton and Hall, Tenth Edition , Saunders Publishing Co.2000

6. Cynthia Gibas & Per Jambeck (2001) Developing Bioinformatics Computer Skills: -Shroff Publishers & Distributors Pvt. Ltd (O’Reilly), Mumbai

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**SCHOOL OF BIOSCIENCES**

**M.Sc. Biochemistry/Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 507 MOLECULAR BIOLOGY AND GENETICS C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS I Sem M.Sc. Biotechnology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| I | **Introduction to Molecular Biology**  DNA Replication Mechanism (Prokaryotic and eukaryotic), Enzymes (Like DNA Polymerases,  Topoisomerases etc) and accessory proteins involved in DNA replication. Inhibitors of DNA replication ( blocking precursor synthesis, nucleotide polymerization, altering DNA structure)  Mutations: nature of mutations; mutagens . DNA damage and repair: types of DNA damage (deamination) oxidative damage, alkylation, pyrimidine dimers). Repair pathways-methyl-directed mismatch repair, very short patch repair, nucleotide excision repair, base excision repair, SOS system. | 8 Hours |
| II | **Transcription-**  Structural features of RNA (rRNA, tRNA and mRNA) .Prokaryotic transcription, Comparison with Eukaryotic transcription, Maturation and processing of RNA : methylation, cutting and trimming of rRNA; capping, polyadenylation and splicing of mRNA; cutting and modification of tRNA . Intron splicing | 8 Hours |
| III | **Translation-**  Prokaryotic and eukaryotic translation mechanisms: Initation, Elongation and Termination. Post-translational modifications of proteins. Synthesis of Secretory and membrane proteins. | 8 Hours |
| IV | Antisense and Ribozyme-Technology, Applications of antisense and ribozyme technology.  Gene transfer mechanisms in bacteria- transformation, transduction, conjugation .  Plasmids, F type, R Type, and Col Type plasmids .Plasmids as vectors for gene cloning. Replication of plasmids and compatibility. | 8 Hours |
| V | Regulation of bacterial gene expression –  Operon concept, catabolite repression, positive and negative regulation, inducers and corepressors, Operon model – lac, ara,and trp ; Antitermination – N protein and nut sites. Global regulatory responses : heat shock response, stringent response and regulation by small molecules such as ppGpp and cAMP. | 8 Hours |

**Reference Books**

1. Freidberg, E.C., Walker, G.C., Siede, W. (2009). DNA repair and Mutagenesis, ASM Press, Washington D.C.
2. Lewin, B, (2011). Genes IX. Oxford University Press.
3. Malacinski, M. and Freifelder, D. (2010). Essential of Molecular Biology. III Edition. Jone and Barlett Publishers, Boston.
4. Maloy, S.R., Cronan, J.R. Freifelder, D. (1994). Microbial Genetics, Jones and Bartlett Publishers.
5. Siger, M., Berg, P. (2005). Genes and Genomes, University Science Book.
6. Snustad, D., Simmons, J. and Jenkins, B. (2008). Principles of Genetics. First edition. JohnWiley and Sons.

**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry/Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 508 GENETIC ENGINEERING C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS II Sem M.Sc. Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours. Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Scope of Genetic Engineering ,Milestones in Genetic Engineering - Core techniques (Blotting techniques, electrophoresis and Autoradiography) and essential enzymes used in rDNA technology-- Restriction enzymes, Ligases ,DNA polymerases Terminal transferase , ,Nucleic Acid Extraction , Purification, Yield Analysis. | 8 Hours |
| II | Cloning -Principles of gene cloning, Types of cloning,.  Gene Cloning Vectors- Plasmids, Bacteriophages, Phasmids, Cosmids. Artificial chromosomes, Shuttle vectors.  cDNA Synthesis and Cloning, Linkers and adaptors. | 8 Hours |
| III | Library construction and screening -Genomic, Chromosomal, cDNA Library ,Screening of libraries  Analysis of DNA-Protein Interactions. Electro mobility shift assay, DNA Foot printing.. Primer extension method, SI mapping, RNase protection assays, Reporter genes and their assays. Microarray arrays Technology . | 8 Hours |
| IV | PCR, types and its applications. Site-directed Mutagenesis and Protein Engineering. Molecular Markers, DNA sequencing | 8 Hours |
| V | Recombinant protein Technology : Design and use of expression vectors, selection of suitable promoter sequences, ribosome binding sites, transcription terminator, plasmid copy number. Processing of Recombinant proteins- Stabilization of proteins. Phage Display, Inclusion Bodies, solubilization of insoluble proteins. Codon optimization, Fusion Proteins  Gene therapy, Gene silencing. | 8 Hours |

**Reference:**

1. Plant Biotechnology and transgenic plants, Caldentey. K. M. O,Marcel Dekker, 2002.
2. Molecular biotechnology: Principles and practices. Channarayappa University

press 2006.

3. From genes to clones.Winnacker. E. L. Panima Publishers, 2003

4. Principles of gene manipulation and Genomics. Primrose S. B. 7th edition

Blackwell Publishing 2006.

5. Genetic transformation of plants-Jackson JF,Linskens HF Vol.23,Springer,2003

6. Principles of cloning-Cibell.J Academic Press 2002

7. Molecular biotechnology: Principles and practices. Channarayappa. University press 2006.

8. Microbial biotechnology. Glazer. A.N. Freeman 1995

9. From genes to clones-Winnacker. E. L. Panima Publishers, 2003

10.Principles of gene manipulation and Genomics. Primrose S. B. 7th edition Blackwell Publishing 2006.

11.Recombinant Microbes for industrial and Agricultural application. Murooka Y. Marcel Decker.1. Molecular biotechnology: Principles and practices. Channarayappa University press 2006.

12. Microbial biotechnology. Glazer. A.N. Freeman 1995

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**SCHOOL OF SCIENCE**

**M.Sc. Biotechnology /Microbiology/Biochemistry**

**HS 509 SOFT SKILLS-I C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Recap of English Language Skills | 8 Hours |
| II | Fluency Building | 8 Hours |
| III | Principles of Communication | 8 Hours |
| IV | Types of Communication- | 8 Hours |
| V | LSRW in Communication – Listening ,Speaking ,Reading & Writing | 8 Hours |

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**SCHOOL OF SCIENCES**

**M.Sc. Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 510 ENVIRONMENTAL BIOTECHNOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS II Sem M.Sc. MICROBIOLOGY** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Environment-basic concepts and issues; Sources of water pollution .Natural resources and its management. Surface and underground source of water, Sources of water pollution. Waste water treatment, Process, stages methods: Aerobic Processes-Oxidation ponds, rotating discs, rotating drums; Anaerobic processes-Anaerobic digestion,anaerobic filters, Up flow anaerobic sludge blanket reactors. Pollution indicators – BOD and COD determinations, Water Quality standards impurities in water and their removal, Water purification.,Air pollution,air pollutents, particulate matter | 8 Hours |
| II | Microbial degradation of xenobiotics in Environment-Ecological hydrocarbons, oil pollution, surfactants, pesticides. Solid wastes :Sources and management. Types of solid wastes, sources, problems associated with it. solid waste management, landfilling, incineration, Vermi composting, vermiculture Vermi composting properties, and methane production. | 8 Hours |
| III | Biodegradation and biodegradation of naturally occurring compounds.Biodegradation of cellulose, lignin, cellulose. Bioremediation concepts, types of bioremediation. In situ and Ex situ process of bioremediation. Renewal energy sources ,Non renewal energy sources ,Energy conservation. | 8 Hours |
| IV | Biopesticides, plant, biochemical, microbial pesticides. Advantages and disadvantages of microbial pesticides and insecticides.Global environmental problems:UV-B and Ozone depletion, Green house effect and acid rain, their effects and biotechnological approaches for management. Methiodology of environmental management –the problem solving approach, its limitation. | 8 Hours |
| V | Genetically modified organism, Uses of GMO and transgenic animal, Benefits and controversies of GM product. Classical plant breeding, molecular basis of genetic modification and crop improvement programmes, GM food crops, biotechnology in controlling crop diseases, weeds, insects and pests.  Seed-biology, technology and role in agriculture, Seed certification, seed banks, terminator gene technology and implications, plant as chemical and pharmaceutical factories, biosafety and GM food crops, Biogeochemical cycles :Oxygen cycle, Carbon cycle, Nitrogen cycle ,Phosphorus cycle ,Sulpher cycle. | 8 Hours |

REFERENCES:

1. Mackenzie L. Davis and Susan j.Mastens (2008)-Principles of Environmental Engineering and Science.
2. Gilbert M. Mastens and Wendell P. Ela. (2007) -Introduction of Envirnmental Engineering and Science .
3. Lawrance K.Wang (2010) -Enviromental biotechnology , publisher humana press Ist editionApril
4. Vyas R.K. et all (2008)-Basic Environmental Engineering, publisher Genius publication , Ist edition

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**SCHOOL OF SCIENCES**

**M.Sc. Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 512 BIOCHEMISTRY C (L, T, P) = 3 (3, 0, 0) TotalLect.-40**

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| **CLASS II Sem M.Sc. Microbiology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours . Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | **Carbohydrates:** Classification of carbohydrates. Optical and chemical Properties of Monosaccharides. Occurrence, structure and biological functions of disaccharides and polysaccharides Metabolism of carbohydrate: Glycolysis,TCA cycle, HMP Pathway and gluconeogenesis . | 8 Hours |
| II | **Lipids:** Classification of lipids. Fatty acids-structure, types and their physiochemical properties. Structure and biological role of TAG, phospholipids, sphingolipids, cholesterol. Structure and biological role of lipoproteins and prostaglandins. Metabolism of lipid: cholesterol biosynthesis,biosynthesis and oxidation of fatty acids. | 8 Hours |
| III | **Protein :** Amino acid structure, classification and Physiochemical properties of the amino acids. Stability and formation of the peptide bond. Proteins structure- primary, Secondary structure Ramchandran plot. Tertiary structure and quaternary structure. Protein sequencing. Metabolism: amino acid biosynthesis and urea cycle. | 8 Hours |
| IV | **Nucleic Acids :** Composition and structure of nucleic acid . Types of DNA (B,A,C and Z forms). Forces stabilizing nucleic acid structure. Effect of temperature salts, acid, alkali and enzymes on nucleic acid structure. Types of RNA- Secondary and tertiary structure. Nucleoproteins . DNA – Protein interaction. Fractionation and analysis of nucleic acids. Metabolism of nucleic acid : Biosynthesis and degradation of purine and pyrimidine | 8 Hours |
| V | **Enzymes and bioenergetics** :  Basics of pH, acid –base and buffers .law of thermodynamics, Gibbs free energy and standard potential  Enzymes: enzyme classification, nomenclature, specificity, active site, unit of activity. Enzyme kinetics: Michaelis – Menton equation, determination of kinetic parameters (Vmax,Km) enzyme inhibition, Enzyme catalysis, Enzyme regulation :feed back and allosteric regulation. Enzyme immobilization. | 8 Hours |

**References**

1. Proteins, Structure and molecular properties, Thomas E.Creighton, W.H.Freeman, 1993.

2. DNA structure and function, Richard R.Sinden, Academic Press- 1994. DNA protein Interaction (Ed. Kiyoshi Nagai and I.W.Mattaj), Oxford University Press, 1996.

3. Proteins Biochemistry and Biotechnology, Gary Walsh, John Willey and Sons, Ltd. 2002.

4. Modern genetic analysis, Anthony J.Griffiths, Gelbart M.William, et al.,W.H.Freeman and Company, Second Edition, 2002.

5. Bioinformatics - A practical guide to the analysis of genes and proteins. (Ed.Baxevanis and Ouellette), Willey Inter Science, 1998.

6. Introduction to Bioinformatics, Dr.S.Sundara Rajan and R.Balaji, Himalaya Publishing House, First Edition, 2002.

7. Bioinformatics - Concepts, skills and applications. S.C.Rastogi, Namita, Mendiratta, Rastogi, CBS publishers, First Edition, 2003.

8. Visual Basic-6, Gary Cornell, Tata McGraw Hill publishing Company,Ltd., New Delhi,2002.

9. Data Base System concepts, McGraw Hill International Editions, Third Edition, 1997.

10. Bioinformatics for beginners, Dr.K.Mani and N.Vijayaraj, Kalaikathir Achagam, Coimbatore, First Edition, 2002

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**SCHOOL OF SCIENCES**

**M.Sc. Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 514 MICROBIAL DIVERSITY AND PHYSIOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS II Sem M.Sc. Microbiology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Ultra structure and function of Bacteria. Morphological types; cell wall characteristics,L-forms and Archaebacteria, Cell wall synthesis, capsule types,composition and function. Cell membranes in eubacteria, archabacteria and cyanobacteria. Structure and function of flagella, cilia and pili, gas vesicles, chlorosomes, carboxysomes, magnetosomes and phycobilisomes. Plasmids and its types. Types of Reserve food materials . New approaches to bacterial taxonomy, classification including ribotyping; Ribosomal RNA sequencing; Characteristics of primary domains; Taxonomy, Nomenclature and Bergey's Manual**.** | 8 Hours |
| II | Cultivation of bacteria; anaerobic, aerobic culture media, growth curve, growth kinetics, batch, continuous culture, growth measurements, factors affecting growth, control of bacteria-physical and chemical agents. Types of bacteria on the basis of energy and nutritional requirement. Pure culture techniques (spread plate, pour plate, streak plate), preservation methods  Nutritional classification of microorganisms- chemoautotrophs, chemoheterotrophs and photosynthetic microorganisms. Photosynthesis in microorganisms, oxygenic – anoxygenic photosynthesis – autotrophic generation of ATP; fixation of CO2 – Calvin cycle – C3 – C4 pathways | 8 Hours |
| III | Chemolithotrophy; Hydrogen, Iron, Nitrate and oxidizing bacteria; Nitrate and sulfate reduction; Syntrophy,Role of anoxic decomposition; Nitrogen metabolism; Nitrogen fixation; Hydrocarbon transformation. Survival at extreme environments – starvation – adaptative mechanisms in thermophilic, alkalophilic, osmophilic and psychrophilic. Bioluminescence - mechanism & advantages. | 8 Hours |
| IV | Microbial respiration and fermentative pathway**-**  Respiratory metabolism –Enter Doudroff pathway – glyoxalate pathway,oxidative and substrate level phosphorylation –Fermentation of carbohydrates – homo and heterolactic fermentations. Endospore – structure – properties, germination and dormancy | 8 Hours |
| V | Chemotherapy and Antimicrobial agents-  Types of toxins(Exotoxin, Endotoxin and Enterotoxin) and their structure; mode of actions; virulence and pathogenesis.Chemotherapy and Antimicrobial agents; Sulfa drugs; Antibiotics; Penicillin and Cephalosporins; Broad-Spectrum antibiotics; Antibiotics from prokaryotes; Antifungal antibiotics; Mode of action; Resistance to antibiotics.  General classification and Economic importance of algae and fungi. | 8 Hours |

**Reference:**

1. Caldwell, D.R. (1995). Microbial Physiology and metabolism, Wm. C. Brown Publishers, USA
2. Gottychalk, G. (1986). Bacterial Metabolism (Second Edition) Springer – Verlag, Bertin. Moat, A.G. and Foster, J.W. (1988). Microbial Physiology (Second Edition). John Wiley & Sons, New York.
3. Pelczar Jr, M.J. Chan, E.C.S. and Kreig, N.R. (1993). Microbiology, Mc. Graw Hill. Inc, New York.
4. White, D. (1995). The Physiology and biochemistry of Prokaryotes, Oxford University Press, Oxford, New York.
5. General Microbiology,Stainer, R.Y.Ingraham.J.L,Whelis,M.L and Painter,P.R. The Macmillan Press Btd.
6. Brock Biology Microorganism,Madigan,M.T.,Martinko J.M. and Parker,J.Printice-Hall.
7. Microbiology,Pelczar,M.J.Jr.,Chan,E.C.S. and Kreig,N.R.,Tata McGraw HIll.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Thinking and Articulation | 8 Hours |
| II | Acquisition of Oral and Aural Skills | 8 Hours |
| III | Communication Boosters | 8 Hours |
| IV | Function of Cultural Codes in Presentation | 8 Hours |
| V | Models of Presentation | 8 Hours |

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry**

**DETAILED SYLLABUS**

**2014-15**

**SC 601 PLANT BIOCHEMISTRY AND BIOTECHNOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc. Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours. Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100[ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| I | Introduction to Plant tissue culture,.Totipotency; Cyto-differentiation. Initiation and maintenance of callus and suspension culture. Single cell culture. Organogenesis; Shoot-tip culture: rapid clonal propagation and production of virus-free plants. Transfer and establishment of whole plants in soil. | 8 Hours |
| II | Production of haploid plants through anther and ovary culture. Somatic embryogenesis. Embryo culture and embryo rescue. Protoplast isolation, culture and fusion; selection of hybrid cells and regeneration of hybrid plants; symmetric and asymmetric hybrids, cybrids. Cryo-preservation, Germplasm conservation. | 8 Hours |
| 1II | Gene transfer in plant; Physical and Chemical methods. Agrobacterium and Ti plasmids, Binary vectors. Plant viruses as vectors. Transgenic plants - application, methods of engineering insecticide and herbicide resistant plants. Anti-sense RNA technology - altering nutritional contents of plant foods. | 8 Hours |
| IV | Introduction to animal biotechnology. Equipments and required materials for animal cell culture technology. Characteristics of cells in culture; Growth and maintenance of cells in culture; Cells and Cell lines, Culture media: Natural and Chemical Defined Media; Advantages and Disadvantages of Serum and Protein based media. Isolation and Disaggregation of tissues by Mechanical and Enzymatic Methods. Primary and established cell line cultures. Monoclonal antibodies. Immuno toxins as therapeutic agents Stem cell culture, embryonic stem cells and their applications. | 8 Hours |
| V | Overview of photosynthesis: Light reaction centre complex. The photosystem, Organization of thyllakoid. Electron transport pathways in chloroplast membranes. ATP synthesis in chloroplasts. Carbon reactions C3, C4 and CAM plants. Photorespiration. Nitrogen fixation - Enzymology of N2 fixation. Symbiotic and Non-symbiotic nitrogen fixation. Biochemistry of photo-periodism and seed dormancy.  Biochemistry and physiological role of Plant hormone. | 8 Hours |

**Reference Books**

1. Plant Biochemistry by Devlin.
2. Introduction of plant tissue culture : Rajdan and Bhojwani
3. Principles of gene manipuulation, Old,R.W. and Primrose,S.B., Blackwell Scientific Publishers, Fifth Edition, 1995.
4. .Plant Biochemistry and Molecular Biology – Hans, Walter and Heldt, Oxford UniversityPress,1997.
5. Plant Biotechnology –Adrian Slater, Nigel Scot and Mark Fowler,Oxford University Press,2003.
6. Animal Biotechnology-Frashney

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**SCHOOL OF BIOSCIENCES**

**M.Sc Microbiology /Biotechnology/Biochemistry**

**DETAILED SYLLABUS**

**2014-15**

**SC 603 BIOSTATISTICS AND BIOINFORMATICS C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assesment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Definitions  Scope of biostatistics, probability analysis – variables in biology, collection, classification and tabulation of data – graphical and diagrammatic representation – scale diagrams – historograms – frequency polygan – frequency curves. Measures of central tendency – arithmetic mean, median and mode – calculation of mean, median & mode in series of individual observations, discrete series continuous open – end classes. Measure of dispersion – standard deviation and standard curves. Measures of central tendency, Analysis of variance. | 8 Hours |
| II | Correlation and regression  Simple correlation – correlation coefficient. Regression-simple, linear regression. Basic ideas of significance test – Hypothesis testing level of significance – Test based on student ‘t’ *‘chi’* square and goodness of fit. ‘F’ test - ANOVA. | 8 Hours |
| III | Bioinformatics and Databases  Introduction, aspects and role of Bioinformatics. Applications of Bioinformatics in Biology (Biocomputing). Biological resource databases – Examples and application – sequence Analysis –protein and nucleic acid. | 8 Hours |
| IV | Genomics and proteomics  Sequencing genomes – sequence assembly – genome on the web – annotating and analyzing genome sequences. proteomics – biochemical pathway databases. | 8 Hours |
| V | **Sequence analysis**  Pair wise sequence comparison. protein data bank, Swiss-prot, Genebank – sequence queries against biological databases – BLAST and FASTA – multifunctional tools for sequence analysis. multiple sequence alignments, phylogenetic alignment – profiles and motifs. | 8 Hours |

**Reference Books**

1. Cynthia Gibas & Per Jambeck (2001) Developing Bioinformatics Computer
2. Skills: -Shroff Publishers & Distributors Pvt. Ltd (O’Reilly), Mumbai
3. HH Rashidi & LK Buehler (2002) Bioinformatics Basics: Applications in

Biological Science and Medicine, CRC Press, London

1. Des Higgins & Willie Taylor (2000) Bioinformatics: Sequence, structure and databanks. Oxford University Press.
2. Baxevanis, A.D. & Ouellette, B.F.F. (2001). Bioinformatics: A practical guide to the analysis of genes and proteins – Wiley Interscience – New York.
3. Arora PN & Malhon PK, (1996) Biostatistics. Imalaya Publishing House, Mumbai.
4. Sokal & Rohif, (1973) Introduction to Biostatistics - Toppan Co. Japan.
5. Stanton A & Clantz, Primer of Biostatistics –– The McGraw Hill Inc., New York

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry**

**DETAILED SYLLABUS**

**2014-15**

**SC 605 MICROBIAL BIOCHEMISTRY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc. Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours . Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Course Contents** | **Total**  **Contact**  **Hrs.** |
| **I** | Isolation, cultivation and identification of bacteria. The bacteria cell wall structure. Gram positive and gram negative bacteria Microbial nutrition and growth. Bacterial growth and kinetics. Chemostatic culture Continuous cultivation of microbes,  Viruses –General structure, properties and classification. | **8** |
| **II** | Fermentation– Types of fermentation processes- Batch,continous and fedbatch culture.Alcoholic fermentation, lactic acid fermentation. penicillin, riboflavin, glutamic acid,lysine, amylases and proteases Solid state fermentation. Sterilization and scale- up process | **8** |
| **III** | Basic design of fermentors. types, aspetic operation, control systems, batch versus continuous operation, Tower fermenter, Air lift fermenter. . Aeration and Agitation. , Baffled, vortex and airlift systems, Impeller design, Effect of stirring, sparging and other parameters. Down-stream processing.  Introduction of secondary plant metabolite,terpenes (classification, biosynthesis), lignin, tannins, alkaloids, flavinoides | **8** |
| **IV** | Production of biomass (microbial insecticides, single cell proteins production). Production of low molecular weight compounds-primary and secondary metabolites.. Microbial polysaccharides. Production of enzymes (amylases proteases, lipases and cellulases) and high fructose syrup Microbiological mining Introduction to drug design | **8** |
| **V** | Antibiotics: Chemistry and biosynthesis of important antibiotic compounds. First, second, third and fourth generation antibiotics with reference to modified penicillins.Antibiotic resistence. Biochemical modes of action of antibiotics acting as inhibitors of ribosomal function (e.g., aminoglycosides, tetracyclines, puromycin, chloramphenicol etc.) inhibitors of nucleic acid metabolism, actinomycin D, mitomycin C etc. inhibitors of cell wall biosynthesis (penicillins, bacitracins etc.) and inhibitory of membrane function (polyenes, peptide antibiotics etc.) | **8** |

**Reference Books**

1. Microbial Biotechnology – Alexander N.Glazer, Hiroshni - Kaido, W.H.Freeman and Co.1995.
2. Chemical Microbiology, Antony H.Rose, Butterworths,Third Edition, Plenum Press,1976.
3. Principles of fermentation technology, P.F. Stanbury, A. Whitaker, S.J.Hall, Second Edition, Pergamon Publishers, 1995.
4. Biotechnology, A text of “Industrial Microbiology, Wulf Crueger and Anneliese Crueger , Second Edition, Sinauer Associates Inc, Sanderland, 1989c.
5. Animal Tissue Culture, Freshney, IRL Press,Fifth Edition, 1992

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**SCHOOL OF SCIENCES**

**M.Sc. Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 607 PLANT BIOTECHNOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc. Biotechnology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours** |
| I | Introduction to Plant tissue culture. Tissue culture media (composition and preparation).Totipotency; Cyto-differentiation. Initiation and maintenance of callus and suspension culture. Single cell culture. Organogenesis; Shoot-tip culture: rapid clonal propagation and production of virus-free plants. Transfer and establishment of whole plants in soil., | 8 Hours |
| II | Somatic Embryogenesis, .Synthetic Seeds ,Embryo culture and embryo rescue. Protoplast isolation, culture and fusion; selection of hybrid cells and regeneration of hybrid plants; cybrids. Another, pollen and ovary culture for production of haploid plants. Cryopreservation, Germplasm conservation., Inroduction of Transgenic plants and their application. | 8 Hours |
| III | Plant Transformation Technology: Basis of tumor formation, hairy root, features of TI and RI plasmid, mechanisms of DNA transfer, use of TI and RI as vectors, binary vectors, and methods of nuclear transformation, direct DNA transfer methods : particle bombardment, electroporation, and microinjection. | 8 Hours |
| IV | Chloroplast Transformation; advantages, vectors, success with tobacco and potato. Metabolic Engineering and industrial Products: plant secondary metabolites, biodegradable plastics, polyhydroxybutyrate, therapeutic proteins, edible vaccines .Plants culture, Tissues culture, cell Line culture ,stem cell culture and its application. | 8 Hours |
| V | Conventional plant breeding. Molecular Marker-aided Breeding: RFLP maps, linkage analysis, RAPD markers, AFLP ,microsatellites, SCAR (sequence characterized amplified region), SSCP (single strand conformation polymorphism), , molecular marker assisted selection. Arid and semi-arid plant biotechnology. Green house and green-home technology.,anti-sense RNA Technology,Introduction of plants hormones and its application. | 8 Hours |

**Reference Books**

1. Metabolic activities of plant cells, John W. Anderson and John Beandall, Blackwell Scientific Publishers First Edition.1991.
2. Principles of gene manipuulation, Old,R.W. and Primrose,S.B., Blackwell Scientific Publishers, Fifth Edition, 1995.
3. .Plant Biochemistry and Molecular Biology – Hans, Walter and Heldt, Oxford UniversityPress,1997.
4. Plant Biochemistry ,Bonner &Varner, Academic press , Third Edition. 1976
5. Plant Biotechnology –Adrian Slater, Nigel Scot and Mark Fowler,Oxford University Press,2003.
6. Animal Biotechnology-Frashney
7. Biotechnology in crop improvement-Harvinder Singh Chawla, International Book DistributionCo.,1998.

**SCHOOL OF BIOSCIENCES**

**M.Sc Microbiology**

**DETAILED SYLLABUS**

**2014-15**

**SC 609 MEDICAL MICROBIOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc Microbiology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assesment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Course Contents** | **Total**  **Contact**  **Hrs.** |
| **I** | **Introduction:** Early discovery of pathogenic microorganisms; development of bacteriology as scientific discipline; contributions made by eminent scientists. Classification of medically important micro organisms.  Estsblishment, spreading, tissue damage and anti- phagocytic factors; mechanism of bacterial adhesion , colonization and invasion of mucous membranes of respritory, enteric and urinogenital tracts, Role of aggressins, depolymerising enzymes, organotropisms, variation and virulence. Organs and cells involved in immune system and immune response | **8** |
| **II** | Chemical conditions and diagnosis of the following diseases.  **Disease**  **Pathogen**   * Pneumonia *Streptococcus pneumoniae* * Whooping –cough *Bordetalla pertusis* * Meningitis *Haemophlius influenzae* * Diptheria *Corynebacterium diphtheriae* * Pulmonary Tuberculosis *Mycobacterium tuberculoss* * Typhoid *Salmonella typhi* * Cholera *Vibrio cholerae* * Syphilis *Treponema pallidum* * Gonorrhea *Neisseria gonorrhoeae* * Dysentery *Shigella dyseneteriae* * Gasteroenteritis *Clostridium botulinum* | **8** |
| **III** | Classification of pathogenic bacteria  Staphylococcus, Streptococcus, Pneumococcus, Neissseria, Cornebacterium, Bacillus, Clostridium, Non sporing Anaerobes, Organisms belonging to Enterobacteriacea, Vibrios, Non fermenting gram negative bacilli Yersinia, Haemophilus; Bordetella, Bucella; Mycobacteria, Spirochaetes, Actinomycstes, Rickettsiae, Chlamydiae. | **8** |
| **IV** | Viral, protozoan and helminth – Common diseases  Virus: Small pox, Influenza, Measles, Poliomyelitis, Common cold (Rhino virus), Hepatitis, Encephalitis, Rabies, AIDS. Protozoa: Amoebiasis – Entamoeba *histolytic*, Malaria – Plasmodium *vivax*, P*. Malariae*. Helminths: Liver fluke – *Fasciola hepatica*, Filariosis – *Wauheria bancrofti*. Hospital acquired infection: Hospital infections Principles of control committee – functions; Hospital waste disposal – Ethical committee – functions. | **8** |
| **V** | Various methods of drug susceptibility testing, antibiotic assay in body fluids. Brief account of available vaccines and Schedules; passive prophylactic measures; Noscomical infection, common types of hospital infections and their diagnosis and control | **8** |

**Reference:**

1. David Greenwood, Richard CD., Slack, John Forrest Peutherer. (1992). Medical Microbiology. 16th edition. ELBS with Churchill Livingstone.
2. Tom Parker, M., Leslie H. Collier (1990). Topley & Wilson’s Principles of Bacteriology, Virology and Immunity (VIII Edition).
3. Joan Stokes, E., Ridgway GL and Wren MWD (1993).Clinical Microbiology, 7th edition, Edward Arnold. A division of Holder and Stoughton.

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry**

**DETAILED SYLLABUS**

**2014-15**

**SC 611 ADVANCED CLINICAL BIOCHEMISTRY C (L, T, P) = 3 (3, 0, 0) Total lect.-40**

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| **CLASS III Sem M.Sc. Biochemistry** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours . Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours Max. Marks =100[ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Course Contents** | **Total**  **Contact**  **Hrs.** |
| **I** | Blood composition and its function. Blood-Pressure ,Mechenism and regulation of blood coagulation. thalassemia. haemorrhagic disorder –haemophilia, purpura, porphyries ,circulating anticoagulants. sickle cell anemia  Synaptic transmission, Neurotransmitters and Neurohormones , Biochemistry of vision.  . | **8** |
| **II** | Composition, functions and regulation of saliva, gastric, pancreatic, intestinal and bile secretions. Digestion and absorption of carbohydrates, lipids, proteins and nucleic acids.  Structure of Nephron, Composition and formation of urine.Clinical significance of urinary components. homeostic regulation of water and electrolytes .Acid -Base balance, -Acidosis and Alkolosis. composition and biochemical analysis of CSF and amniotic fluid | **8** |
| **III** | Liver function test and related disorder :Jaundice ,hepatitis, fatty liver and gall stone ,Cirrhosis.  Renal function test and related disorders ,Gastric and pancreatic function test .Diagnostic test for lipoproteins disorders. Obesity – Definition, Genetic and environmental factors leading to obesity | **8** |
| **IV** | Clinical significance of enzymes in health and diseases. biochemical diagnosis of diseases by enzyme assays .SGOT, SGPT,CPK,alkaline phosphatase,cholinesterase and LDH. Inborn errors of metabolism: diabetes mellitus ,gaucher’s disease ,tay sach’s disease ,Niemann pick disease, phenylketonuria ,alkaptonuria ,albinism ,maple syrup disease ,lesch-nyhn syndrome. Sexual Transmitted Disease | **8** |
| **V** | Oncology – Cancer markers for oral Cancer, Breast cancer and gastrointestinal tract cancer. Alpha feto proteins, Carcino embryonic antigens, Leukemia. Free radicals in diseases - Introduction, Types of free radicals, free radical induced lipid peroxidation. Scavengers – Superoxide dismutase, catalase, peroxidase and antioxidants | **8** |

**Reference Books**

### 1.[Clinical Biochemistry: An Illustrated Colour Text, 4e](http://www.amazon.com/Clinical-Biochemistry-Illustrated-Colour-Text/dp/0443069328/ref=sr_1_1?s=books&ie=UTF8&qid=1334982547&sr=1-1) by Allan Gaw ,Michael J. Murphy (2008)

### 2.[Marks' Basic Medical Biochemistry: A Clinical Approach](http://www.amazon.com/Marks-Basic-Medical-Biochemistry-Lippincott/dp/078177022X/ref=sr_1_2?s=books&ie=UTF8&qid=1334982547&sr=1-2) by Michael A. Lieberman and Allan Marks (2008)

### 3.[Textbook of Biochemistry with Clinical Correlations](http://www.amazon.com/Textbook-Biochemistry-Clinical-Correlations-Thomas/dp/0470281731/ref=sr_1_4?s=books&ie=UTF8&qid=1334982547&sr=1-4) by Thomas M. Devlin .( 2010)

### 4.[Clinical Chemistry: Techniques, Principles, Correlations](http://www.amazon.com/Clinical-Chemistry-Techniques-Principles-Correlations/dp/078179045X/ref=sr_1_5?s=books&ie=UTF8&qid=1334982547&sr=1-5)  by Michael L. Bishop, Edward P. Fody and Larry E. Schoeff (2009)

### 5.[Clinical Biochemistry (Fundamentals of Biomedical Science)](http://www.amazon.com/Clinical-Biochemistry-Fundamentals-Biomedical-Science/dp/0199533938/ref=sr_1_6?s=books&ie=UTF8&qid=1334982547&sr=1-6) by Nessar Ahmed ( 2011)

### 6.[Essentials of Medical Biochemistry: With Clinical Cases](http://www.amazon.com/Essentials-Medical-Biochemistry-Clinical-Cases/dp/0120954613/ref=sr_1_7?s=books&ie=UTF8&qid=1334982547&sr=1-7) by [N. V. Bhagavan](http://www.amazon.com/N.-V.-Bhagavan/e/B0044895UK/ref=sr_ntt_srch_lnk_7?qid=1334982547&sr=1-7) and Chung-Eun Ha ( 2011)

### 7.[Medical Biochemistry at a Glance](http://www.amazon.com/Medical-Biochemistry-at-Glance-Salway/dp/0470654511/ref=sr_1_8?s=books&ie=UTF8&qid=1334982547&sr=1-8) by [J. G. Salway](http://www.amazon.com/J.-G.-Salway/e/B001JS98CS/ref=sr_ntt_srch_lnk_8?qid=1334982547&sr=1-8) ( 2012)

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**SCHOOL OF BIOSCIENCES**

**M.Sc Microbiology**

**DETAILED SYLLABUS**

**SC 613 FERMENTATION TECHNOLOGY C (L, T, P) = 3 (3, 0, 0) TotalLect.-40**

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| **CLASS III Sem M.Sc Microbiology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assesment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | **Introduction to Bioprocess Engineering**: Classification of Bioreactors, types, Design and operation of various types of reactors, main components, peripheral parts and accessories, various control systems specialized bioreactors (pulsed, fluidized, photo bioreactors etc). | 8 Hours |
| II | **Isolation, Preservation and Media Requirements**  Isolation and preservation of industrially important microorganisms - strain development mutation and recombination - upstream processing. Media for industrial fermentation - characteristics of an ideal production medium - raw material -screening for production media - media formulation - sterilization - (batch and continuous) - addition of antifoaming agents.. | 8 Hours |
| III | **Types of Fermentation processes**: Batch ,fed batch and continuous bioreactors. Downstream processing: Introduction, Removal of microbial cells and solid matter, foam separation, precipitation, filtration, centrifugation, cell disruptions, liquid-liquid extraction, chromatography, membrane process, Drying and crystallization, Whole Cell immobilization and their industrial applications. | 8 Hours |
| IV | **Industrial Production :** Alcohol (ethanol) Acids (citric, acetic acid), solvents (glycerol, acetone), antibiotics (Penicillin, streptomycin,), Amino acids (lysine, glutamic acid), Enzymes (amylase, proteases), | 8 Hours |
| V | **Industrial Process Technology**  Single Cell Protein. Fermented beverages: beer and wine. Genetically modified foods. Biosensors - types and application in various industries | 8 Hours |

**Reference**

1. Plant,Gene and Crop Bitechnol,M.J.chrispeel and D.E.Sadava ASPB 2003.
2. Economic Botany,S.L. Kocher.
3. Wastewater Engineering-Treatment,Disposal and Reuse,Metcall and Eddy,Inc.,Tala McGraw Hill,Delhi.
4. Comprehensive biotechnology, vol.4, M. Moo-Yound (Ed-in-chief),Pergamon Press,Oxford.
5. Environmental Chemistry,A.K.De,Willey Eastern Ltd.,New Delhi.
6. Introduction to Biodeterioration.D.Allsopp and K.J.Seal,ELBS/Edward Arnold.
7. Cookson,J.T.1995.Bioremediation Engineering:design and Application.McGraw-Hill,Inc.
8. Cheremisinoff,Nicholas P.Biotechnology for waste and wastewater treatment

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**SCHOOL OF BIOSCIENCES**

**M.Sc. Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 617 ANIMAL BIOTECHNOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc. Biotechnology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | **Equipments and materials for animal cell culture technology :**  Primary and established cell line cultures.Balance salt solutions and simple growth medium. Brief discussion on the chemical, physical and metabolic functions of different constituents of culture medium Role of carbon dioxide. Role of serum and supplements. | 8 Hours |
| II | **Introduction of media:** Serum & protein free defined media, advantages and disadvantages of serum and protein based media .measurement of viability and cytotoxicity. | 8 Hours |
| III | **Basic techniques:** of mammalian cell culture in vitro; disaggregation of tissue and primary culture; maintenance of cell culture; sub culture and cell line, cell strain, cell separation, methods for cell separation, cell characterization, cryopreservation, principle of cryopreservation, methods for cryopreservation | 8 Hours |
| IV | **Introduction of cloning :** Cell cloning, micromanipulation and types of cloning. Cell transformation. Application of animal cell culture, limitations of animal cell cultures.  Stem cell culture, embryonic stem cells and their applications. Organ and histotypic cultures. Three dimensional culture and tissue engineering | 8 Hours |
| V | **Manipulation and Reproduction :** Manipulation of Reproduction, in animals, artificial insemination, semen collection and storage ovulation, control, sperm sexing, embryo transfer, multiple ovulation (super ovulation) embryo splitting, embryo sexing, In vitro Fertilization Technology, Embryonic stem cell production. | 8 Hours |

**Reference**

1. R.C. Dubey, 2006: A Text book of Biotechnology, S. Chand & Company Ltd. New Delhi
2. Bernard H.U. and Helinski, D.R. (1980):IN genetic Engg and principle and methods Vol. II Plenum press, New York.
3. Boffey, S. A. (1987): In Biotechnology , and Biological principles edition Trevan, M.D.,Boffey, England.

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**SCHOOL OF BIOSCIENCES**

**M.Sc Microbiology**

**DETAILED SYLLABUS**

**2014-15**

**SC 619 Food Microbiology C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc Microbiology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assesment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | **Industrial Food fermentations**  Starter cultures their biochemical activities, production and preservation of the following fermented foods.  a. Soy sauce fermentation by Moulds  b. Fermented vegetables – Saurkraut  c. Fermented Meat – Sausages  d. Production and application of Bakers Yeast  e. Application of microbial enzymes in food industry | 8 Hours |
| II | **Quality Assurances in foods**  Foodborne infections and intoxications; bacterial wi th examples of infective and toxic types –,Clostridium, Salmonella, Shigella, Staphylococcus, Campylobacter, Listeria.Mycotoxins in food with reference to Aspergillus species.  Quality assurance: Microbiological quality standards of food. Government regulatory practices and policies. FDA, EPA, HACCP, ISI. | 8 Hours |
| III | **Food Preservation methods**  Radiations - UV, Gamma and microwave, Temperature  Chemical and naturally occurring antimicrobials .Biosensors in food industry. | 8 Hours |
| IV | **Fermentation of Milk products and Beverages**  Microbiology of cheese and beverage fermentation.  Microbiology of fermented milk products (acidophilus milk, yoghurt).  Role of microorganisms in beverages – tea and coffee fermentations.Vinegar Fermentation | 8 Hours |
| V | **Advanced Food Microbiology**  Genetically modified foods. Biosensors in food, Applications of microbial enzymes in dairy industry [Protease, Lipases].  Utilization and disposal of dairy by-product – whey | 8 Hours |

**References**

1. Food Microbiology. 2nd Edition By Adams

2. Basic Food Microbiology by Banwart George J.

3. Food Microbiology: Fundamentals and Frontiers by Dolle

4. Biotechnology: Food Fermentation Microbiology, Biochemistry and

Technology. Volume 2 by Joshi.

5. Fundamentals of Dairy Microbiology by Prajapati.

6. Essentials of Food Microbiology. Edited by John Garbult. Arnold International Students Edition.

7. Dairy Microbiology by Robinson. Volume II and I.

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**SCHOOL OF BIOSCIENCES**

**M.Sc. Biotechnology**

**DETAILED SYLLABUS**

**2014-15**

**SC 621 BIOPROCESS TECHNOLOGY C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **CLASS III Sem M.Sc. Biotechnology** | **EVALUATION** |
| Schedule Per Week Lectures: \_\_\_ Tutorial: \_\_\_  Total Lecture/ Unit: 8 Hours Total Lecture/ Paper: 40 hrs | Examination Time = Three (3) Hours  Max. Marks =100  [ Internal Assessment (30) & Semester End Exam (70)] |

There will be ten questions in all. Two from each unit. Students have to attempt 5 questions in all, taking at-least one question from each unit and each question carries 14 marks.

|  |  |  |
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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | **Introduction to Bioprocess Engineering**: Classification of Bioreactors, types, Design and operation of various types of reactors, main components, peripheral parts and accessories, various control systems specialized bioreactors (pulsed, fluidised, photobioreactors etc). Isolation preservation and maintenance of industrial microorganisms, media for industrial fermentation, Air and media sterilization. Strain selection and improvement. | 8 Hours |
| II | **Types of Fermentation processes**: Batch,fed batch and continuous bioreactors. Downstream processing: Introduction, Removal of microbial cells and solid matter, foam separation, precipitation, filtration, centrifugation, cell disruptions, liquid-liquid extraction, chromatography, membrane process, Drying and crystallization, Whole Cell immobilization and their industrial applications. | 8 Hours |
| III | **Industrial Production of chemicals utilizing wastes:** Alcohol (ethanol) Acids (citric, acetic acid), solvents (glycerol, acetone), antibiotics (Penicillin, streptomycin,), Aminoacids (lysine, glutamic acid), Single Cell Protein. Enzymes (amylase, proteases), | 8 Hours |
| IV | **Introduction Dairy Technology:** Principles of food processing,Elementary idea of canning and packing,sterilization and pasteurization of Food Products,Technology of typical Food/Food Products(bread,cheese idli),Food Preservation. Microbes as sources of food (*Spirulina*, *Saccharomyces cerviceae*, *Rhizopus* spp). Food borne infections and poisoning. | 8 Hours |
| V | **Introduction of Food Technology:** Fermented beverages: beer and wine. Genetically modified foods ,Microbiology of fermented milk – starter cultures, butter milk, cream yoghurt, kafir, kumiss, acidophilus milk and cheese. | 8 Hours |

**Reference**

1. Plant,Gene and Crop Bitechnol,M.J.chrispeel and D.E.Sadava ASPB 2003.
2. Economic Botany,S.L. Kocher.
3. Wastewater Engineering-Treatment,Disposal and Reuse,Metcall and Eddy,Inc.,Tala McGraw Hill,Delhi.
4. Comprehensive biotechnology, vol.4, M. Moo-Yound (Ed-in-chief),Pergamon Press,Oxford.
5. Environmental Chemistry,A.K.De,Willey Eastern Ltd.,New Delhi.
6. Introduction to Biodeterioration.D.Allsopp and K.J.Seal,ELBS/Edward Arnold.
7. Cookson,J.T.1995.Bioremediation Engineering:design and Application.McGraw-Hill,Inc.
8. Cheremisinoff,Nicholas P.Biotechnology for waste and wastewater treatment.
9. Arora PN & Malhon PK, (1996) Biostatistics. Imalaya Publishing House, Mumbai.
10. Sokal & Rohif, (1973) Introduction to Biostatistics - Toppan Co. Japan.
11. Stanton A & Clantz, Primer of Biostatistics –– The McGraw Hill Inc., New York.

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**SCHOOL OF SCIENCE**

**M.Sc. Biotechnology /Microbiology/Biochemistry**

**HS 623 SOFT SKILLS-III C (L, T, P) = 3 (3, 0, 0) Total Lect.-40**

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| **Unit** | **Contents of the Subject** | **No. of Hours.** |
| I | Group Discussion | 8 Hours |
| II | Effective Interview | 8 Hours |
| III | Conference and Seminar Organizing Skills | 8 Hours |
| IV | Scientific communication Skills | 8 Hours |
| V | Oral Delivery & Visual Aids | 8 Hours |

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**SCHOOL OF SCIENCES**

**M.Sc. Biochemistry/Microbiology/Biotechnology**

**DETAILED SYLLABUS**

**DI 602 DISSERTATION/ PROJECT WORK C (L, T, P) = 14 (0, 0, 0)**

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| --- | --- |
| **CLASS IV Sem M.Sc. Biochemistry/Microbiology/Biotechnology** | **EVALUATION** |
| Schedule Per Week  Practicals: | Examination Time = Three (3) Hours Max. Marks =100  [ Internal Assesment (60) & Semester End Exam (40)] |

The Project work will involve in depth practical work on a problem suggested by the supervisor of the candidate. The student will submit the dissertation of the work done. The dissertation submitted by the candidate shall be evaluated by one External expert,Head of the Department and supervisor of the candidate. The examination shall be held in the department and the dissertation etc. will NOT be required to be mailed to the external examiner. The distribution of the marks will be as under.

Max. Marks:- 100

|  |  |
| --- | --- |
| Dissertation Record | 60 marks |
| Viva Voce | 40 marks |
| Total | 100 marks |

Scheme of Examination

General Guide-lines for Course of Study

1. The whole syllabus is divided into five units.
2. Number of teaching hours required to finish the contents of each unit are mentioned in the syllabus.
3. Books recommended/references are given at the end of each paper separately.
4. In P.G. programme list of periodicals for consultation are also given.
5. Two questions will be set from each unit and student will have to attempt one question from each unit.
6. Maximum time allowed for answering each question paper is 3 hours.
7. Maximum marks allotted to a paper are 70.

Examination Pattern

Evaluation will be done under two headings:

1. Theoretical Examination & Sessionals
2. Practical Examination & Sessional

**1. Theoretical Examination (100 Marks):**

This will be further divided under two categories

(i) Internal Assessment : 30 Marks (30% Component)

(ii) End term Assessment : 70 Marks (70% Component)

1. Internal Assessment (30 Marks): This is the 30% component of the total 100% theoretical examination & is further divided as follows

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Process** | Mid Term I | Mid Term II | Weekly Tests | Assignment | Total |
| **Marks** | 10 | 10 | 05 | 05 | 30 |

Two Mid Term Examinations, Two Weekly Tests per subject and two assignments from each unit will be conducted for assessment as per the following schedule:

* + After Completion of 1st Unit : Weekly test - I (to cover unit – I) and 2 assignments
  + After Completion of 2nd Unit : Mid Term Exam-I and 2 assignments (to cover unit 1 & 2)
  + After Completion of 3rd Unit : Weekly test – II (to cover unit 3)

and 2 assignment

* + After Completion of 4th Unit : Mid Term Exam – II & 2

assignments (to cover unit – 3 & 4)

* + After Completion of 5th Unit : End Term Exams & 2 assignments

(to covers all 5 units)

After completion of each unit, two assignments from each unit are to be given to the students, which will be submitted by the student after two working days. Thus total of 10 assignments will be assessed per semester. The Mid Term examination will be of 90 Min. duration and the concerned faculty members will be responsible for the question papers & evaluation.

Mid Term marks will be displayed within two working days of exams.

1. End Term Assessment (70 Marks): End term examination will be of 3.00 hrs duration and the question paper and the evaluation system will be as follows

**Question Paper:** For paper setting each subject, paper should be sent to three paper setters randomly and then any one paper will be selected randomly.

**Evaluation System:** Final result will be declared within one month after completion of examination. Centralized evaluation will be undertaken for End Term examinations.

**2. Practical Examination & Sessionals (100 Marks):**

The practical examination is also further divided into two categories i.e.

(i) Internal Assessment : 60 Marks (60% Component)

(ii) End Term Assessment : 40 Marks (40% Component)

(i) Internal Assessment (60 Marks): This is the 60% component of the total 100% practical examination and is further divided as follows

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Process** | Internal Exam | Attendance | File work | Presentations | Overall Performance | Viva  Voice | Total |
| **Marks** | 10 | 10 | 10 | 10 | 10 | 10 | 60 |

* The internal exam component will be awarded on the basis of total number of experiments conducted during the practical classes.
* Marks of attendance will be awarded based on percentage of attendance. The students will be detained if the total percentage falls below 75% in all subjects taken together.
* The file work will depend on the submission of detailed theory & experimented record.
* Overall presentation on the practicals performed during the semester will be taken into consideration for award of marks.
* Internal viva on the practicals performed will form the basis for award of marks in Viva-Voce.

1. End Term Assessment (40 Marks): This examination will be final practical examination the evaluation of the final examination should be done on same day as given below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Process** | Performance of the practical | Quiz | Viva voce | Total |
| **Marks** | 15 | 15 | 10 | 40 |

Mid-Term exams, weekly test and assignment will be reflected in the academic calendar.