Vels University, Pallavaram, Chennai 600 117

School of Life Sciences

Department of Biotechnology

Typical Program Specific Outcome(PSO)

To enable the student to emerge as:

PSO – 1: An expert in Biotechnology subjects knowledge

PSO – 2: An expert in Biotechnology practical skills.

PSO – 3: Efficient researcher using biotechnology practical skills.

PSO – 4: Development of own entrepreneur skills in biotechnology industry

PSO – 5: Well versed in the field of various biotechnology fields (medical, microbial, agricultural, environmental, plant and animal).

SCHOOL OF LIFE SCIENCE
DEPARTMENT OF BIOTECHNOLOGY

B.Sc.BIOTECHNOLOGY

BOARD OF STUDIES (BOS) – MEMBERS DETAILS

S.No	BOARD OF STUDIES MEMBERS	
	Name	Address
BOARD CHAIRMAN		
1.	Dr.K.Rajagopal	Head, Department of Biotechnology, Vels University, Pallavaram, Chennai-117.
BOARD MEMBER - External		
2.	Dr.K.Kathiravan,	Associate Professor, Dept of Biotechnology, University of Madras. Chennai.
BOARD MEMBER – External (Industry Representative)		
3.	Dr.N.Sivasamy,	Scientist, Synkromax Biotech Pvt Ltd, Porur, Chennai.
BOARD MEMBER - External		
4.	Dr.K.P.Girivasan	Associate Professor, Dept of Plant Biology and Biotechnology, Government Arts College (Men's),Nandanam,Chennai.
BOARD MEMBER - Internal		
5.	Dr.N.Banu,	Associate Professor, Dept of Biotechnology, Vels University, Pallavaram, Chennai.117.
STUDENT MEMBER – Student Representative		
6.	Mr.Edward Joseph Gallyot,	III B.Sc. Student, Dept of Biotechnology, Vels University, Pallavaram, Chennai.117.

Curriculum and Syllabus

(Based on Choice Based Credit System)
Effective from the Academic year

2015-2016

Department of Biotechnology
School of Life Sciences

B.Sc. – BIOTECHNOLOGY
CURRICULUM

Total number of Credits : 135

Category	Code	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER I						
Core	15BBT001	Advanced Cell Biology	6	0	0	4
Core	15BBT002	Advanced Cell Biology Practical	0	0	3	2
DSE		Discipline Specific Electives-I	6	0	0	4
DSE		Discipline Specific Electives-II	0	0	3	2
AECC	15LEN001	Foundation English – I	6	0	0	4
AECC	15LTA001/ 15LHN001/ 15LFR001	Tamil/ Hindi/ French	6	0	0	4
Total			**24**	**0**	**6**	**20**
SEMESTER II						
Core	15BBT003	Molecular Genetics and Developmental biology	5	0	0	4
Core	15BBT004	Molecular Genetics and Developmental biology-Practical	0	0	3	2
DSE		Discipline Specific Electives-III	5	0	0	4
DSE		Discipline Specific Electives-IV	0	0	3	2
AECC	15LEN002	Foundation English – II	6	0	0	4
AECC	15LTA002/ 15LHN002/ 15LFR002	Tamil/ Hindi/ French	6	0	0	4
SEC		Skill Enhancement Course – I	2	0	0	2
Total			**24**	**0**	**6**	**22**

SEMESTER III						
Category	**Code**	**Course**	**Hours/Week**			**Credits**
			Lecture	**Tutorial**	**Practical**	
Core	15BBT005	Clinical Diagnostic Techniques	6	0	0	4
Core	15BBT006	Clinical Diagnostic Techniques – Practical	0	0	3	2
DSE		Discipline Specific Electives-V	6	0	0	4
DSE		Discipline Specific Electives-VI	0	0	3	2
GE		Generic Elective– I	2	0	0	2
AECC		English Communication - I	5	0	0	4
AECC	15LTA003/ 15LHN003 /15LFR003	Tamil/ Hindi/ French	5	0	0	4
Total			**24**	**0**	**6**	**22**
SEMESTER- IV						
Core	15BBT007	Plant and Animal Biotechnology	5	0	0	4
Core	15BBT008	Plant and Animal Biotechnology – Practical	0	0	3	2
DSE		Discipline Specific Electives-VII	5	0	0	4
DSE		Discipline Specific Electives-VIII	0	0	3	2
GE		Generic Elective – II	2	0	0	2
AECC		English Communication-II	5	0	0	4
AECC	15LTA004/ 15LHN004/ 15LFR004	Tamil/ Hindi/ French	5	0	0	4
AECC		Environmental Studies	2	0	0	2
Total			**24**	**0**	**6**	**24**

SEMESTER –V						
Category	**Code**	**Course**	**Hours/Week**			**Credits**
			Lecture	**Tutorial**	**Practical**	
Core	15BBT009	Genetic Engineering, IPR and Bioethics	6	0	0	4
Core	15BBT010	Immunotechnology	6	0	0	4
Core	15BBT011	Genetic Engineering - Practical	0	0	3	2
Core	15BBT012	Immunotechnology – Practical	0	0	3	2
DSE		Discipline Specific Electives-IX	6	0	0	4
GE		Generic Elective – III	2	0	0	2
SEC		Skill Enhancement Course - II	2	0	0	2
Total			**22**	**0**	**6**	**20**
SEMESTER –VI						
Core	15BBT013	Biofermentation and Downstream Processing	5	0	0	4
Core	15BBT014	Medical Coding and Clinical Research	5	0	0	4
Core	15BBT015	Biofermentation - Practical	0	0	3	2
DSE		Discipline Specific Electives-X	5	0	0	4
DSE		Discipline Specific Electives-XI	5	0	0	4
GE		Generic Elective – IV	2	0	0	2
Core	15BBT016	Project work	7	0	0	7
		*Bridge Course	0	0	0	0
Total			**29**	**0**	**3**	**27**

- Bridge Course for Students who joining B.Sc., course in Biotechnology without biology background in 12th standard

List of Discipline Specific Elective Courses

15BBT101	Chemistry
15BBT102	Chemistry Practical
15BBT103	Biochemistry and Bioinstrumentation
15BBT104	Biochemistry – Practical
15BBT105	Microbiology
15BBT106	Microbiology – Practical
15BBT107	Biophysics, Biostatics and Computational Biology
15BBT108	Computational Biology – Practical
15BBT109	Microbial and Environmental Biotechnology
15BBT110	Mushroom cultivation and its Marketing
15BBT111	Pharmaceutical Biotechnology

List of Ability Enhancement Compulsory Courses

15LEN001	Foundation English - I
15LEN002	Foundation English - II
15LEN003	English Communication – I
15LEN004	English Communication - II
15LTA001	Tamil – I
15LTA002	Tamil – II
15LTA003	Tamil – III
15LTA004	Tamil - IV
15LHN001	Hindi – I
15LHN002	Hindi – II
15LHN003	Hindi – III
15LHN004	Hindi – VI
15LFR001	French – I
15LFR002	French – II
15LFR003	French – III
15LFR004	French – IV
15EVS201	Environmental Studies

List of Generic Elective Courses

15BBT151 Mushroom Cultivation and its Marketing

15BBT152 Entrepreneurship Development

15BBT153 Biotechnology and Human Welfare

15BBT154 Food Processing Technology

Skill Enhancement Courses

15BBT251 National Social Service - I

15BBT252 National Social Service - II

15BBT253 National Social Service - III

15BBT254 National Social Service - IV

15BBT255 National Social Service - V

15BBT256 National Social Service - VI

15BBT257 Personality Development -I

A Typical Course code, Course name, Course Objectives, Course Outcomes, Syllabus and References

Syllabus
Core Courses

15BBT001 ADVANCED CELL BIOLOGY 6 0 0 4

Course Objective:

- To provide knowledge about the morphology, structure and functions of various cells at molecular level.

Course Outcome:

- CO-1: Students understand the molecules of life and how the cell has evolved with period of time.
- CO-2: The structure and functions of cell and the various cell organelles at molecular level are explained in detail.
- CO-3: Student gets to understand the principles of cell division and cell to cell communication.
- CO-4: The progression and role played by oncogenes and tumor suppressor gene in cancer regulation is well covered.
- CO-5: Students learn about the detailed membrane organization and its functions in living cell in transporting material across membrane.
- CO-6: There is a good learning on receptor mediated signal transduction with respect to bio molecules like hormones and other signal molecules.
- CO-7: Students are taught about the basic structures of Proteins and also the various stages of Protein modification and folding for becoming functional.
- CO-8: Students also get to understand the concept of central dogma and genetic code that decides the protein composition finally.

- CO-9: The importance of genetic material, its composition and role in life is well understood.
- CO-10: There is a detailed chapter on anatomy of gene, its repair mechanism and their role in gene regulation.

Unit 1: Cell and Cell Organelles **12**

The dynamic cell: Evolution, the molecules of life, the architecture of cells, cells into tissues. Structural organization and function of intracellular organelles: Cell wall, Nucleus, itochondria, Golgi bodies, Lysosomes, Endoplasmic reticulum, Peroxisomes, Plastids, Vacuoles. Structure and function of Cytoskeleton.

Unit 2: Cell division and Regulation **8**

Cell division and cell cycle: Mitosis and Meiosis, their regulation, Tumor cells, Proto-oncogenes and Tumor suppressor genes and their regulation.

Unit 3: Membrane Structure and Function **13**

Biomembrane: Structural organization and basic functions. Transport across cell membranes. Cellular energetics: Glycolysis, Aerobic oxidation and Photosynthesis. Microscopy and its type. Cell motility: Microfilaments, Microtubules, Intermediate filaments. Cell - to – Signaling: Hormones and Receptors.

Unit 4: Proteins and its functions **12**

Protein structure and function: Hierarchial structure of protein, folding, modification, sorting and degradation of protein, functional design of proteins. Genetic code, Synthesis of proteins.

Unit 5: Molecular Aspects of DNA and RNA **15**

Molecular structure of genes, DNA and chromosomes, Synthesis of DNA and RNA. DNA replication, repair, and recombination, Regulation of transcription Initiation. RNA processing, nuclear transport and post-transcriptional control.

Total : 60 hours

TEXT BOOKS:

1. P. K. Gupta, Cell and Molecular Biology, Rastogi Publications. 2012 – 2013.
2. S. C. Rastogi, Cell Biology, New Age International Publishers.2011.
3. NaliniChandar, Susan Viselli, Cell and Molecular Biology, Wolters Kluwer (India) Pvt. Ltd. New Delhi.2012.

REFERENCE BOOKS:

1. Lodish, H. Berk, A.., Zipursky, S.L., Matsudaria, P., Baltimore, D., and Darnell, J. Molecular Cell 3.Biology. Media connected, W. H. Freeman and Company.2000.
2. Cooper, G.M.. The cell. A.S.M press.2000
3. E.D. D. De Robertis, E.M.F. De Robertis, Jr. Cell and Molecular Biology, Wolters Kluwer India Pvt. Ltd.2012.
4. P. S. Verma, V.K. Agarwal. Cytology, S. Chand and Company Pvt. Ltd.,2014.

15BBT002 ADVANCED CELL BIOLOGY PRACTICALS 0 0 3 2

Course Objective:

- To get hands on experience on basic microscopy and its principles and functioning.
- To impart knowledge about various cell organelles and cell division

Course Outcome:

- CO – 1: To understand the basic microbiology handling techniques like sterilization and media preparation.
- CO -2: To learn about staining and slide preparation.
- CO - 3: To be well versed in Basic cell biology practical.
- CO – 4: Student learnt about the practical knowledge of structure and functions of cell and cell organelles at molecular level using microscope.
- CO-5: To learn about different microscope principles
- CO-6: To be well versed with the handling of microscope
- CO-7: Student will understand the cell division principle and its various stages
- CO-8: Student will understand the cell division of gametes production in the organism
- CO-9: Students learn about the presence of Barr body which is otherwise called as sex chromatin. Which they can identify the gender.
- CO – 10: Explore several representative mechanisms underlying key cell-biological functions.

List of Experiments:

1.Sterilization and Media preparation techniques.

2. Different types of Microscope and its principles

3. Electron Microscopy and its principle

4. Mitosis preparation from onion root tip.
5. Meiosis preparation from grasshopper
6. Meiosis preparation from flower bud
7. Buccal smear preparation
8. Charts showing different cell organelles,
9. Charts illustrating the membrane structure -Fluid mosaic model.
10.Charts on Cell cycle- Mitosis and Meiosis.

Total : 36 hours

15BBT003 MOLECULAR GENETICS AND DEVELOPMENTAL BIOLOGY 5 0 0 4

Course Objective:

- To provide the knowledge from the fundamental aspects of Genetics till the molecular level and significant aspects of developmental biology.

Course Outcome:

- CO-1: Students get an idea on fundamentals of Mendelian and extra chromosomal inheritance with genome organization and related concepts.
- CO-2: There is a brief introduction to the concepts of population genetics.
- CO-3: The students learn about the various types of inheritance such as extra-chromosomal inheritance and sex linked inheritance along with their respective disorders.
- CO-4: The concept and mechanism of Mutation with reference to DNA repair system is taught well.
- CO-5: Students get to understand the major mechanisms involved in gene transfer.
- CO-6: They also learn about the presence and significance of operon models, plasmids and Transposons in the living system.
- CO-7: Students have a good introduction to the concept of Central Dogma and importance of the universal Genetic code and its features.
- CO-8: Get detailed knowledge on transcription, translation and its machinery.
- CO-9: Students are introduced to the different facets of developmental biology.
- CO-10: Study in detail the molecular aspects of embryogenesis in animals and plants.

Unit 1: Principles in Genetics **15**

Principles of Mendelian inheritance – Incomplete dominance – Multiple alleles – Linkage, crossing over – Genetic mapping – recombination – Population genetics – Hardy-Weinberg law.

Unit 2: Inheritance of Gene **13**

Quantitative genetics – polygenic inheritance – Extra chromosomal inheritance – Sex chromosomes – Sex determination – Sex linked inheritance – Mutation: Types – Mutagens – Ames test for mutagenesis – Chromosomal aberrations – Syndromes – DNA repair.

Unit 3: Gene transfer mechanism **8**

Gene Transfer in Bacteria - Conjugation, Transformation, Transduction – operon model in prokaryotic organisms – plasmids - Transposons

Unit 4: Molecular Gene Regulation **12**

Transcription – regulation – post transcriptional modification – Genetic code; Translation – regulation – Post translational modification.

Unit 5: Embryo Development **12**

Embryology of animals and plants – Morphogenesis; Drosophila – life cycle – embryo development – Molecular aspect of embryogenesis.

Total : 60 hours

TEXT BOOKS:

1. S. Chand and P.S. Verma, Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand Publishing. 2006.
2. Dr. Richard Twyman, Instant notes in Developmental Biology, Taylor and Francis, 2000.

REFERENCE BOOKS:

1. Robert J. Brooker, Genetics: Analysis and Principles, 5th edition, McGraw-Hill. 2014
2. Eldon John Gardner, Michael J. Simmons, D. Peter Snustad, Principles of Genetics, 8th edition, John Wiley and Sons. 2012
3. P.S. Varma, B.S. Author Tyagi and V.K. Agarwas, Chordate Embryology, 1st edition, S.Chand and Company. 2006
4. Robert Tamarin, Principles of Genetics, 7th edition, Tata McGraw Hill publishing.2010.
5. Scott F. Gilbert, Developmental Biology, 9th edition. 2010.

15BBT004 MOLECULAR GENETICS AND DEVELOPMENTAL BIOLOGY PRACTICALS 0 0 3 2

Course Objective:

- To provide the practical knowledge of the fundamental aspects of Genetics till the molecular level and significant aspects of developmental biology.

Course Outcome:

- CO-1:- Students gain practical knowledge about blood group typing and its mechanisms
- CO-2:- To be well versed with the isolation of genomic DNA from the bacteria
- CO-3: To be comfortable with the isolation of genomic DNA from the plants
- CO-4: To be familiar with the isolation of genomic DNA from blood
- CO-5:- Students will get to know Karyotyping and learn to identify the size, shape and number of chromosomes and also helps to learn about the chromosomal aberrations
- CO-6:- To know about the Drosophila culturing strategy.
- CO-7:- To be well versed with the mutation study using Drosophila
- CO-8:- To learn about the chromosome and its isolation from the Chironormous larvae.
- CO-9:- Students get the knowledge about the developmental stages of Chick embryo
- CO-10:- Students can prepare the permanent slide of specimen

List of Experiments:

1. Blood grouping
2. Isolation of genomic DNA from Bacteria
3. Isolation of genomic DNA from plants
4. Isolation of genomic DNA from Blood
5. Karyotyping
6. Preparation of culture medium for *Drosophila,* Drosophila culture development and maintenance.
7. Mutation studies of *Drosophila* in Eye
8. Mutation studies of *Drosophila* in Wings
9. Giant chromosome from *Chironormous* larvae

10. Embryo development stages: Different stages of Chick embryo developmental stage 48 hrs, 72 hrs and 96 hrs. (Permanent slide)

Total : 36 hours

15BBT005 CLINICAL DIAGNOSIS TECHNIQUES 6 0 0 4

Course Objective:

- To understand fundamental principles and processes used in the clinical laboratory testing and
- To familiarize with the diagnosis of infectious diseases**.**

Course Outcome:

- CO – 1: To understand the scope and importance of clinical diagnosis
- CO – 2: To learn about the collection, transport and storage of specimen samples
- CO – 3: To understand about the collection of blood and its constituents
- CO – 4: To learn about the blood bank and blood grouping (ABO system & Rh system)
- CO – 5: Student will identify malarial parasites
- CO – 6: Student will learn about the examination method of Urine, sputum, feces, semen and CSF.
- CO – 7: To understand the microbial sensitivity of pathogen present in Urine, sputum and feces.
- CO – 8: To understand various serological tests like Rheumatoid arthritis, Pregnancy test, Widal (slide and tube test), VDRL, HBs antigen, carbohydrate reactive protein test
- CO – 9: To understand the immunological diagnosis of AIDS, MOTT, Legionellosis, Chicken guinea, *Helicobacter pylori* and SARS.
- CO – 10: Student will learn about the clinical manifestation and laboratory diagnosis of bacterial pathogens

Unit1:Clinical Diagnosis **8**

Introduction, definition, scope and importance of clinical diagnosis. Specimen –definition, types. Collection and transport of specimen. Specimen preservation and storage.

Unit2:Haematology **15**

Blood and its constituents, collection of blood various anticoagulants and their uses. Total Leukocyte Count(TC), Differential count(DC), Erythrocyte Sedimentation Rate(ESR) Red blood cells count(RBC), Platelet count, Packed cell volume(PCV), Mean cell volume(MCV), Hb estimation Bleeding time(BT), Clotting time(CT).Blood bank -Blood grouping(ABO system & Rh system),Identification of malarial *parasites.*

Unit3:Clinical Pathology **13**

Complete urine routine examination –physical, chemical and microbiological examination of urine, Culture and sensitivity. Complete routine examination of sputum and feces. Semen analysis. Examination of CSF.

Unit4:Clinical Serology and Immunology **12**

Common serological tests - Rheumatoid arthritis, Pregnancy test, Widal (slide and tube test), VDRL, HBs antigen, carbohydrate reactive protein test. Clinical manifestations and lab immunological diagnosis of AIDS, MOTT, Legionellosis, Chicken guinea, *Helicobacter pylori* and SARS.

Unit5:Clinical Microbiology **12**

Clinical manifestation and laboratory diagnosis of bacterial pathogens-Enteric pathogens (*E.coli*, *Shigella, Samonella*and *Vibrio*), pyogenic organisms (Staphylococcus and Streptococcus), Spirochetes (*Leptospira*), Mycobacterium, B. anthracis and Rickettsia. Virology, Mycology and Parasitology - Clinical manifestation and laboratory diagnosis of *Rabies* and *Poliomyelitis*, *Dermatophytes* and *E.histolytica*. Application of nanotechnology in clinical application studies.

Total : 60 hours

TEXT BOOKS:

1. Pradeepkumar.NS.Manual of Practical Pathology, CBS Publishers and Distributors Pvt Ltd, Chennai. 2011.
2. Naigaonkar.A.V.andM.D.Burande, A Manual of Medical Laboratory Technology, NiraliPrakashan.Pune. 2004

REFERENCE BOOKS:

1. P. Gunasekar, Laboratory Manual in Microbiology, New Age international Private Ltd. Publishers, New Delhi, Chennai.1995.
2. Prakash M & C.K. Arora, Biochemical techniques, Anmol publication (1) Ltd New Delhi.1998.
3. David T. Plummer, An Introduction to practical biochemistry – 3rd edition. Tata McGraw Hill Publishing Company Ltd New Delhi. 1978
4. Lele Buckingham and Maribeth L. Flaws,Molecular Diagnostics: Fundamentals, Methods & Clinical applications. 2007.
5. Lewin .B Genes VIII, Oxford University Press. 2004.
6. Lewontin and W.M. Gelbart,Modern Genetic Analysis, W.H. Freeman, New York.1999
7. Watson J.D. Tania A baker, Stephen P. Bell, Alexander,Molecular Biology of the Gene. 2004
8. David E. Bruns, Edward R. Ashwood, Carl A. Burtis.Fundamentals of Molecular Diagnostics. Saunders Group. 2007
9. Expert Review of Proteomics and Molecular Diagnostics (Journals) 2011.
10. Watson, J.D. Tania A baker, Stephen P.Bell, Alexander Gann, Michael Levine, Richard Losick, Molecular Biology of the Gene.Pearson Education Pte. Ltd. (Singapore). 2004
11. G. M. Malacinski and D. Friefelder,Essentials of Molecular Biology,Jones& Bartlett publishers. 1998
12. Government of India, Ministry of Science and Technology, Dept.of Biotechnology, Recombinant DNA safety guidelines New Delhi. 1990.
13. Rudin,N and Inman, K.An Introduction to Forensic DNA Analysis. CRC Press.2002.
14. Forensic DNA Typing. Biology, Technology and Genetics of STR markers 2005.
15. Molecular Diagnostics edited by George Patrinos, Wilhelm Ansorge.2009.

15BBT006 CLINICAL DIAGNOSTIC TECHNIQUES PRACTICALS 003 2

Course Objective:

- To understand fundamental practical principles and processes used in the clinical laboratory testing
- To familiarize with the diagnosis techniques of infectious diseases**.**

Course Outcome:

- CO – 1: Student will learn about significance of Hemoglobin
- CO – 2: To estimate the RBC, WBC, Platelets
- CO – 3: To understand the Blood grouping and Rh system
- CO – 4: To estimate the Sugar level in human blood
- CO – 5: To understand the amount of cholesterol in human blood
- CO – 6: To Know the function of Blood coagulation cascade
- CO – 7: To understand the Red blood cell Sedimentation time
- CO – 8: Constitutions of White blood cells
- CO – 9: Student will learn about the of Nature of urine sample
- CO – 10: Microscopic Analysis of urine sample

List of Experiments:

1. Blood analysis I: Estimation of Haemoglobin by Haemometer
2. Estimation of RBC by Haemocytometer
3. Estimation of WBC by Haemocytometer
4. ABO Blood Grouping and Rh factor
5. Blood sugar analysis by Follin Wu Method
6. Blood cholesterol analysis
7. Blood analysis II: Total leukocyte count and Differential count
8. Erythrocyte Sedimentation Rate
9. Bleeding time and Clotting time
10. Urine analysis : Color reaction, pH,
11. Albumin and Sugar of Urine Sample
12. Analysis of urine deposits (pus cells, Epithelia cells, RBC's and crystals) using microscope

Total : 36 hours

15BBT007 PLANT AND ANIMAL BIOTECHNOLOGY 5 0 0 4

Course Objective:

- The objective of this course is to introduce students to learn basics in Plant and Animal Biotechnology
- To know about the application in improvement of crops and livestock.

Course Outcome:

- CO –1: Student will understand about plant genome organization and gene families
- CO –2: Student will have knowledge on plant hormones, gene expressions
- CO –3: To understand the subject of plant genetic engineering
- CO–4: Student will understand the various techniques and vector involved in plant transformation
- CO –5: student will learn about the GM crops and their products
- CO –6: Understanding the knowledge of improvement of crops and yields
- CO –7: To understand the term of molecular farming, plant tissue culture, embryogenesis and protoplast culture
- CO –8: Student will learn about the embryo transferring in animals
- CO –9: To learn about various gene transfer methods in animals
- CO –10: Student will learn about genetically modified animals and artificial insemination of animals
- CO –11: To understand about the animal cell culture and origin and characterization of various cell lines

Unit 1: Plant Genetics and Physiology **8**

Plant genome organization, Gene families in plants. Chloroplast and Mitochondrial genome. Plant hormones- structure and function regulation of gene expression. IAA, GA, Cytokinins, ABA and Ethylene.

Unit 2: Plant Molecular Biology **15**

Genetic engineering of plants. Vectors for plant transformation. Techniques for Plant transformation. Genetic manipulation for herbicide, disease and stress resistance. Transgenic crops- concerns about GM crops and products. Introduction to inducible gene expression.

Unit 3: Crop Improvement **12**

Improvement of crop yield and quality. Molecular farming / pharming. Plant tissue culture, Micro propagation, Cell suspension culture, Somatic embryogenesis, Anther culture. Protoplast culture and its applications.

Unit 4: Embryo transfer mechanism **13**

In vitro fertilization and embryo transfer in animals. Cryopreservation in vitro fertilization & technique of embryo transfer, super ovulation and embryo culture. Gene Transfer methods in animals- Microinjection, Embryonic stem cell gene transfer, Retro Virus Gene Transfer.

Unit 5: Genetically modified animals **12**

Transgenic animal's sheep, pigs, goats, cows. Artificial insemination animal clones. Animal cells primary cell culture, differentiation of cells, animal cell lines under origin and characterization. **Total :60 hours**

TEXT BOOKS:

1. Animal Biotechnology, M.M Ranga Third Edition, Agro Bios, India. 2007.
2. Ignacimuthu, Applied Plant Biotechnology. Tata McGraw Hill. 1996
3. Rajagopal, K.,Kathiravan, G. and Karthikeyan; S. Introduction to Plant Biotechnology. DGI, publishers. Chennai. 2014.
4. H.S.Chawla, Plant Biotechnology. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi. 2004.

REFERENCE BOOKS:

1. Animal biotechnology: Models in discovery and Translation, Ashish S Verma, Anchal Singh, Academic Press. 2014
2. Animal biotechnology, Editors- A.K Srivastava, R.K Singh, M.P Yadav , Oxford and IBH publishing company PVT LTD.2009
3. Animal biotechnology, ManjulaShenoy,Laxmi Publications PVT LTD. 2007.
4. Introduction to Animal Biotechnology, Ravi Pathak , Atlantic publishers and distributors PVT LTD. 2007.
5. Introduction to plant biotechnology, H.S Chawla Third Edition, Science Publishers, 2009
6. Plant Biotechnology, Slater Ascot N Fowler M, Oxford University Press.2003.
7. Introduction to Plant Cell Tissue and Organ Culture, Sumil D Purohit PHI Learning PVT LTD.2013.
8. Adrian Slater, N.Scott and Mark Fowler. Plant Biotechnology. Oxford University press. 2003.

15BBT008 PLANT & ANIMAL BIOTECHNOLOGY PRACTICALS0032

Course Objective:

- Learn basics practical knowledge in Plant and Animal Biotechnology

Course Outcome:

- CO –1: To learn about the Hardening of Plants
- CO –2: To know about the callus formation in plant tissue culture

- CO –3: To understand the process involved in protoplasmic fusion
- CO –4: To learn about how to handle an animal
- CO –5: Know to handle the animal cell culture techniques
- CO –6: To learn the regeneration of plants in tissue culture
- CO –7: To understand the cytological examination
- CO –8: T know the nature of cell line cultures
- CO –9: Handling of cell line cultures
- CO –10: To gain information on stem cell Technology

List of Experiments:

1. Learn about Plant Tissue Culture Lab infrastructure, Green House Hardening Lab.
2. Preparation of media, Sterilization of media, glassware, hormones, etc.
3. Inoculation of explants for callus formation seed, bud, embryo, anther, leaf tissue.
4. Cytological examination of callus tissue.
5. Protoplast isolation.
6. Animal House infrastructure and Animal Handling.
7. Preparation of media, Sterilization of glassware, media and other accessories for animal cell culture.
8. Isolation of cells and cell viability study.
9. Monolayer formation.
10. Stem cell isolation (Demo).

Total : 45 hours

15BBT009 GENETIC ENGINEERING, IPR AND BIOETHICS 6 0 0 4

Course Objective:

- To understand vector biology, principles in cloning, cloning strategies for prokaryotes and eukaryotes,
- To know about the molecular techniques and ethical issues.

Course Outcome:

- CO –1: To learn about the fundamental principles of cloning vectors
- CO –2: Student will understand about the gene markers
- CO –3: To understand about various types of vector
- CO –4: Student will understand about cloning of *Saccharomyces cerevisiae*
- CO –5: Student will have complete knowledge about various molecular techniques and their application

- CO –6: Student will have complete knowledge about DNA sequencing and fingerprinting
- CO –7: Student will have idea about Gene transfer technologies and analysis
- CO –8: To understand the knowledge about the Agriculture and Forensic science
- CO –9: Student will have knowledge about Intellectual property rights and Patents
- CO –10: To understand the importance and release of GMOs organisms and foods

Unit 1: Vector Biology **8**

Fundamental principles of cloning vectors – Plasmid biology: E.coli vectors- pBR322 and its derivatives- Phage- Filamentous phages – Cosmid – Phagemid – Gene markers.

Unit 2: Types of vector **12**

Eukaryotic vectors – Cloning in *Saccharomyces cerevisiae:* Types of vectors- Animal cell cloning vectors andPlant cloning vectors.

Unit 3: Molecular techniques **15**

Electrophoresis of DNA – blotting techniques - molecular probes – Hybridization techniques - Autoradiography – Restriction Fragment Length Polymorphism (RFLP) - DNA fingerprinting - . Polymerase chain reaction (PCR) - Random amplification of polymorphic DNA (RAPD) – DNA sequencing. Real time –PCR.

Unit 4: Gene transfer and its significance **12**

Gene transfer technologies - Gene Cloning and DNA analysis in Medicine, Agriculture and Forensic science.

Unit 5: IPR and its importance **13**

Intellectual Property Rights(IPR) and patents, Biosafety, containment facilities for Genetic Engineering experiments, Release of GMOs (Genetically Modified Organisms),labeling of GM (Genetically Modified) Foods.

Total : 60 hours

TEXT BOOKS:

1. Vadakar Praveen. Concepts, Theories and Practice of Human Rights, Raja Publications. 2000

2. Mishra Promod, Human Rights Global Issues, Kalpaz Publications. 2000
3. B.D. Singh, 2005, Molecular biology and Genetic Engineering, Kalyani publishers.2005
4. T.A.Brown, Gene cloning and DNA analysis, 6th edition, Wiley Blackwell science.2010.

REFERENCE BOOKS:

1. Watson, Molecular Biology of the gene, 5th edition Person education, Singapore. 2004
2. Kreuzer-Massey, Recombinant DNA and Biotechnology, ASM Press. 2001
3. Alcamo, I. Edward. DNA Technology, Academic Press.2001
4. Trayor, P.C., Frederick, R. and Koch M. Biosafety. Board of Trustees, Michigan State University, USA. 2002.
5. Paul, R.C. Situations of Human Rights in India, Efficient Offset printers.2000
6. Jecker Nancy.S *et al*. Bioethics: An Introduction to the History, Methods and practice,Jones and Bartlett.2010
7. J.M. Walker and R. Rapley, Molecular Biology and Biotechnology, 4th edition. 2006

15BBT010 IMMUNOTECHNOLOGY 6 0 0 4

Course Objective:

- To provide basic knowledge of immunology for biotechnologists and their application in modern medical field**.**

Course Outcome:

- CO-1: Students will learn about basic immune system
- CO-2: To know various types of antigen
- CO-3: Student will understand the isolation, purification and characterization techniques for the antogens.
- CO-4: To learn about isolation of various types of immune cells.
- CO-5: To get basic knowledge about antibodies
- CO-6: Student can able to explain the monoclonal antibodies.
- CO-7: To learn about hypersensitivity, cell characterization and HLA typing.
- CO-8: To know about cytokines and its types
- CO-9: To understand the vaccine and its types
- CO-10: To know about various immune techniques for infectious diseases

Unit 1: Types of Immunity **10**

Immunity: Humoral and Cell mediated immunity – Antigen, Hapten, Immunoglobulins – structure and types- Immune cells and organs.

Unit 2: Immune cells **12**

Purification of mononuclear cells from peripheral blood: Isolation and characterization of T cells subsets; B cells, dendrite cells and Macrophages; Macrophage cultures; Assay for Macrophage activation.

Unit 3:Antibodies **15**

Production of antibodies - Hybridoma and Monoclonal antibody production – Immunodiagnostic and Application of Monoclonal antibodies in biomedical research - Purification of antibodies - Quantization of immunoglobulin's.

Unit 4:Immune Response **13**

Hypersensitivity: Assessment of delayed type hypersensitivity reactions; Immunohistopathological studies and detection of immune complexes - HLA typing – Immunogenomics – Antibody diversity.

Unit 5: Cytokines and Vaccines **13**

Biology & Assay of cytokines; Vaccine technology including DNA vaccine: Immunotechnology and Infectious diseases.

Total: 60 hours

TEXT BOOKS:

1. Fahim Halim Khan, 2009. The elements of Immunology. Dorling Kindersley (India) Pvt. Ltd, Pearson Education India.
2. SeemiFarhatBasir, 2009. Textbook of Immunology. PHI Learning Private limited, New Delhi.

REFERENCE BOOKS:

1. Ramasamy, P. & R.E.B. Hanna, Immunity and Inflammation. University of Madras Publication Division, M/s. Pearl press, Chennai, India. 2002.

2. Parslow, T.G., Stities, D.P. and Terr, A.L. Medical Immunology, 10th edition. McGraw-Hill publishing. 2001
3. Goldsby, R.A., Kindt, T.J. and Osborne, B.A. Kuby Immunology. 4th edition. Freeman and company. 2000.
4. Zola, H. Monoclonal antibodies. Bios Scientific Publishers ltd. 2000.
5. Roitt, Immunology. Blackwell scientific Publications. 1996
6. Ivan Roitt, Essential Immunology, 10th Edn. Blackwell Scientific Publication.2002
7. Weir DM and Stewart, J., Immunology, 10th Edn. Churchill Livingston, New York.2000
8. BrudceAlberts, Dennis Bray, Julian Lewis, Martin Raff, Keith Roberts and James D Watson, Molecular Biology of the Cell (5th Edn).2000.
9. Ivan Roitt, Jonathan Brostoff, David Male, 2002, Immunology, 5th Edn., Mosby Publication.2002.
10. Kuby, J. 2002, Immunology. W.H. Freeman and Company, New York.2002.
11. Abul K. Abbas, Andrew K. Lichtman& Jordan S. Pober, 2001, Cellular and Molecular Immunology. 3rd Edn. W.B. Saunders Company. 2001

15BBT011 GENETIC ENGINEERING PRACTICALS 0 0 3 2

Course Objective:

- To provide the basic practical skills of genetic engineering techniques

Course Outcome:

- CO-1: Students will able to culture bacteria with antibiotic selection
- CO-2: Students will able to isolate genomic and plasmid DNA from the cells
- CO-3: Students will able to isolate RNA from the cells
- CO-4: Student can able to operate agarose gel electrophoresis
- CO-5: Student can able to Quantify nucleic acids
- CO-6: To learn about restriction enzymes and able to perform restriction digestion of DNA
- CO-7: To perform ligation of DNA fragments
- CO-8: Student can able to make competent cell preparation
- CO-9: Students can able to perform transformation in bacteria
- CO-10: To know about PCR concept and perform the techniques

List of Experiments:

1. 1. Preparation of Bacterial cell culture and antibiotic selection media
2. Isolation of genomic DNA
3. Isolation of plasmid DNA
4. Isolation of RNA
5. Agarose gel electrophoresis
6. Quantification of DNA
7. Quantification of RNA
8. Competent cell preparation
9. Transformation
10. Restriction digestion
11. Ligation
12. PCR – DEMO

Total: 45 hours

15BBT012 IMMUNOTECHNOLOGY PRACTICALS 0 0 3 2

Course Objective:

- To provide the basic practical skills of Immunology

Course Outcome:

- CO-1: Students will able to perform various immuno diffusion methods
- CO-2: Students will able to do various Immunoelectrophorosis techniques
- CO-3: Student can able to isolate immune cells from the blood
- CO-4: Student can able to perform ASO test
- CO-5: Student can able to perform RPR test
- CO-6: Student can able to perform Widal test
- CO-7: Student can able perform blood grouping
- CO-8:Student will get to know the Rh factor
- CO-9: To know about ELISA technique concept and perform the techniques
- CO-10: To understand the complement system

List of Experiments:

1. Double immuno diffusion
2. Single radial immuno diffusion
3. Immunoelectrophoresis
4. Countercurrent Immunoelectrophoresis
5. Rocket immuno electrophoresis
6. Isolation of mononuclear cells from peripheral blood
7. ASO test
8. RPR test
9. Widal test
10. Blood grouping and Rh typing
11. DOT ELISA- DEMO
12. Complement Fixation - DEMO

Total : 45 hours

15BBT013BIOFERMENTATION AND DOWNSTREAM PROCESSING

5 0 0 4

Course Objective:

- To make the students familiar with the theoretical aspects of Biofermentation and Downstream Processing for biotechnology industries.

Course Outcome:

- CO-1: Students will have knowledge on basics of fermentation principles
- CO-2: To learn upstream process in fermentation
- CO-3: Students can able to formulate fermentation media for fermentation
- CO-4: To know the various sterilization method in the industries
- CO-5: To know the procedure to operate fermenter for various fermentation processes.
- CO-6: To know about various type of Fermentor/reactor
- CO-7: Student can able to design reactor.
- CO-8: Students will learn about various downstream processing.
- CO-9: To know about various types of chromatography concepts and its types

- CO-10: To understand and importance of finished product state

Unit 1: Basics of Fermentation Technology **10**

Introduction to Fermentation technology, History of Fermentation, Basic principles in Fermentation process - Media formulation, Sterilization-Batch and continuous sterilization systems.

Unit 2: Fermentation Processes **15**

Introduction to Fermentation processes- microbial culture selection for fermentation processes; main parameters to be monitored and controlled in fermentation processes, aerobic and anaerobic fermentation processes and their applications in the Fermentation industry.

Unit 3: Bioreactors and Types **12**

Bioreactors: Design, function and their parts. Continuous and fed batch cultures, Different types of reactors- packed bed reactor, fluidized bed reactor, trickle bed reactor and bubble column reactor.

Unit 4: Downstream Processing I **13**

Introduction to Downstream processing principles-Recovery of particulate matter, product isolation, Precipitation, filtration, centrifugation, liquid -liquid extraction, aqueous two phase extraction, solvent extraction, membrane separation- Ultra filtration, reverse osmosis and dialysis.

Unit 5: Downstream Processing II **10**

Product purification- chromatography- adsorption, reverse phase, ion exchange, size exclusion, hydrophobic interaction and affinity chromatographic techniques. Crystallization, drying and lyophilisation.

Total hours : 60

TEXT BOOKS:

1. A.H.Patel. Industrial Microbiology. Macmillan India Limited. New Delhi.2005.
2. L.E.Casida, JR. Industrial Microbiology. New Age International Publisher. New Delhi. 2007.

REFERENCE BOOKS:

1. P.F.Stanbury, A.Whitaker and S.J.Hall..Principles of Fermentation Technology2nd edition.Elseveir Science Limited.2012

2. MichealJ.Waites.Neil. Morgan, John S.Rockey and Gary Higton..Industrial Microbiology.Blackwell Science Publisher.United Kingdom. 2001
3. Michael Shuler and Kargi. Bioprocess Engineering Basic concepts. 2nd edition.Pearson Prentice Hall of Private Limited, India. 2006
4. Prescott and Dunn. Industrial microbiology.4th edition. CBS Publishers and Distributors Private Limited, New Delhi.2004

15BBT014 MEDICAL CODING AND CLINICAL RESEARCH 5 0 0 4

Course Objective:

- The paper is designed to introduce and provide basics in medical coding and Clinical Research to students.

Course Outcome:

- CO-1: To know about Medical Coding system and uses
- CO-2: To understand the transcription and ICD principles.
- CO-3: To educate the student about how CPT codes used in medical coding
- CO-4: To understand the coding rule
- CO-5: To learn the importance of Pharmacovigilance study for clinical researchers.
- CO-6: Student learn about ethics in clinical research
- CO-7: To learn how to prepare and manage the medical reports
- CO-8: To learn about drug developmental process
- CO-9: To learn about toxicology studies in drug development
- CO-10: To study drug trials method

Unit 1: Coding Procedures **8**

Basics and Principles in to medical coding – Over view and responsibilities. Standardization of coding and coding over view. History of ICD and CPT. Introduction to ICD – 9 - CM versus ICD – 10 – CM. Coding accuracy.

Unit 2: Coding Rules **12**

Introduction to CPT – Medical coding, structure of CPT codes. Categories of CPT codes. Absence of codes and special cases. Coding rituals and modifiers.

Unit 3: Basics in Clinical Research 13

Introduction to clinical research, history of clinical research and an over view. Scope of clinical research. GCP and ICH. Different phases of clinical research. Ethics to be followed in clinical research trails.

Unit 4: Drug Development Process 15

Drug studies - Pre clinical toxicology: General principles, Systemic toxicology (Single dose and repeat dose toxicity studies), Types of clinical trials, single blinding, double blinding, Open access, Randomized trials and their examples, interventional study, Basics terminologies in Pharmacology. New drug development process.

Unit 5: Importance of Pharmacovigilance 12

Introduction, definition, aim and objective of Pharmacovigilance study. Method, Plans, procedures, scope of Pharmacovigilance study. Pharmacovigilance study in India.

Total : 60 hours

TEXT BOOKS:

1. Gupta.S.K, 2007, Basic Principles of Clinical Research and Methodology.

REFERENCE BOOKS:

1. Textbook of Therapeutics Drug and Disease management Eric T. Herfindel, Dick R. Gourley. 6th edition.
2. Assuring data quality and validity in clinical trials for regulatory decision making: Janet woodcock, Frederick Ognibene, john overbeke 2003.
3. Medical transcription guide: do's and don'ts- Marilyn takahashi Fortney Otis Diehl.

15BBT015 BIOFERMENTATION AND DOWNSTREAM PROCESSING PRACTICALS 0032

Course Objective:

- To provide the basic practical skills of fermentation
- Toimpart practical skills on downstream processing in bioindustry

Course Outcome:

- CO-1: Students will able to identify the parts in fermentor and run the system
- CO-2: Students will able to operate the fermentor
- CO-3: Students can able to perform biomass quantification
- CO-3: Student can able to make wine from fruits
- CO-4: Student can able to do citric acid production
- CO-5: To be well versed of making antibiotic production
- CO-7: To get skills of enzymes production
- CO-8: To learn the cell disruption to get cell content
- CO-9: To understand the various downstream process
- CO-10: Student will able purify the cell content

List of Experiments:

1. Demonstration of Parts and design of fermenter
2. Production of biomass and its estimation (Dry weight)
3. Production of wine from grapes
4. Determination of microbial growth curve
5. Microbial production of citric acid
6. Penicillin production
7. Production of bacterial amylase by batch fermentation.
8. Cell disruption techniques
9. Protein precipitation and its recovery
10. Purification cell extract by paper chromatography
11. Purification cell extract by column chromatography
12. HPLC purification -DEMO

Total : 45 hours

15 BBT016 Project Work 5 0 0 5

Course Objective:

- To understand the basic methods of research
- To familiarize with the research data analysis
- To provide presentation skills

Course Outcome:

- CO-1: Students will able to work in team
- CO-2: Students can able to perform research
- CO-3: Student can able to make research hypothesis
- CO-4: Students can be able to think novel ideas based on previous work
- CO-5: Student can able to collect data's and arrangement
- CO-6: To be well versed of data analysis using statistical software
- CO-7: To get skills of data presentation
- CO-8: To induce go for further studies
- CO-9: To be well versed with lab chemicals
- CO-10: To know about research need

Titles

1. Plate assay for industrially important enzyme production.
2. Biotech industry survey.
3. Mushroom cultivation.
4. Algae cultivation for biofuel.
5. Bio fertilizer preparation.
6. Wine production.
7. Secondary metabolite production.
8. Detection of a flatoxin in food samples.
9. In vitro germination of mycorrhizal spores.
10. BOD and COD analysis.
11. Influence of soil minerals on mycorrhizal association.
12. Cultivation of biodiesel plants.
13. Soil analysis.
14. Water analysis.
15. Identification of insect pest from crop plants.
16. Identification of predatory species of insects from crop plants.
17. Antibiotic sensitivity assay.
18. Probiotic consortium preparation.

19. Vermicompost.
20. Isolation of intracellular and extracellular enzymes from microbes.
21. Panchakavya preparation.
22. Isolation of coelomycetes and hyphomycetes.
23. Bioprospecting of endophytic fungi

BIOLOGY BRIDGE COURSE

Course objective:

- To facilitate Non Biology students at +2 level by understanding the basic concepts of biology
- To fill the gap to understand their interested subject

Course Outcome:

- CO-1: Students will able to understand the new subject of interest with ease
- CO-2: Students will know about basic biology
- CO-3: To learn about cell theory
- CO-4: To learn about cell contents
- CO-5: To understand the different types of biological system and cells
- CO-6: To understand the nucleic acid
- CO-7: To clearly explains the how microscope works
- CO-8: To study various types of microbes
- CO-9: To be well versed of biotechnology concept
- CO-10: To clearly explain the application of biotechnology

Unit 1:

Cell as the basic unit of life – cell theory, structure of prokaryotic and eukaryotic cell.

Unit 2:

Introduction to various group of plants, basic structure of plants and human body systems.

Unit 3:

Basic concepts of genetics Structure of DNA,RNA and Structure of a gene

Unit 4:

Light microscope, Electron microscope (TEM&SEM) and its use in biology.

Unit 5:

Introduction to biotechnology and its concepts.importance of biotechnology in today's society.

TEXT BOOKS:

1. N. Arumugam, Cell biology, Saras Publication. 2014
2. Dr. T. Devasena, Cell biology, Oxford University Press India; First edition 2012.
3. S. C. RastogiCell Biology, new age publishers, 2008.

Syllabus
Discipline Specific Elective Courses

15BBT101 CHEMISTRY 6 0 0 4

Course Objective:

- To educate the basics of atoms to chemistry of life.
- To know about chemical use in various industry and its character

Course Outcome:

- CO –1: To learn about chemistry and its classification
- CO –2: To learn about chemical used in industry
- CO –3: To understand the organic chemical and its types
- CO –4: To able to explain chemotherapy concept and it principle
- CO –5: Student know about amino acid and its character
- CO –6: To study about carbohydrate chemistry and its types
- CO –7: Student will have complete knowledge electrochemistry
- CO –8: Student will have idea about chemical analysis using chromatography
- CO –9: To understand the knowledge about the spectrophotometer
- CO –10: To learn about catalyst and its work principle

UNIT 1: Industrial Chemistry **15**

Fuels: Fuel gases; Natural gas; water gas - producer gas, Semi-water gas and carbureted gas (composition and uses only) [Manufacturing details not required]

Fertilizers : Preparation and uses of urea, ammonium sulphate, ammonium nitrate, potassium nitrate, super phosphate of lime, triple super phosphate, NPK Fertilizers, and micronutrients

Catalysis: Definition and examples of Acid – base catalysis and enzyme catalysis

Unit 2: Organic compounds **8**

Classification of Organic compounds: Functional Groups. Concept IUPAC: System of nomenclature, IUPAC rules for naming alkanes, alkenes, alkynes, alcohols, and aldehydes

Heterocyclic compounds: Synthesis and Chemical properties of furan, thiophenes and pyrrole.

Chemotherapy: Definition and one example each for analgesics, anti-pyretics, local anesthetics, and general anesthetics.

Unit 3: Amino acids and Carbohydrates **13**

Amino acids: Classification: general methods of preparation and properties of proteins.

Carbohydrates: Classification, properties and uses of glucose and sucrose.

Unit 4:Electrochemistry **12**

Conductors and non-conductors, strong and weak electrolytes common-ion effect, pH, buffer solution.Galvanic cells: emf and its origin, standard electrode potentials, reference electrodes (NHE and calomel), Electrochemical series and its applications

Unit 5: Properties and Physics of biological molecule **12**

Spectroscopy: Principle and Applications of UV visible spectroscopy, and infra- red spectroscopy. Chromatography: Principle, techniques and applications of column, Paper and thin layer Chromatography.

Total : 60 hours

TEXT BOOKS:

1. Dr.K.Sivakumar, Applied Chemistry.2009.
2. Mr. Bagavathi Sundaram, Applied Chemistry.2006.

REFERENCE BOOKS:

1. Lee, J.D. Inorganic chemistry. Blackwell science.2001.
2. Negi, A.S and Anand. A textbook of physical chemistry. Taj Press. 2001
3. Sony P.L. A textbook Inorganic chemistry, Sultan Chand & sons. 2000

4. Mathews, P. Advanced chemistry. Cambridge university press. Low price edition. 1996
5. Voet D. and Voet J.G. Biochemistry, 2nd edition. John wiley and sons, Inc.1995.
6. Lehninger A.L. Nelson D.L. and Cox, M.M. Principles of Biochemistry 2nd edition. CBS publishers & distributors, Delhi.1993.
7. Amend, J.R. Mundy B.P and Armld M.T. General, Organic & Biological chemistry. Saunders college publishing.1990.
8. Greenwood, N.N and Earnshaw, A. Chemistry of the elements. Maxwell Macmillan int. Ed.1989
9. Cotton F.A and Wilkinson G. Inorganic chemistry. John wiley and sons, Inc., 1989.
10. Finar, I.L. Organic chemistry Volume 1 & 2, ELBS. 1986.

15BBT102 CHEMISTRY PRACTICALS 0 03 2

Course Objective:

- To provide the basic practical skills of chemical analysis techniques

Course Outcome:

- CO-1: Students will able to perform volumetric analysis
- CO-2: To able perform titration and its calculation
- CO-3: Student can able to do acidimetric and alkalimetry test
- CO-4: To able to do permangametry – dichorometry – iodimetry – complexemetry
- CO-5: Student can able to perform organic compound analayais
- CO-6: To get skills to identify the functional group
- CO-7: Student can able perform alcohol analysis
- CO-8:Student will get to know the nitro compound analysis
- CO-9: To know about aromatic amines and its analytics
- CO-10: Student will have the skill to analyze aromatic ester compounds

List of Experiments:

1. Volumetric analysis:
2. Acidimetric –
3. alkalimetry –
4. permangametry –
5. dichorometry –
6. iodimetry –

7. complexemetry –
8. Analysis of organic compounds with one functional group: aldehyde, ketone, carboxylic acid
9. Analysis of organic compounds with one functional group aromatic primary and secondary amine,
10. Analysis of organic compounds with one functional group phenol, aromatic ester,
11. Analysis of organic compounds with one functional group alcohol,
12. Analysis of organic compounds with one functional group nitro compound, carbohydrate

Total: 45 hours

15BBT103 BIOCHEMISTRY AND BIO INSTRUMENTATION 5 0 0 4

Course Objective:

- To provide the basic knowledge about biochemistry to understand the biochemical reactions and principles and importance of various instruments

Course Outcome:

- CO-1: Student will get the basic knowledge and importance about biochemistry
- CO-2: To know about the various biomolecules
- CO-3: Students will understand the biochemical reaction in cells
- CO-4: To learn biosynthesis of molecules
- CO-5: to study about oxidation of biomolecules
- CO-6: To learn basic instruments in biological industries such as microscope and its types
- CO-7: To understand the chromatography techniques to separate products and purification
- CO-8: Student get the basic knowledge about the spectrophotometer
- CO-9: To clearly explains the advanced bioinstrumentation (NMR, FTIR)
- CO-10 To know about XRD and its application in biology

Unit 1: Basics of Life **8**

Introduction to Biochemistry. Importance of Biomolecules. Classification of Carbohydrates, Amino acids and lipids.

Unit 2: Biochemical Metabolism **15**

Carbohydrate metabolism -Glycolysis, Glycogenesis, Glycogenolysis, Citric acid cycle & HMP shunt. Lipid metabolism- Biosynthesis of Saturated &Unsaturated fattyacids. Beta & omega oxidation of fatty acids and cholesterol Biosynthesis. Amino acids- Essential &Non essential amino acids, structure and properties.

Unit 3: Microscopy and its importance **13**

Introduction to Microscopy, History of Microscopy. Principle and applications of Simple, Compound, Phase Contrast, Bright Field, Fluorescent Microscopy, Confocal Microscopy, SEM and TEM.

Unit 4: Separation Techniques **12**

Principles and applications of Centrifuge, Chromatography and Elctrophoresis. Various types of Centrifuges, chromatography and electrophoresis. Immunoelectrophoresis and its applications.

Unit 5: Analytical Techniques **12**

Principles and applications of different types of spectroscopy. Importance of XRD, FTIR and NMR studies for biological molecules.

Total : 60 hours

TEXT BOOKS:

1. U. Sathyanarayana, Biochemistry.2012.

REFERENCE BOOKS:

1. U. Sathyanarayana, Chakrapani; Edition 2; Biochemistry- Books and allied (P) Ltd.,2012
2. David L. Nelson, Michael M. Cox,Lehninger Principles of Biochemistry, Publisher: W H Freeman & Co (Sd); 6 Har/Psc edition. 2012
3. Hiram F. Gilbert, Basic Concepts in Biochemistry: A Students Survival Guide 2nd Edition by World Scientific Publishing Co. Pte. Ltd. 2007.
4. M.H Fulekar and Bhavana Pandey,Bioinstrumentation, Publisher: I K International Publishing House, ISBN-13: 978-9382332398. 2013.

15BBT104 BIOCHEMISTRY AND BIO INSTRUMENTATION 0 0 3 2

Course Objective:

- To provide the basic practical skills of biochemical analysis
- To provide skill to operate bio instruments

Course Outcome:

- CO-1: Students will able to perform carbohydrate estimation
- CO-2: To able estimate amino acids in any samples
- CO-3: To clearly explain about colorimetry work principle
- CO-4: To able to do protein estimation
- CO-5: To get skill to quantify glucose
- CO-6: To understand the titration principle on biochemical analysis
- CO-7: Student can able quantify ascorbic acid in any samples
- CO-8:Student will get to know the chromatography principle
- CO-9: To analyse the amino acid separation using thin layer chromatography
- CO-10: Student will have the skill to analyze data and presentation in biochemistry

List of Experiments:

1. Qualitative estimation of Carbohydrates.
2. Qualitative estimation of amino acids.
   Calorimetry
3. Estimation of protein by Lowry's methods.
4. Estimation of glucose by OD method.
   Titration
5. Estimation of amino acid by Sorenson formal Titration
6. Estimation of ascorbic acid by Dye method.
   Chromatography:
7. Separation of amino acid by Thin Layer Chromatography.

Total: 60 hours

15BBT105 MICROBIOLOGY 6 0 0 4

Course Objective:

- To provide the knowledge about various microbes and their structure, function
- The uses of microbes in various industries.

Course Outcome:

- CO – 1: Student will learn about the History and scope of microbiology and its classification and taxonomy
- CO – 2: Student will learn about the identify microorganism by Morphology, biochemical and molecular techniques.
- CO – 3: Student will learn about various types of microorganisms like Viruses, Protozoa, Bacteria, Fungi and Algae.
- CO – 4: To understand the structure and function of cellular components of each microorganism
- CO – 5: To understand the Microbial ecosystems and biogeochemical cycles
- CO – 6: Student will learn about various food borne pathogens and find the method to preserve the food
- CO – 7: Student will learn about microbial pathogens which causes disease
- CO – 8: Student will study the various control and prevention measure to kill microbial pathogens
- CO – 9: Student will learn about beneficial microorganism used in various industries
- CO –10: To understand and benefit of beneficial microbes in Diary, beverages, biofertilizers, Biopesticide etc.

Unit 1: History **9**

Introduction to Microbiology - History and scope of Microbiology - Classification of microbes – Numerical taxonomy – Molecular taxonomy – Methods of Microbial identification.

Unit 2: Various microbes **9**

Structure and function of the Cellular Components – Viruses, Protozoa, Bacteria, Fungi and Algae.

Unit 3: Microbes in environment **15**

Environmental Microbiology - Introduction to microbial ecosystems and biogeochemical cycles (global geochemical cycling of elements). Food Microbiology - Food borne infections and intoxications; bacterial with examples of infective and toxic types – *Clostridium, Salmonella, Staphylococcus*. Food preservation methods

Unit 4: Microbial diseases **12**

Medical microbiology – Pathogenic microbes – Bacterial, Viral, Fungal and Protozoan Diseases. Cure, control and prevention – Pharmaceuticals (antibiotics, vaccines, etc.)

Unit 5:Industrial uses of microbe **15**

Industrial uses of microbes —Dairy and non Dairy products- fermented foods, production of food (Single cell protein) and alcoholic beverages –, Fuel (ethanol). Methanogenesis - methane production. Biofertilizers (BGA), Biopesticide (*Bacillus thuringiensis*), Biopolymers, Biosurfactants.

Total : 60 hours

TEXT BOOKS:

1. Ananthanarayan, R and Paniker, C.K.J. A textbook of microbiology. 7th edition. Orient Longman Ltd. 2005.
2. Parija S.C, Textbook of Microbiology & Immunology, Elsevier, India.2009

REFERENCE BOOKS:

1. Pelczar M.J, Chan ECS, King NR, McGraw – Hill, Jnc.NY. Microbiology- Concepts and Applications. Tata Mac. Graw Hill.2001
2. Ananthanarayan, R and Paniker, C.K.J. A textbook of microbiology. 7th edition. Orient Longman Ltd. 2005
3. Pelzar. Microbiology, 5th edition. Tata Mac Graw Hill.2000

4. Ingraham, J.L. and C.A. Ingraham, Introduction to microbiology, 2nd edition. Brooks/Cole, Thomson Learning, USA.2000.
5. Kathleen Park Talaro and Talaro, A. Foundation in microbiology, 3rd edition. Mac Graw – Hill.1999.
6. Cappucino, J.G and Sharman, N. Microbiology: A laboratory manual, 4th edition. Additional Wesley Longbman, Incorporation.1999.
7. Prescott LM, Harley JP, Klein's DA.Microbiology, 6th edition, McGraw-Hill Higher Education.2005.
8. Shimled L.A. and A.T. Rodgers, Essential of diagnostic microbiology. Delmar Cengage Learning publishers.1999.
9. Prescott,s, Linda Sherwood, Joanne Willey, Chris Woolverton, Micro Biology 9 th edition Publisher:The McGraw-Hill Company.2013

15BBT106 MICROBIOLOGY PRACTICALS 0 03 2

Course Objective:

- To provide the practical knowledge about various microbiology techniques

Course Outcome:

- CO – 1: To understand the importance and principle of sterilization
- CO – 2: Student will learn about isolation of microorganisms
- CO – 3: To understand the Population of microbial cultures
- CO – 4: To observe the structure of microbes
- CO – 5: To understand the motility of Bacteria
- CO – 6: To identify the Gram positive and Gram negative Bacteria
- CO – 7: To understand the spore structure of bacteria
- CO – 8: To differentiate the capsule formed in bacteria
- CO – 9: Student will learn about the of Biochemical identification
- CO – 10: To know the culture characteristic of bacteria

List of Experiments:

1. Sterilization techniques
2. Pour plate and Spread plate
3. Dilution techniques

4. Wet Mount preparation: Hay infusion, hanging drop.
5. Simple staining
6. Gram's staining
7. Capsule staining
8. Spore staining
9. Catalase test
10. Oxidase test
11. Urease test
12. IMVIC test

Total : 45 hours

15BBT107 BIOPHYSICS, BIOSTATISTICS & COMPUTATIONAL BIOLOGY 5 0 0 4

Course Objective:

- It provides detail knowledge about basic principles in biophysics, data collection and analysis,
- To know the importance of computational biology for biologists.

Course Outcome:

- CO –1: Student will understand about biostatistics
- CO –2: To understand about collection and calculation measures of central tendency
- Student will understand various statistical methods
- CO –3: To understand about Baye's theorem, errors and tests
- CO –4: Understand the methods of Biophysis and structure of protein and stability
- CO –5: Student will understand the various bonding and structure properties of water
- CO –6: Students will knowledge about the classification and conformation of proteins
- CO –7: Student will understand various types of protein structures and Ramachandran plot
- CO –8: To understand about the fundamentals of bioinformatics

- CO –9: To understand the biological Database
- CO –10: To Know the sequence Alignment tool.

Unit 1: Basics of Biostatistics **8**

Introduction to biostatistics - Collection, Classification, Tabulation, Diagrammatic representation. Measures of Central Tendency.

Unit 2: Different statistical methods **12**

Measures of Dispersion, Correlation, Regression Lines. Probability, Conditional Probability, Baye'stheorem,sampling theory and errors. Tests of significance. T, Chi square and F-test.

Unit 3: Biophysics of molecules **15**

Scope and methods of Biophysics. Various bonding: structure and properties of water. Understanding various structure of proteins, globular and fibrous protein; protein stability; protein folding. The physics of nucleic acids: Forces stabilizing structures; Double helical structures; properties; helix – coil; transitions.

Unit 4: Conformation of structures **12**

Biophysics: Introduction to biophysics, classification and conformation of proteins primary, secondary, tertiary and quaternary structure, Ramachandran plot.

Unit 5: Fundamentals of bioinformatics **13**

Definition, nucleic acid and protein sequence database, sequence analysis, sequence alignment hidden mark, types of alignment, BLAST, FASTA, inter pro-log models.

Total : 60 hours

TEXT BOOKS:

1. Thiravia Raj, Biophysics. 2004.
2. Sai Subramanian, Biostatistics. 2005.
3. Thiagarajan. B, Computational Biology. 2009

REFERENCE BOOKS:

1. P. Narayanan, Essentials of Biophysics ISBN-13**:** 978-8122420807 , 2008

2. William Bialek. Biophysics: Searching for Principles: ISBN-13: 978-0691138916: ISBN-10: 0691138915, Princeton University Press. 2012
3. PhilipNelson, Biological Physics: with New Art by David GoodsellISBN-13: 978-0716798972 ISBN-10: 0716798972, 2013
4. Gupta S.P., Sultan Chand & Sons, Statistical Methods: ISBN 978-93-5161-028-1, 2014
5. Zhumur Ghosh, BibekanandMallick. Bioinformatics: Principles & Applications Oxford University Press. 2008

15BBT108 COMPUTATIONAL BIOLOGY 0 03 2

Course Objective:

- It provides detail practical knowledge about computational biology

Course Outcome:

- CO –1: To understand the bibliographic database
- CO –2: To analysis the Nucleotide Sequences
- CO –3: To analysis the protein Sequences
- CO –4: To understand the similarity between the sequences using FASTA
- CO –5: To understand the similarity between the sequences using BLAST
- CO –6: Multiple sequence alignment using EMBOSS SUITE
- CO –7: Multiple sequence alignment using CLUSTAL
- CO –8: Multiple sequence alignment using OMEGA
- CO –9: Sequence analysis by Pylogenetic method
- CO –10: To understand the protein Database

List of Experiments:

1. Accessing bibliographic database.
2. Retrieving nucleotide/ORF/Sequence information from NCB/Database
3. Retrieving protein Sequence information from NCB/Database
4. Similarity search using FASTA Tool from NCBI.
5. Similarity search using EMBL BLAST Tool from NCBI
6. Pair wise and multiple sequence alignment using EMBOSS SUITE

7. Pair wise and multiple sequence alignment using CLUSTAL
8. Pair wise and multiple sequence alignment using OMEGA
9. Phylogenetic Analysis- Tree view
10. PDB- retrieving

Total : 45 hours

15BBT109 MICROBIAL AND ENVIRONMENTAL BIOTECHNOLOGY

6 0 0 4

Course Objective:

- To provide the basic knowledge of industrial products from microorganisms and use of microorganisms in cleaning of environment**.**

Course Outcome:

- CO-1: Students will have the knowledge on basics of microbial biotechnology
- CO-2: To be well versed with fermentation principles
- CO-3: To be well versed with various microbial products.
- CO-4: To gain knowledge of production methods of enzymes, organic solvents, yeast and milk products.
- CO-5: Provides knowledge about basic terminologies used in environmental biotechnology.
- CO-6: To clearly know about biopesticides and biofertilizers
- CO-7: students will get the knowledge about bioremediation
- CO-8: To understand the concept of microbe to clean up the polluted environment, mining, etc.
- CO-9: Students will be familiar with Denitrification process
- CO-10: To clearly explain the concept of Methanogenesis

Unit 1: Introduction to Microbial Biotechnology **10**

History and scope of microbial biotechnology, microbial diversity and its use, cultivation and preservation of microorganisms in small scale. Microbial polysaccharides, immobilized cells.

Unit 2: Microbial Products **12**

Production of microbial enzymes and applications, production of organic solvents, single cell proteins, production of beverages, Production of baker's yeast, milk products. Microbes in mining. Production of biofertilizers, biopesticides and their application. Bioenergy and biomass.

Unit 3: Basics of Environmental Biotechnology **13**

Concept and scope of environmental biotechnology. Bioconversion, bioaccumulation, biomagnifications. Bioremediation, biofeasibility, application of bioremediation, bioreduction, phytoremediation.

Unit 4: Microbial Functions **15**

Bioabsorption and bioleaching of heavy metals: Metal – microbial interactions, commercial biosorbents, bioleaching. Advantages and disadvantages of bioleaching. Solid waste pollution and its managements, biomedical waste management, biodegradation of pollutants by microorganisms.

Unit 5: Denitrification and Methanogenesis **10**

Denitrification: physiology of denitrifying bacteria – tertiary denitrification – one sludge denitrification – drinking water treatment, anaerobic treatment by methanogenesis, uses for methanogenic treatment.

Total : 60 hours

TEXT BOOKS:

1. Bimal C. Bhattachayya, RintuBanerje,. Environmental Biotechnology, Oxford University Press. 2010.
2. Padma Singh. Recent Trends in Microbial Biotechnology. CBS Publishers and Distributors.2013

REFERENCE BOOKS:

1. El-man, E.M.T and Bryce, C.F.A. Fermentation microbiology and Biotechnology. Taylor and Francis group. 2002
2. Prave, P. Faust, V. Sitting W and sukatesh O, A. (Ed). Fundamentals of Biotechnology. WCH Weinhein.1987
3. Patel.A.H, Industrial Microbiology, MacMillan India, Ltd. 1996

4. Wulfcrueger and AnnelieseCrueher, A Text Book of industrial Microbiology, Paima Publishing Corporation, New Delhi.2000.
5. Ram Kumar, EnvironmentalBiodegradation, Sarup/sons.2000.
6. Bruce E. Rittmann, Perry L. MCcarty, Environmental Biotechnology – Principle and Application, Tata McGraw Hill Education Pvt.Ltd. 2012.
7. Alexander N. Glazer and Hiroshi Nikaido, Microbial Biotechnology. Fundamentals of Applied Microbiology. Cambridge Publications.2007.

15BBT110 MUSHROOM CULTIVATION AND ITS MARKETING 5 0 0 4

Course Objective:

- To learn the cultivation of various mushrooms
- To create the student for self employment

Course Outcome:

- CO –1: Student will understand what is mushroom and where the mushroom is present
- CO –2: To understand mushroom lifecycle and how to identify different types of mushrooms
- CO –3: Student will learn how to cultivate mushroom and its basic elements of preparation
- CO –4: Student will learn about the cultivation methods of (*Agaricus morcella*, *Volvariella* and *Pleurotus*)
- CO –5: To understand the about waste substrate and cultivation of mushrooms
- CO –6: Student will understand the nutritive and medicinal values of mushrooms
- CO –7: student will understand the production of mushroom enzymes and metabolites
- CO –8: To understand to make value added products from mushroom.
- CO –9: Student will learn about the post harvest technology of mushroom
- CO –10: To know the marketing strategies of mushroom in local and export market

Unit 1: Mushroom Biology **8**

Introduction to Mushroom - History of Mushroom - Ecology of Mushroom -Life cycle of Mushroom. Identification of Mushrooms - Phylogeny of Mushrooms.

Unit 2:Cultivation Methods **15**

General preparation for Mushroom Cultivation. - Basic elements for Mushroom growth and farm settings - Basic elements for Mushroom growth and farm settings - Cultivation methods (*Agaricusmorcella*, *Volvariella* and *Pleurotus*)

Unit 3: Value of Mushroom **13**

Production of Mushrooms from waste substrates. Rice bran, Ground nut, Sugar cane trash. Mushrooms in food and medicine. Nutritional and medicinal value of mushrooms.

Unit 4: Compounds from Mushroom **12**

Production of Mushrooms enzymes and metabolites and Preparation of other value added products from Mushroom. Diseases and Pest control.

Unit 5:Mushroom Marketing **12**

Postharvest technology, marketing strategies of mushroom with special reference to export and local marketing.

Total: 60 hrs

TEXT BOOKS:

1. Suman, B.C and V. P. Sharma. Mushroom Cultivation in India, Daya Publishing House. 2007
2. Subrata Biswas, M. Datta, S.V. Ngachan. Mushrooms: A Manual for Cultivation. PHI Learning Private limited, New Delhi. 2012

REFERENCE BOOKS:

1. Suman, B.C and V. P. Sharma. Mushroom Cultivation in India, Daya Publishing House. 2007
2. Ram R.C.Mushrooms and Their Cultivation Techniques, Pointer Publishers- Jaipur.2007.
3. Yaniv. Handbook of Medicinal Plants, Cbs Publisher.2007.
4. ZoharaYaniv. Handbook of Medicinal Plants, Crc Press. 2005.
5. Benson, Plant Conservation Biotechnology, Taylor and Francis.2002.
6. Nicholas L.G and Kerry Ogame, Psilocybin Mushroom Hand Book.2006.

7. TraddCottler,Organic Mushroom Farming and Mycoremediation. Chelsea Green Publishing. USA.2014
8. GajendraJagtap, UtpalDey,Mushroom Cultivation. LAP Lambert Academic Publishing. 2012
9. D.P. Tripathi,Mushroom Cultivation. Oxford and IBH Publishing Company Pvt. Limited.2005.
10. Subrata Biswas, M. Datta, S.V. Ngachan. Mushrooms: A Manual for Cultivation. PHI Learning Private limited, New Delhi.2012.

15BBT111 PHARMACEUTICAL BIOTECHNOLOGY 5 0 0 4

Course Objective:

- To provide knowledge on principles of drug development, design and its importance in Pharmaceutical industry.

Course Outcome:

- CO – 1: To know about Principle of pharmacology
- CO-2: To get basic knowledge about Drugs, its names and classification
- CO – 3: To clearly know about different therapeutic types
- CO-4: Study about genetic engineering in Pharmaceuticals
- CO-5: To clearly explain about rDNA technolohy pharmaceuticaloducts
- CO-6: To be well versed in actions of different drug compounds
- CO-7: To clearly explain about the bioactivity of various careers
- CO-8: To clearly understand the concept of chemotherapy
- CO-9: To know about biomaterials used in pharmacy
- CO-10: To be well versed with the protein engineering concept

Unit 1: Basics of Pharmacology **10**

History and Principle of pharmacology. Drug names and Classification systems. General Principles of Drug action Pharmaco kinetics, Pharmaco dynamics.

Unit 2:Drug Treatment **12**

Chemo therapeutic drugs- Protein synthesis inhibitors, Anti mycobacterial, anti-fungal, anti-protozoal, antiviral, anticancer, anti-inflammatory drugs.

Unit 3: r-DNA Technology **15**

Techniques of r-DNA technology for production of Bio active compounds - Human Insulin, Human Growth Hormone

Unit 4: Drug Compounds **13**

Production of Ergot alkaloids, Probiotics, Production of recombinant vaccines. Anticancer agents and anti-inflammatory agents in chemotherapy.

Unit 5:Bioactivity **10**

Biochips, Biofilms, Biosurfactants, Biorepellents and Protein Engineering.

Total hours : 60

TEXT BOOKS:

1. Sivakumar.S M, Pharmaceutical Biotechnology. 2003
2. Sambamurthy.K, Pharmaceutical Biotechnology. 2006

REFERENCE BOOKS:

1. Pharmaceutical Biotechnology (PB) Vyas S.P. / Dixit V. ISBN : 9788123906140, 2011
2. Walsh, Biopharmaceuticals: Biochemistry and Biotechnology, 2e (PB) ISBN : 9788126530014, 2011
3. S.S. Agrawal and M. Paridhavi, Herbal Drug Technology, University press 2007.
4. O. Kayser, R.H. Muller. Pharmaceutical Biotechnology - Drug Discovery andclinical applications. Wiley - VCH. 2004

Syllabus

Ability Enhancement Compulsory Courses

15EVS201 ENVIRONMENTAL STUDIES 2 0 0 2

Course Objective:

- To inculcate the importance of environmental pollution
- Preservation of nature and environmental management for human welfare

Course Outcome:

- CO –1: Student will understand the scope and importance of environmental studies
- CO –2: Student will have the knowledge of environment public awareness
- CO –3: To understand about the renewable and non-renewable energy sources
- CO –4: Student will know Conservation of natural resources.
- CO –5: Student will learn about environmental pollution and cause, effects and control
- CO –6: To understand the knowledge of solid waste management and disaster management
- CO –7: To understand about the social issues and environmental unsustainable and sustainable development
- CO –8: Student will know about the urban problems, energy and rain water management
- CO –9: Student will understand about environment protection act and wildlife and forest conservation act
- CO –10: To understand the knowledge of Global warming, nuclear accidents and waste land reclamation

Unit 1: Environmental Awareness **8**

Definition, scope and importance of environmental studies. Public awareness regarding environment.

Unit 2: Energy resources **12**

Renewable and non-renewable energy sources. Forest resources, water resources, mineral resources, food resources, energy and land resources. Conservation of natural resources.

Unit 3: Pollution and Control **15**

Environmental pollution-Definition, causes, effects and control measures of air, water, soil, marine, noise and nuclear pollution. Solid waste management and disaster management.

Unit 4: Environmental Management **13**

Social issues and the environment-unsustainable and sustainable development. Urban problems related to energy. Water conservation, rain water, and harvesting and watershed management.

Unit 5: Environmental Protection **12**

Climate change-Global warming, acid rains, ozone layer depletion, nuclear accidents, waste land reclamation and maintenance. Environment protection act, wildlife, forest conservation act.

Total : 60 hours

TEXT BOOKS:

1. Bharucha, E. Text Book of environmental Studies for undergraduates, University Press (India) Pvt. Ltd. 2005

2. RajanMisra, A Text Book on environmental Studies. University Science Press. New Delhi. 2009

REFERENCE BOOKS:

1. Subramaniam.V.. Text Book in environmental Science, Narosa.2002
2. Balu.V, Environmental Studies, Srivenkateshwara.2004
3. Moo Young. M. et al. Environmental biotechnology, Principles and application, Springer. 1996
4. Bharucha, E. Text Book of environmental Studies for undergraduates, University Press (India) Pvt. Ltd. 2005.
5. Sinha andSaradha , Text Book of Environmental Studies, AITBS Publication. 2005
6. Vijaya Ramesh K. Environmental Microbiology. MJP Publication.2004
7. Demain, A.L. Manual of Industrial Microbiology, ASM. 2004
8. RajanMisra, A Text Book on environmental Studies. University Science Press. New Delhi. 2009

9. Mohapatra P.K. Text Book of Environmental biotechnology. I.K. International Publishing House Pvt.Ltd. 2006

15LEN001 FOUNDATION COURSE ENGLISH 6 0 0 4

Course Objective:

- To enable the students to develop their communication skills effectively. To make students familiar with the English Language.To enrich vocabulary in English, To develop communicative competent

UNIT 1: DETAILED POEMS I

1. On His Blindness - John Milton
2. The Village Schoolmaster - Oliver Goldsmith
3. The Daffodils - William Wordsworth

UNIT 2: DETAILED POEMS II

4. Night and Death - Joseph Blanco White
5. The Ballad of Father Gilligan - W.B.Yeats

UNIT 3: PROSE

1. Martin Luther King Jr. - Coretta s King
2. Albert Shweitzer - Norman Wymar
3. Stanley Finds Livingstone - Lawrence Wilson
4. Srinivasa Ramanujan - C.P. Snow
5. My Days - R.K. Narayan

UNIT 4: GRAMMAR

1. Articles
2. Prepositions
3. Tenses
4. Wh - Questions
5. Synonyms and Antonyms
6. One Word Substitution

UNIT 5:COMPOSITION

7. Reading Comprehension
8. Filling up Forms
9. Railway Reservation/ Cancellation Forms
10. Bank-Chalan
11. Convocation Form
12. Money Order Form

TEXT BOOK:

Mahadevan, Usha. *Empower with English*, *Sun Beams - 1*. Emerald Pub: Chennai. 2012. Print.

15LEN002 ELIZABETHAN AGE 6 0 0 4

Course Objective:

- To enable the students to develop their communication skills effectively. To make students familiar with the English Language.To enrich vocabulary in English, To develop communicative competent

UNIT 1: PROSE-I

1. On Saying 'Please' - A.G. Gardiner
2. Women, Not the Weaker Sex - M.K. Gandhi
3. The Sky is the Limit - Kalpana Chawla

UNIT 2: PROSE-II

4. Polluting the World - Edgar I. Baker
5. Dimensions of Creativity - Dr. A. P. J. Abdul Kalam
6. The Message of Visva - Bharati

UNIT 3: SHORT STORIES

1. Open Window - H. H. Munro (Saki)
2. The Lion's Share - Arnold Bennett
3. The Sparrows - K.A. Abbas
4. The Cop and The Anthem - O- Henry
5. The Necklace - Guyde Maupassant

UNIT 4: FUNDAMENTAL GRAMMAR SKILLS

1. Question Tags
2. Concord
3. Reported Speech
4. Idiom and Phrases

UNIT 5: ADVANCED GRAMMAR SKILLS

5. Conditional Clauses
6. Cause and Effect
7. Simple, Complex, Compound
8. Framming Questions

TEXT BOOK:

Rao, Shoba B. *Empower with English*, *Sun Beams - II*. Emerald Pub:Chennai. 2012. Print.

15LEN003 ENGLISH COMMUNICATION - I 5 0 0 4

Course Objective:

- To train the students in the use of the english language in varied literary and non literary context, To teach them soft skills and strength their foundation in grammar and composition, To elevate their comprehension skills

UNIT 1: PROSE I

1. Spoon Feeding - W. R. Inge
2. Reading for Pleasure - L. A. G. Strong
3. The Challenge of our Time - E. M. Forster

UNIT 2: PROSE II

1. Human Values in Education - V. K. Gokak
2. Human Rights - Sivagami Paramasivam

UNIT 3: SHORT STORIES

1. Comrades - Nanine Gordimer
2. Games at Twilight - Anita Desai
3. The Gateman's Gift - R.K. Narayan

UNIT 4: PRIMARY COMPOSITION EXERCISES

1. Letter Writing
2. Comprehension

UNIT 5: ADVANCEDCOMPOSITION EXERCISES

1. Precis-Writing
2. Resume Writing
3. Report Writing

TEXT BOOKS:

1. Subramanian, S. Dr. *Words of Wisdom*. An Anthology of Modern Prose. Anu Chitra Pub., Chennai. 2003. P.
2. Subramanian, A, E. *Gifts to Posterity.* An Anthology of Modern Short Stories. Anu Chitra Pub., Chennai. 2003. P

15LEN003 ENGLISH COMMUNICATION – II 5 0 0 4

Course Objective:

- To train the students in the use of the english language in varied literary and non literary context, To teach them soft skills and strength their foundation in grammar and composition,To elevate their comprehension skills

UNIT 1: PROSE I

1. The Complete Man - Prince Philip
2. Try Prayer Power - Norman Vincent Peale
3. On Not Answering The Telephone - W. Plomer

UNIT 2: PROSE II

1. Science, humanities and religion - S. Radhakrishnan
2. The Reason - E. V. Lucas

UNIT 3: SHORT STORIES

1. The Ant and the Grasshopper - W. Somerset Maugham
2. How much land does a man need - Leo Tolstoy
3. The Dying Detective - Sir Arthur Conan Doyle

UNIT 4: PRIMARY COMPOSITION EXERCISES

1. Business Letters
2. Hints Development

UNIT 5: ADVANCEDCOMPOSITION EXERCISES

1. Paraphrasing
2. Writing Abstract
3. Dialogue Writing

TEXT BOOKS:

1. Subramanian, S. Dr. *Words of Wisdom*. An Anthology of Modern Prose. Anu Chitra Pub., Chennai. 2003. P.
2. Subramanian, A, E. *Gifts to Posterity.* An Anthology of Modern Short Stories. Anu Chitra Pub., Chennai. 2003. P

LFR001 FRENCH I 5 0 0 4

Course Objective:

- To introduce French Language. To enable the students to understand and to acquire the basic knowledge of French, Language with the elementary grammar.

UNIT 1 : INTRODUCTION 12

Introduction - Alphabet – Comment prononcer, écrire et lire les mots- Base : Les prénoms personnel de 1er, 2ème et 3ème personnes – Conjugaisons les verbes être et avoir en forme affirmative, négative et interrogative

UNIT 2 : Leçons 1- 3 12

Leçons 1.Premiers mots en français,- 2. Les hommes sont difficiles,- 3 Vive la liberté- Réponses aux questions tirés de la leçon - Grammaire : Les adjectives masculines ou féminines – Les articles définis et indéfinis - Singuliers et pluriels

UNIT 3 :Leçons 4- 6 12

Leçons 4. L'heure, C'est l heure,- 5. Elle va revoir sa Normandie,- 6 .Mettez –vous d'accord groupe de nom - Réponses aux questions tirés de la leçon - Grammaire :Aplacer et accorder l'adjectif en groupe de nom- Préposition de lieu –A écrire les nombres et l'heure en français

UNIT 4 : Leçons 7- 9 12

Leçons7. Trois visage de l'aventure,- 8. A moi, Auvergne,- 9. Recit de voyage - Réponses aux questions tirés de la leçon - Grammaire : Adjectif possessif – Les Phrases au Présent de l'indicatif - Les phrases avec les verbes pronominaux au présent

UNIT 5 : Composition : 12

Aécrire une lettre à un ami l'invitant à une célébration différente ex : mariage – A faire le dialogue - A lire le passage et répondre aux questions

Total : 60 hours

TEXT BOOK :

Jacky GIRARDER & Jean Marie GRIDLIG,« Méthode de Français, PANORAMA », Clé Intérnationale , Goyal Publication, New Delhi., Edition 2004

REFERENCE BOOKS:

1. DONDO Mathurin , " Modern French Course", Oxford University Press., New Delhi., Edition 1997
2. Nitya Vijayakumar, "Get Ready French Grammar – Elementary",Goyal Publications, New Delhi., Edition 2010

15LFR002 FRENCH II 5 0 0 4

Course Objective:

- To fortify the grammar and vocabulary skills of the students. Enable the students have an idea of the French Culture and Civilization

UNIT 1 :Leçons 10 – 11 **12**

Leçons : 10. Les affaires marchent,- 11. Un après midi à problemes- Réponses, aux questions tirés de la leçon - Grammaire : Présent progressif, passé récent ou future proche - Complément d'objet directe - Complément d'objet, indirecte.

UNIT 2 : Leçons 12– 13 **12**

Leçons : 12. Tout est bien qui fini bien,- 13. Aux armes citoyens –Réponses, aux questions tirés de la leçon - Grammaire :Les pronoms« en ou y » rapporter des paroles - Les pronoms relatifs que, qui, ou où ,

UNIT 3 : Leçons 14– 15 **12**

Leçons 14. Qui ne risqué rien n'a rien,- 15. La fortune sourit aux audacieux – Réponses aux questions tirés de la leçon - Grammaire : Comparaison– Les phrases au passé composé

UNIT 4 : Leçons 16 – 18 **12**

Leçons16 La publicite et nos reves 17 La france le monde 18 Campagne publicitaire Réponses aux questions tirés de la leçon - Grammaire :- Les phrases à l' Imparfait - Les phrases au Future

UNIT 5 : Composition : **12**

A écrire une lettre de regret// refus à un ami concernant l'invitation d'une, célébration reçue- A écrire un essaie sur un sujet générale - A lire le passage et répondre aux questions

TOTAL : 60 hours

TEXT BOOK

Jacky GIRARDER & Jean Marie GRIDLIG,« Méthode de Français, PANORAMA », Clé Intérnationale , Goyal Publication, New Delhi.,Edition 2004

REFERENCE BOOKS

1. DONDO Mathurin, " Modern French Course", Oxford University Press, New Delhi., Edition 1997
2. Paul Chinnappane " Grammaire Française Facile" , Saraswathi House Pvt, Ltd, New Delhi, Edition 2010

15LFR003 FRENCH III 5 0 0 4

Course Objective:

- To strengthen the Grammar and Composition in French language.To train the students to enhance his skill in French language for communication

UNIT 1 : LEÇONS 16& 29 **12**

La famille Vincent (Page 44) - Grammaire : Passé composé'Vers l'hôtel (page 80) Grammaire : Impératif, A mettre les phrases, du singulier au pluriel

UNIT 2 :LEÇONS 40 & 44 **12**

L'épicerie, les légumes et les fruits (page 112) – Grammaire : Présent, de l'indicatif a poste (page 124) – l Grammaire : A mettre les phrases à l'imparfait

UNIT 3 : LEÇONS 51 & 58 **12**

Le café et tabac (page 142) - Grammaire : A changer les phrases en Interrogatif**,** La Chasse et la pèche (160) - Grammaire : Le plus que parfait

UNIT 4 : LEÇONS 61 **12**

Un mariage à la campagne(page 170) - Grammaire –A changer au participe présent

UNIT 5 : COMPOSITION **12**

Aécrire une lettre à un ami l'invitant à une celebration differente ex : mariage – A faire un essaie sur un sujet générale - A lire le passage et répondre aux questions

TOTAL : **60 hours**

TEXTBOOK :

Les leçons ont été choisi et tiré de I & II degré de G .MAUGER « Cours de, Langue et de Civilisation Française » The Millenium,Publication Hachette,Edition 2002

REFERENCE BOOKS:

1. DONDO Mathurin, "Modern French Course", Oxford University Press, New Delhi., Edition 1997
2. Paul Chinnapan, « Saraswati Grammaire Française facile », Saraswathi House, Pvt. Ltd., New Delhi., Edition 2010
3. Larouse, "Larouse French Grammar",Goyal Publication, New Delhi, Edition, 1995.

15LFR004 FRENCHIV 5 0 0 4

Course Objective:

- To enable the students to strengthen their knowledge of grammar/composition
- To make the students to develop their skills of communication in French language

UNIT I LEÇONS 20& 46 12

Une grande Nouvelle (page 56) – Grammaire : A mettre les phrases au Future, Le métro ; l'autobus (page 130) -Grammaire :A former ou à changer, l'adjectif masculin ou féminin à l'adverbe - Atrouver les noms qui correspondent aux verbes.

UNIT IILEÇONS 48 &63 12

A la Préfecture de police (page 132) - Grammaire : Les Pronoms relatifs, Les sports (page 174) Grammaire : Le conditionnel présent

UNIT III LEÇONS 56 &57 12

A Biarritz, la plage (page 156) - Grammaire : Le future antérieure, Dans les Pyrénées (page 158) -Grammaire : Le future antérieure suite)

UNIT IV LEÇONS 65 12

A fin des vacances (page 178) Grammaire : A changer les phrases du pluriel, au singulier - Le présent du subjonctif

UNIT V COMPOSITION 12

A écrire une lettre de regret / refus à un ami concernant l'invitation d'une célébration reçue- A écrire un essaie sur un sujet générale - A lire le passage et répondre aux questions

TOTAL : **60 hours**

TEXTBOOK :

Les leçons ont été choisi et tiré de I & II degré de G .MAUGER « Cours de, Langue et de Civilisation Française » The Millenium,Publication Hachette,Edition 2002

REFERENCE BOOKS:

1. DONDO Mathurin, "Modern French Course", Oxford University Press, New Delhi., Edition 1997

2. Paul Chinnapan, « Saraswati Grammaire Française facile », Saraswathi House, Pvt. Ltd., New Delhi., Edition 2010

3. Larouse, "Larouse French Grammar",Goyal Publication, New Delhi, Edition, 1995.

15LHN001 HINDI I 5 0 0 4

Course Objective:

- To train the students in the use of Karyalayin Basha.To enable the students to develop the communication skill in Hindi language .

Unit 1: Gadya aur Karyalayin Basha

Mamata, -Yogyatha evam vyavasay kaa ChunaavParibashik shabdavalil prashasanik vakyansh,padanam, **12**

Unit 2:Gadya aur Sarkari Patra

Rajneethi kaa Bhantwara, , Samanya sarkari patra,gyapan,karyalay gyapan **12**

Unit 3: Gadya aur Sarkari Patra

Computer nayi krantee kee dastak, , Karyalay aadesh,Ardha sarkari patraparipatra,Adhisoochana **12**

Unit 4 :Gadya aur Samanya Patra

Raspriya, Samanya patra- chutti patra,sampadak ke naam patra, shikayati patra, pustak vikretha ke naam patra **12**

Unit 5:Vyavasaayik patra

Bankon mein bach khaata kholne ke liye – chek buk ke liye, run lene hetu, chek buk gum ho jane hetu, kitaabon kaa krayadesh **12**

Total : 60 hours

TEXT BOOK:

Gadya Aur Prayojanmulak Hindi ed by Dr.N.Lavanya Mayura Publishers,edition 2008

15LHN002 HINDI II 5 0 0 4

Course Objective:

- To enable the students to have the knowledge in contemporary literature of the modern era. It also provides an idea how translation to be effected.

Unit 1: Kahani Aur Ekanki

Poos Kee Raat.,**- Duzhazar** **12**

Unit 2: Ekanki aur Kahani

Vaapasi,Akeli, .Akbhari vigyapan **12**

Unit 3 : Kahani Aur Anuvad

Sharandatha **-**Anuvad anuched angreji se hindi me karne ke liye. **12**

Unit 4: Ekanki aur Anuvad

Raat ke Raahi Main Bhi Maanav hoonAnuvad anuched angreji se hindi me karne ke liye. **12**

Unit 5: Kahani,Ekanki Aur Anuvad

Parda -Yeh Meri Janma Bhoomi Hai -anuvad anuched angreji se hindi me karne ke liye. **12**

Total : 60 hours

TEXT BOOK:

Sankalan Kahani evam Ekankied by Dr.N.Lavanya, Mayura Publishers,edition 2010

15LHN003 **HINDI III** **5 0 0 4**

Course Objective:

- To help the students to have in depth knowledge of Literature. It makes the students to acquire more about the medieval period through the literary works.

Unit 1:Prachin Kavya Hindi Sahitya kaItihas

Kabir- Hindi bash aka vikas – Hindi sahitya kaa aavirbahv **12**

Unit 2:Prachin Kavya Hindi Sahitya ka Itihas

Surdaas, Tulsidass. Hindi sahitya kaa kaal vibhajan, aadikal, kaa Parichay **12**

Unit 3:Prachin Kavya Hindi Sahitya ka Itihas

Rahim, aadikaal kaa namkran, paristhitiyan, racha evam rachnaakar **12**

Unit 4: Bhakti Kaal, Reethi kaa

Bhakti kal kaa vibhajan paristhitiyan- racha evam rachnaakar - Reethikal ke prakaar, rachna evam rachnakar **12**

Unit 5:Prachin Kavya evam rachnakaron kaa parichay

Bihari -Chandbardayee, Ameerkhusaro, Kabir, Surdas, Tulsidas Jaayasi, Kesahv das Bhushan, **12**

Total : 60 hours

TEXT BOOK:

Prachin evam Aadhunik Kavya Sankalan ed by Dr.N.Lavanya, Mayura Publishers,Edition 2011

REFERENCE BOOK:

Hindi Sahitya kaa Itihas, By Dr.Nagendra, Raj kamal Prakashan, 1997

15LHN004 HINDI IV 5 0 0 4

Course Objective:

- To enable the students to acquire knowledge in journalism so as to enhance his skill in effective communication pertaining to Hindi language.

Unit 1:Aadhunik kavitha Aur Rachnaakar

Mythili Sharan Gupt - Apna Sansar, Aadhunik Rachnakar Hazaari prasad Diwedi,Mahaveer Prasad Diwedi, **12**

Unit 2:Aadhunik kavitha Aur Rachnaakar

Jayashankar Prasad Kamayani - Chinta, Aadhunik Hindi Rachanakar Premchand, Jainendra **12**

Unit 3:Aadhunik kavitha Aur Patrakaritha

Mahadeviverma, Murjaya PhoolBhavani Prasad Mishra Patrakarita – paribhasha,, arth, prakar, swaroop **12**

Unit 4:Aadhunik kavitha , Patrakaritha aur Rachnakar

Mukthibodh Tum Logoan se door,Shamsher Bhadur Singh – Bharat kee aarathi, Vigyapan-sampadan kala,-Nirala, -Pant- Mohan Rakesh **12**

Unit 5: Aadhunik kavitha , Patrakaritha aur Rachnakar

Prabhakar Machve Nimna Mdhya varg, **Patrakaritha-** samachar sankalan - Peeth patrakarita, Rachnakaar - Fanishwaranath renu -Mannu bhandari,Bhagawaticharan Verma, Yashpal **12**

Total : 60 hours

TEXT BOOK:

Prachin evam Aadhunik Kavya Sankalan ed by Dr.N.Lavanya, Mayura Publishers, edition 2011

REFERENCE BOOK:

Patrakaritha Ek Paricahy by Dr.Madhu Dhawan, Bodh Prakashan, edition 1997

15LTA001 தமிழ் மொழி, இலக்கிய வரலாறு - அறிமுகம்5004

நோக்கம்: தமிழ்மொழி மற்றும் இலக்கியத்தின் வரலாற்றை அறிமுகம் செய்யும் நோக்கில் இப்பாடம் வடிவமைக்கப்பட்டுள்ளது. தமிழ்மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்பங்களின் அடிப்படையிலும் விளக்குகிறது. சங்க இலக்கியம் தொடங்கி, இக்கால இலக்கியம் வரையிலான தமிழிலக்கிய வரலாற்றை இலக்கிய வரலாறு அறிமுகப்படுத்துகின்றது. அரசு வேலை வாய்ப்பிற்கான போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையிலும் இப்பாடம் அமைந்துள்ளது.

அலகு 1 தமிழ் மொழி வரலாறு 13

மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஆட்சி மொழிகள் - திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளின் வகைகள் –திராவிட மொழிகளின் சிறப்புகள் - திராவிட மொழிகளின் வழங்கிடங்கள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்.

அலகு 2 சங்க இலக்கியம் 12

சங்க இலக்கியம் - எட்டுத்தொகை - நற்றிணை - குறுந்தொகை - ஐங்குறுநூறு - பதிற்றுப்பத்து - பரிபாடல் - கலித்தொகை - அகநானூறு - புறநானூறு - பத்துப்பாட்டு – திருமுருகாற்றுப்படை – சிறுபாணாற்றுப்படை – பெரும்பாணாற்றுப்படை – பொருநராற்றுப்படை – மலைபடுகடாம் – குறிஞ்சிப்பாட்டு, முல்லைப்பாட்டு, பட்டினப்பாலை – நெடுநல்வாடை – மதுரைக்காஞ்சி.

அலகு 3 அற இலக்கியங்களும் காப்பியங்களும் 11

களப்பிரர் காலம் விளக்கம் – நீதி இலக்கியத்தின் சமூகத்தேவை - பதினெண்கீழ்க்கணக்கு நூல்கள் அறிமுகம் - திருக்குறள், நாலடியார்.

காப்பியங்கள் – ஐம்பெருங்காப்பியங்கள் மற்றும் ஐஞ்சிறுங்காப்பியங்கள் அறிமுகம்– காப்பிய இலக்கணம் - சிலப்பதிகாரம் – மணிமேகலை – சீவகசிந்தாமணி – வளையாபதி – குண்டலகேசி.

அலகு 4 பக்தி இலக்கியங்களும் சிற்றிலக்கியங்களும் 11

தமிழகப் பக்தி இயக்கங்கள் - பக்தி இலக்கியங்கள் - சைவ இலக்கியம் - நாயன்மார்கள் அறுபத்து மூவர் - சமயக்குரவர் நால்வர் - வைணவ இலக்கியம் - பன்னிரு ஆழ்வார்கள் - முதல் மூன்று ஆழ்வார்கள்.

சிற்றிலக்கியக் காலம் - சிற்றிலக்கியங்கள் - வகைகள் - பரணி - கலிங்கத்துப்பரணி - குறவஞ்சி - குற்றாலக் குறவஞ்சி - பிள்ளைத்தமிழ் - மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தூது - தமிழ்விடு தூது - கலம்பகம் - நந்திக்கலம்பகம் - பள்ளு - முக்கூடற்பள்ளு.

அலகு 5 இக்கால இலக்கியங்கள் 13

நவீன காலம் – நவீன இலக்கியம் – உள்ளடக்கம் - புதுக்கவிதை - தோற்றமும் வளர்ச்சியும்- நாவல் - முதல் மூன்று நாவல்கள் – நாவலின் வகைகள் - பொழுது போக்கு நாவல்கள் - வரலாற்று நாவல்கள் - சமூக நாவல்கள் - இக்கால நாவல்கள் - மொழிபெயர்ப்பு நாவல்கள் - சிறுகதை –வகைகளும் வளர்ச்சியும் – நாடகம் – காலந்தோறும் நாடகங்கள் - புராண இதிகாச நாடகங்கள் - சமூக நாடகங்கள் - வரலாற்று நாடகங்கள் – மொழிபெயர்ப்பு நாடகங்கள் - நகைச்சுவை நாடகங்கள்.

மொத்தம்: 60 மணி நேரம்

பார்வை நூல்கள்

1. அகத்தியலிங்கம். ச., “திராவிடமொழிகள் தொகுதி 1”, மணிவாசகர் பதிப்பகம், முதற்பதிப்பு, 1978.

2. சக்திவேல். சு., “தமிழ்மொழி வரலாறு”, மணிவாசகர் பதிப்பகம், முதற்பதிப்பு 1998.

3. பூவண்ணன், “ தமிழ் இலக்கிய வரலாறு”, சைவசித்தாந்த நூற்பதிப்புக் கழகம், முதற்பதிப்பு, 1998.

4. வரதராசன். மு., ”இலக்கிய வரலாறு”,சாகித்ய அகாதெமி, ஒன்பதாம் பதிப்பு, 1994.

5. விமலானந்தம். மது.ச., “இலக்கிய வரலாறு”, பாரி நிலையம், மறுபதிப்பு, 2008.

15LTA002 **தமிழிலக்கியம்** **5 0 0 4**

நோக்கம்: சங்க காலம் தொடங்கி தற்காலம் வரையிலும் தமிழில் உள்ள படைப்பிலக்கியங்களை இப்பாடம் அறிமுகம் செய்கின்றது. தமிழ் இலக்கியத்தில் தேர்ந்தெடுக்கப்பட்ட மிக முக்கியமான செய்யுட்கள், கவிதைகள், கதைகள், உரைநடை ஆகியவற்றைக்கொண்டு இப்பாடம் கட்டமைக்கப்பட்டுள்ளது. மாணாக்கரிடம் இலக்கியத் தேடலை உருவாக்குவதும், தற்சார்புடைய அறிவை மேம்படுத்துவதும் இப்பாடத்தின் நோக்கமாகும்.

அலகு 1 செவ்வியல் இலக்கியங்கள் 12

திருக்குறள்- அன்புடைமை, ஒழுக்கமுடைமை, பெரியாரைத்துணைக்கோடல் – மூன்று அதிகாரங்கள் முழுமையும்.

புறநானூறு- பாடல் எண்: 18, 55, 182, 183, 192 – ஐந்து பாடல்கள்.

குறுந்தொகை- பாடல் எண்: 2, 167, 27, 202, 184 - ஐந்து பாடல்கள்.

அலகு 2 காப்பியங்கள் 12

சிலப்பதிகாரம்- கனாத்திறம் உரைத்தக் காதை முழுவதும்.

மணிமேகலை- பவத்திறம் அறுக எனப் பாவை நோற்ற காதை முழுவதும்.

கம்பராமாயணம்- மந்தரைச் சூழ்ச்சிப்படலம் (தேர்ந்தெடுக்கப்பட்ட ஒன்பது பாடல்கள்).

அலகு 3 கவிதையும் புதுக்கவிதையும் 11

பாரதிதாசனின் ‘தமிழியக்கம்’ -(i) நெஞ்சு பதைக்கும் நிலை - (ii) இருப்பதைவிட இறப்பது நன்று - இரண்டு கவிதைகள்.

ஈரோடு தமிழன்பனின், “அந்த நந்தனை எரித்த நெருப்பின் மிச்சம்” என்னும் தொகுதியில் இடம்பெற்றுள்ள ‘விடிகிறது’ என்னும் புதுக்கவிதை.

அலகு 4 சிறுகதைகள் 12

தி. ஜானகிராமனின் ‘சக்தி வைத்தியம்’

கி. ராஜநாராயணனின்‘கதவு’ - இரண்டு கதைகள்

அலகு 5 உரைநடை 13

வைரமுத்து எழுதிய ‘சிற்பியே உன்னைச் செதுக்குகிறேன்’ முழுவதும்

மொத்தம்: 60 மணி நேரம்

பாட நூல்கள்

1. இரவிச்சந்திரன். சு. (ப.ஆ), “செய்யுள் திரட்டு”, வேல்ஸ் பல்கலைக்கழகம், முதற்பதிப்பு, 2008.

2. வைரமுத்து. இரா., “சிற்பியே உன்னைச் செதுக்குகிறேன்”, திருமகள் நிலையம், பதினேழாம் பதிப்பு, 2007.

பார்வை நூல்கள்

1. பாலச்சந்திரன்.சு., “இலக்கியத் திறனாய்வு”, நியூ செஞ்சுரி புக் ஹவுஸ், பத்தாம் பதிப்பு, 2007.

2. மாதையன்.பெ., “தமிழ்ச் செவ்வியல் படைப்புகள்”, நியூ செஞ்சுரி புக் ஹவுஸ், முதல் பதிப்பு, 2009.

3. வரதராசன்.மு., “குறள் காட்டும் காதலர்”, பாரி நிலையம், மறுபதிப்பு, 2005.

15LTA003 பயன்பாட்டுத் தமிழ் 5 0 0 4

நோக்கம்: தற்கால அன்றாடத்தேவைக்குரிய வகையில் தமிழ்மொழியைச் செம்மையாகப் பயன்படுத்த வேண்டும் என்னும் நோக்கில் இப்பாடம் உருவாக்கப்பட்டுள்ளது. மாணாக்கரின் வேலைவாய்ப்பு நேர்காணல்கள் மற்றும் குழு உரையாடல்களை எதிர்கொள்வதற்கேற்ற பேச்சுத்திறன் மேம்பாடு, செய்தித்தாள்களை நுட்பமாக அணுகும்விதம், சிறந்த கடிதங்களை எழுதுவதற்கான பயிற்சி போன்ற பயன்பாடு சார்ந்த மொழிப்பயிற்சியை இப்பாடம் அளிக்கின்றது.

அலகு1 மொழி 11

பிழை நீக்கி எழுதுதல் - ஒற்றுப்பிழை நீக்கி எழுதுதல் - தொடர்பிழை நீக்கி எழுதுதல் - ஒற்று மிகும் இடங்கள் - ஒற்று மிகா இடங்கள் - பிற மொழிச் சொற்களை நீக்கி எழுதுதல் – பயிற்சிகள்.

அலகு2 பேச்சு 13

பேச்சுத்திறன் – விளக்கம் – பேச்சுத்திறனின் அடிப்படைகள்- வகைகள் – மேடைப்பேச்சு - உரையாடல் - குழுவாக உரையாடல் – பயிற்சிகள்.

தலைவர்களின் மேடைப் பேச்சுகள் - பெரியார் - அண்ணா - கலைஞர்.

அலகு3 எழுதுதிறன் 12

கலைச்சொல்லாக்கம் - தேவைகள் - கலைச்சொற்களின் பண்புகள் - கலைச்சொல்லாக்கத்தில் தவிர்க்க வேண்டியவை - அறிவியல் கலைச்சொற்கள்.

கடிதம் - வகைகள் - அலுவலகக் கடிதங்கள் - பயிற்சி - அறிஞர்களின் கடிதங்கள் - கடிதங்களின் வழி கற்பித்தல் - சில அறிஞர்களின் கடிதங்கள் - நேரு...,

அலகு4 மொழிபெயர்ப்பு 13

மொழிபெயர்ப்பு அடிப்படைக் கோட்பாடுகள் - மொழிபெயர்ப்பு முறைகள் - மொழிபெயர்ப்பாளரின் தகுதிகள்.

மொழிபெயர்ப்பு வகைகள் - சொல்லுக்குச் சொல் மொழிபெயர்த்தல் - தழுவல் - கட்டற்ற மொழிபெயர்ப்பு - மொழியாக்கப்படைப்பு - இயந்திர மொழிபெயர்ப்பு - கருத்துப்பெயர்ப்பு - மொழிபெயர்ப்பு நடை - மொழிபெயர்ப்பு சிக்கல்களும் தீர்வுகளும்.

பயிற்சி: அலுவலகக் கடிதங்களை மொழிபெயர்த்தல் (ஆங்கிலத்திலிருந்து தமிழுக்கு).

அலகு5 இதழியல் பயிற்சி 11

இதழ்களுக்குத் தலையங்கம் எழுதுதல் - நூல் மதிப்புரை எழுதுதல் - சாதனையாளரை நேர்காணல் - நிகழ்ச்சியைச் செய்தியாக மாற்றுதல்.

மொத்தம்: 60 மணி நேரம்

பார்வை நூல்கள்

1. ஈஸ்வரன்.ச., சபாபதி.இரா., "இதழியல்", பாவை பப்ளிகேஷன்ஸ், முதற்பதிப்பு, 2004.

2. ஈஸ்வரன்.ச., "மொழிபெயர்ப்பியல்", பாவை பப்ளிகேஷன்ஸ், முதற்பதிப்பு, 2005.

3. எட்கர் தார்ப், ஷோவிக் தார்ப், "நேர்முகத் தேர்வில் வெற்றிபெற", கிழக்குப் பதிப்பகம், இரண்டாம் பதிப்பு, 2009.

4. சுப்பிரமணியன்.பா.ரா., ஞானசுந்தரம்.வ., (ப.ஆ) "தமிழ்நடைக் கையேடு", இந்தியமொழிகளின் நடுவண் நிறுவனம், மைசூர் மொழி அறக்கட்டளை மற்றும் தஞ்சைத்தமிழ்ப் பல்கலைக்கழகம் - வெளியீடு, நான்காம் மீள்பதிப்பு, 2010.

5. சுப்புரெட்டியார்.ந., "தமிழ் பயிற்றும் முறை", மெய்யப்பன் பதிப்பகம், ஐந்தாம் பதிப்பு, 2006.

15LTA004 தமிழர் நாகரிகமும் பண்பாடும் 5 0 0 4

நோக்கம்: பண்டைத் தமிழரின் வாழ்வியல் நெறிகள் இயல்பானதும் இயற்கையோடு இணங்கிச் செல்வதுமாகும்; மிகவும் பழமையானதும் பண்பட்டதுமாகும். அன்பான அக வாழ்க்கையைக்கூட செம்மையாகத் திட்டமிட்டுள்ளனர். பொழுதுபோக்கு, போர்முறைகள், கலை, சமயம், அரசியல், அறிவியல் என அனைத்திலும் தமிழர் சிறந்து விளங்குவதை விளக்கும் பாடமாக இது அமைந்துள்ளது. அரசு வேலை வாய்ப்பிற்கான போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையிலும் இப்பாடம் அமைந்துள்ளது.

அலகு 1 நாகரிகம், பண்பாடு 12

சொற்பொருள் விளக்கம் - பண்டைத் தமிழர் வாழ்வியல் - அகம் - களவு - கற்பு - குடும்பம் - விருந்தோம்பல் - உறவு முறைகள் - சடங்குகள் - நம்பிக்கைகள் - பொழுதுபோக்கு - புறம் - போர் முறைகள் - நடுகல் வழிபாடு - கொடைப்பண்பு.

அலகு2 கலைகள் 12

சிற்பம் - ஓவியம் - இசை - கூத்து - ஒப்பனை - ஆடை அணிகலன்கள்.

அலகு3 சமயம் 12

சைவம் - வைணவம் - சமணம், பௌத்தம் வெளிப்படுத்தும் பண்பாடு.

அலகு 4 அரசியல் 12

அரசு அமைப்பு - ஆட்சி முறை - உள்நாட்டு வணிகம் - வெளிநாட்டு வணிகம் - வரி வகைகள் - நாணயங்கள் - நீதி முறை.

அலகு5 அறிவியல் 12

கல்வி - வேளாண்மை - வானியல் அறிவு - மருத்துவம் - கட்டிடக்கலை.

மொத்தம்: 60 மணி நேரம்

பார்வை நூல்கள்

1. கே.கே. பிள்ளை, "தமிழக வரலாறு: மக்களும் பண்பாடும்", உலகத் தமிழாராய்ச்சி நிறுவனம், மீள்பதிப்பு, 2009.

2. பக்தவச்சல பாரதி, "தமிழர் மானிடவியல்", அடையாளம், இரண்டாம் பதிப்பு, 2008.

3. தட்சிணாமூர்த்தி. அ., "தமிழர் நாகரிகமும் பண்பாடும்",யாழ் வெளியீடு, மறுபதிப்பு, 2011.

4. தேவநேயப்பாவாணர். ஞா., "பழந்தமிழர் நாகரிகமும் பண்பாடும்", தமிழ்மண் பதிப்பகம், சென்னை.

5. வானமாமலை.நா., "தமிழர் வரலாறும் பண்பாடும்", நியூ செஞ்சுரி புக் ஹவுஸ், ஆறாம் பதிப்பு, 2007.

Syllabus
Generic Elective Courses

15BBT151MUSHROOM CULTIVATION AND ITS MARKETING2 0 0 2

Course Objective:

- To learn the cultivation of various mushrooms
- To create the student for self employment

Course Outcome:

- CO –1: Student will understand what is mushroom and where the mushroom is present
- CO –2: To understand mushroom lifecycle and how to identify different types of mushrooms
- CO –3: Student will learn how to cultivate mushroom and its basic elements of preparation
- CO –4: Student will learn about the cultivation methods of (*Agaricus morcella*, *Volvariella* and *Pleurotus*)
- CO –5: To understand the about waste substrate and cultivation of mushrooms
- CO –6: Student will understand the nutritive and medicinal values of mushrooms
- CO –7: student will understand the production of mushroom enzymes and metabolites

- CO –8: To understand to make value added products from mushroom.
- CO –9: Student will learn about the post harvest technology of mushroom
- CO –10: To know the marketing strategies of mushroom in local and export market

Unit 1: Mushroom Biology **8**

Introduction to Mushroom - History of Mushroom - Ecology of Mushroom -Life cycle of Mushroom. Identification of Mushrooms - Phylogeny of Mushrooms.

Unit 2: Cultivation Methods **12**

General preparation for Mushroom Cultivation. - Basic elements for Mushroom growth and farm settings - Basic elements for Mushroom growth and farm settings - Cultivation methods (*Agaricusmorcella*, *Volvariella* and *Pleurotus*)

Unit 3: Value of Mushroom **12**

Production of Mushrooms from waste substrates. Rice bran, Ground nut, Sugar cane trash. Mushrooms in food and medicine. Nutritional and medicinal value of mushrooms.

Unit 4: Compounds from mushroom **13**

Production of Mushrooms enzymes and metabolites and Preparation of other value added products from Mushroom. Diseases and Pest control.

Unit 5: Mushroom Marketing **15**

Post-harvest technology, marketing strategies of mushroom with special reference to export and local marketing.

Total : 60 hours

TEXT BOOKS:

1. Suman, B.C and V. P. Sharma. Mushroom Cultivation in India, Daya Publishing House. 2007
2. Subrata Biswas, M. Datta, S.V. Ngachan. Mushrooms: A Manual for Cultivation. PHI Learning Private limited, New Delhi. 2012

REFERENCE BOOKS:

1. Suman, B.C and V. P. Sharma.Mushroom Cultivation in India, Daya Publishing House.2007
2. Ram R.C.Mushrooms and Their Cultivation Techniques, Pointer Publishers- Jaipur.2007.
3. Yaniv. Handbook of Medicinal Plants, Cbs Publisher.2007.
4. ZoharaYaniv. Handbook of Medicinal Plants, Crc Press.2005.
5. Benson, Plant Conservation Biotechnology, Taylor and Francis.2002.
6. Nicholas L.G and Kerry Ogame, *Psilocybin* Mushroom Hand Book.2006.
7. Tradd Cottler,Organic Mushroom Farming and Mycoremediation. Chelsea Green Publishing. USA.2014
8. GajendraJagtap, UtpalDey, Mushroom Cultivation. LAP Lambert Academic Publishing. 2012
9. D.P. Tripathi,Mushroom Cultivation. Oxford and IBH Publishing Company Pvt. Limited. 2005
10. Subrata Biswas, M. Datta, S.V. Ngachan. Mushrooms: A Manual for Cultivation. PHI Learning Private limited, New Delhi. 2012

15BBT152 ENTREPRENEURSHIP DEVELOPMENT 2 0 0 2

Unit 1: Introduction **10**

Meaning, Needs and Importance of Entrepreneurship, Promotion of entrepreneurship, Factors influencing entrepreneurship, Features of a successful Entrepreneurship.

Unit 2: Establishment of Enterprise **12**

Forms of Business Organization, Project Identification, Selection of the product, Project formulation, Assessment of project feasibility.

Unit 3: Financing the Enterprise **15**

Importance of finance / loans and repayments, Characteristics of Business finance, fixed capital management: Sources of fixed capital, working capital its sources and how to move for loans, Inventory direct and indirect raw materials and its management.

Unit 4: Marketing Management **13**

Meaning and Importance, Marketing-mix, product management – Product line, Product mix, stages of product like cycle, marketing Research and Importance of survey, Physical Distribution and Stock Management.

Unit 5: Entrepreneurship and International Business **10**

Meaning of International business, Selection of a product, Selection of a market for international business, Export financing, Institutional support for exports.-Project Report on a selected product should be prepared and submitted.

Total hours: 60

TEXT BOOKS:

1. Holt DH. Entrepreneurship: New Venture Creation.
2. Kaplan JM Patterns of Entrepreneurship.
3. Gupta CB, Khanka SS. Entrepreneurship and Small Business Management, Sultan Chand & Sons.

15BBT153 BIOTECHNOLOGY AND HUMAN WELFARE 2 0 0 2

Course Objective:

- To learn various aspects of biotechnology including industrial, agricultural, environmental and applications in forensic science.

Course Outcome:

- CO – 1: Students will have knowledge on Biotechnology role in industry (fermentation)
- CO-2: To clearly know the biotechnology process in protein engioneering
- CO – 3: To know about biotechnology role in agriculture sector
- CO-4: To clearly know about plant microbes interaction
- CO-5: To clearly exaplain biotechnology application in environment
- CO-6: To understand and explain about biodegradable materials to protect environment pollution
- CO-7: To learn about biotechnology application in forensic science
- CO-8: To clearly explain about DNA finger printing
- CO-9: To Students will have knowledge on Biotechnology role in medical industry
- CO-10: To know about human genome project and its important in medical field

Unit1: Industrial Biotechnology **10**

Industry: protein engineering; enzyme and polysaccharide synthesis, activity and secretion, alcohol and antibiotic formation.

Unit 2: Agricultural Biotechnology **10**

Agriculture: N2 fixation: transfer of pest resistance genes to plants; interaction between plants and microbes; qualitative improvement of livestock.

Unit 3: Environmental Biotechnology **15**

Environments: e.g. chlorinated and non-chlorinated organ pollutant degradation; degradation of hydrocarbons and agricultural wastes, stress management, development of biodegradable polymers such as PHB.

Unit 4: Biotechnology in Forensic Science **12**

Forensic science: e.g. solving violent crimes such as murder and rape; solving claims of paternity and theft etc. using various methods of DNA finger printing.

Unit 5 Biotechnology and Medicine **13**

Health: e.g. development of non-toxic therapeutic agents, recombinant live vaccines, gene therapy, diagnostics, monoclonal in E.coli, human genome project.

Total: 60 hours

TEXT BOOKS:

1. Sateesh MK, Bioethics and Biosafety, I. K. International Pvt Ltd. 2010
2. Sree Krishna V, Bioethics and Biosafety in Biotechnology, New age international publishers. 2007.

15BBT154 FOOD PROCESSING TECHNOLOGY 2 0 0 2

Course Objectives:

- To make the students familiar with the aspects of food processing and its importance for industrial applications.

Course Outcome:

- CO – 1: Students will have knowledge on role of biomolecules in food, additives and their nature.
- CO – 2: Students will gain knowledge on sources and activity of microorganisms associated with food.
- CO-3: To well versed with the food poisoning (intoxication and infection)
- CO-4: To know about spoilage of food and food preservation methods
- CO-5: To understand the downstream operations involved in food industry.
- CO-6: Provide the knowledge on various methods of sterilization in food industry.
- CO-7: Students will be familiar with various food products produced commercially.
- CO-8: Students gets knowledge about GM foods
- CO-9: To well versed with the various food processing techniques
- CO-10: Students gets the knowledge of Biotechnology application in Food Industry

Unit I: Food Constituents and Processing 10

Constituents of food- Carbohydrates, Lipids, Proteins, Water, Vitamins and Minerals, Dietary sources- Role and functional properties in food; Food additives- intentional and non intentional additives- functional role of Biotechnology in food processing and preservation.

Unit 2: Food Microbiology **15**

Sources and activity of microorganisms associated with food; Food fermentation; Food chemicals; Food borne diseases- Food infections ; Food intoxications and Poisoning; Food spoilage- Factors responsible for spoilage, spoilage of vegetable, fruit, meat, poultry, beverage and other food products.GM Foods. Scope of food biotechnology.

Unit 3: Food Processing **13**

Raw material characteristics; cleaning, sorting and grading of foods; physical conversion operations- mixing, emulsification, extraction, filtration, centrifugation, membrane separation, crystallization, heat processing.

Unit 4: Food Storage **12**

Principles involved in the use of sterilization, pasteurization, blanching, aseptic canning; frozen storage – freezing characteristics of foods. Factors affecting quality of frozen foods, irradiation preservation of foods.

Unit 5: Food Products **10**

Bread and baked goods, dairy products- milk processing, cheese, butter, ice cream, vegetable and fruit products; edible oils and fats; meat, poultry and fish products; confectionery, beverages.

Total: 60 hours

TEXT BOOKS:

1. Dr.M. Swaminathan, Food & Nutrition Technology.
2. Ramani, Alex.V, Food chemistry.2009

REFERENCE BOOKS:

1. Coultate T.P. Food- The chemistry of its components, 2nd ed., Royal society, London, 1992.
2. Sivasankar B. Food Processing and preservation, prentice hall of India PVt .Ltd. New Delhi, 2002.
3. FennemaO.R.Principles of food science: Part I, Food chemistry, Marcel Dekker, New York, 1976.
4. Frazier W.C and Westhoff D.C. Food Microbiology, 4th ed. McGram – Hill book co., New York, 1998.

5. Brenner, J.G., Butters, J.R., Cowell, N.D. and Lilly, A.E.V. Food engineering operations, 2nd ed., Applied Sciences Pub.ltd., London, 1979.
6. Pyke, M. Food science and Technology, 4th ed., John Murray, London, 1981.

Syllabus

Skill Enhancement Courses

NSS SYLLABUS FOR HONOURS/PASS/GENERAL COURSES

PAPER-01

No. of Lectures (35)

Unit – 01: Introduction and Basic Concepts of NSS (4)

a) History, philosophy, aims & objectives of NSS (1)
b) Emblem, flag, motto, song, badge etc. (1)
c) Organizational structure, roles and responsibilities of various NSS functionaries (2)

Unit – 02: NSS Programmes and Activities (10)

a) Concept of regular activities, special camping, Day Camps (3)
b) Basis of adoption of village/slums, Methodology of conducting Survey (2)
c) Financial pattern of the scheme (1)
d) Other youth prog./schemes of GOI (2)
e) Coordination with different agencies (1)
f) Maintenance of the Diary (1)

Unit – 03: Understanding Youth (5)

a) Definition, profile of youth, categories of youth (2)
b) Issues, challenges and opportunities for youth (2)
c) Youth as an agent of social change (1)

Unit – 04: Community Mobilisation (9)

a) Mapping of community stakeholders (3)
b) Designing the message in the context of the problem and the culture of the community (1)
c) Identifying methods of mobilisation (3)
d) Youth-adult partnership (2)

Unit – 05: Volunteerism and Shramdan (7)

a) Indian Tradition of volunteerism (1)
b) Needs & importance of volunteerism (2)
c) Motivation and Constraints of Volunteerism (2)
d) Shramdan as a part of volunteerism (2)

Project work/Practical **40 Marks**

NSS SYLLABUS FOR HONOURS/PASS/GENERAL COURSES

PAPER-02

No. of Lectures (35)

Unit – 01: Importance and Role of Youth Leadership (6)

a)	Meaning and types of leadership	(2)
b)	Qualities of good leaders; traits of leadership	(2)
c)	Importance and role of youth leadership	(2)

Unit – 02: Life Competencies (11)

a)	Definition and importance of life competencies	(2)
b)	Communication	(3)
c)	Inter Personal	(3)
d)	Problem-solving and decision-making	(3)

Unit – 03: Social Harmony and National Integration (9)

a)	Indian history and culture	(2)
b)	Role of youth in peace-building and conflict resolution	(5)
c)	Role of youth in Nation building	(2)

Unit – 04: Youth Development Programmes in India (9)

a)	National Youth Policy	(3)
b)	Youth development programmes at the National Level, State Level and voluntary sector	(4)
c)	Youth-focused and Youth-led organisations	(2)

Project work/Practical **40 Marks**

Conducting surveys on special theme and preparing a report thereof.

NSS SYLLABUS FOR HONOURS/PASS/GENERAL COURSES

PAPER–03

No. of Lectures (35)

Unit – 01: Citizenship (7)

a) Basic Features of Constitution of India (2)
b) Fundamental Rights and Duties (2)
c) Human Rights (1)
d) Consumer awareness and the legal rights of the consumer (1)
e) RTI (1)

Unit – 02: Family and Society (6)

a) Concept of family, community, (PRIs and other community-based organisations) and society (2)
b) Growing up in the family – dynamics and impact (1)
c) Human values (1)
d) IV) Gender justice (2)

Unit – 03: Health, Hygiene & Sanitation (7)

a) Definition, needs and scope of health education (1)
b) Food and Nutrition (1)
c) Safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan) (2)
d) National Health Programme (2)
e) Reproductive health (1)

Unit – 04: Youth Health (6)

a) Healthy Lifestyles (1)
b) HIV AIDS, Drugs and Substance abuse (2)
c) Home Nursing (1)
d) First Aid (2)

Unit – 05: Youth and Yoga (9)

a) History, philosophy and concept of Yoga (2)
b) Myths and misconceptions about yoga (1)
c) Different Yoga traditions and their Impacts (2)
d) Yoga as a preventive, promotive ,and curative method (2)
e) Yoga as a tool for healthy lifestyle (2)

Project work/Practical **40 Marks**

Preparation of research project report.

NSS SYLLABUS FOR HONOURS/PASS/GENERAL COURSES

PAPER–04

No. of Lectures (35)

Unit – 01: Environment Issues (11)

a) Environment conservation, enrichment and Sustainability (2)
b) Climate change (2)
c) Waste management (2)
d) Natural resource management (5)
(Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation)

Unit – 02: Disaster Management (7)

a) Introduction to Disaster Management, classification of disasters (4)
b) Role of youth in Disaster Management (3)

Unit-03: Project Cycle Management (10)

a) Project planning (2)
b) Project implementation (3)
c) Project monitoring (2)
d) Project evaluation: impact assessment (3)

Unit – 04: Documentation and Reporting (7)

a) Collection and analysis of data (3)
b) Preparation of documentation/reports (2)
c) Dissemination of documents/reports (2)

Project work/Practical **40 Marks**

Workshops/seminars on personality development and improvement of communication skills

NSS SYLLABUS FOR PASS/GENERAL COURSES

PAPER-05

No. of Lectures (35)

Unit – 1: Vocational Skill Development (20)

This Unit will aim to enhance the employment potential of the NSS volunteers or, alternately, to help them to set up small business enterprises. For this purpose, a list of 12 to 15 vocational skills will be drawn up, based on the local conditions and opportunities. Each volunteer will have the option to select two skill-areas out of this list – one such skill in each semester. The education institution (or the university) will make arrangements for developing these skills in collaboration with established agencies that possess the necessary expertise in the related vocational skills.

Unit – 02: Entrepreneurship Development (8)

a)	Definition & Meaning	(1)
b)	Qualities of good entrepreneur	(2)
c)	Steps/ways in opening an enterprise	(3)
d)	Role of financial and support service Institutions	(2)

Unit – 03: Youth and Crime (7)

a)	Sociological and Psychological Factors influencing Youth Crime	(2)
b)	Peer Mentoring in preventing crimes	(1)
c)	Awareness about Anti-Ragging	(1)
d)	Cyber Crime and its Prevention	(2)
e)	Juvenile Justice	(1)

Project work/Practical **40 Marks**

NSS SYLLABUS FOR PASS/GENERAL COURSES

PAPER–06

No. of Lectures (35)

Unit – 1: Vocational Skill Development (20)

This Unit will aim to enhance the employment potential of the NSS volunteers or, alternately, to help them to set up small business enterprises. For this purpose, a list of 12 to 15 vocational skills will be drawn up, based on the local conditions and opportunities. Each volunteer will have the option to select two skill-areas out of this list – one such skill in each semester. The education institution (or the university) will make arrangements for developing these skills in collaboration with established agencies that possess the necessary expertise in the related vocational skills.

Unit – 02: Civil/Self Defense (5)

a) Civil defense services, aims and Objectives of civil defense (2)
b) Needs for Self defense training (3)

Unit-03: Resource Mobilisation (3)

a) Writing a Project Proposal (2)
b) Establishment of SFUs (1)

Unit-04: Additional Life Skills (7)

a) Positive Thinking (1)
b) Self Confidence and Self Esteem (2)
c) Setting Life Goals and working to achieve them (2)
d) Management of Stress including Time Management (2)

Project work/Practical **40 Marks**

15GPD251 Personality Development 2 0 0 2

Course Objective: To Make Aware About The Importance Of Personality And Development In The Business World. To Make The Students Follow The Good Personality And Create A Good Relationship With Others.

Unit 1: Personality Development-Introduction: 6

The Concept Personality - Dimensions Of Personality - Term Personality Development - Significance.The Concept Of Success And Failure What Is Success? - Hurdles In Achieving Success - Overcoming Hurdles - Factors Responsible For Success – What Is Failure - Causes Of Failure - Do's And Don'ts Regarding Success And Failure.

Unit 2:**Attitudes and Values 6**

Attitude - Concept - Significance - Factors Affecting Attitudes - Positive Attitude - Advantages - Negative Attitude - Disadvantages - Ways To Develop Positive Attitude – Differencebetween Personalities Having Positive And Negative Attitude.

Unit 3: Motivation 6

Concept Of Motivation - Significance - Internal And External Motives - Importance Of Self-Motivation- Factors Leading To Demotivation-Theories To Motivation

Unit 4: Self Esteem And Smart 6

Term Self-Esteem - Symptoms - Advantages - Do's And Don'ts To Develop Positive Self-Esteem – Low Self-Esteem - Symptoms - Personality Having Low Self Esteem - Positive And Negative Self-Esteem. Interpersonal Relationships - Teaming - Developing Positive Personality - Analysis Of Strengths And Weaknesses. Concept Of Goal-Setting - Importance Of Goals - Dream Vs Goal - Why Goal-Setting Fails? – Smart (Specific, Measurable, Achievable, Realistic, Time-Bound) Goals-Art of Prioritization - Do's And Don'ts About Goals.

Unit 5: Body Language, Stress Management & Time Management: 6

Body Language - Assertiveness - Problem-Solving - Conflict And Stress Management - Decision-Making Skills - Positive And Creative Thinking - Leadership And Qualities Of A Successful Leader - Character-Building - Team-Work - Lateral Thinking - Time Management - Work Ethics – Management Of Change - Good Manners And Etiquettes (Concept, Significance And Skills To Achieve Should Be Studied.)

Topics Prescribed For Workshop/Skill Lab: 12

A) Group Discussion

B) Presentation Skill

C) Problem-Solving

D) Decision-Making

E) Creativity

F) Leadership

G) Time Management

H) Body Language

Total hours : 30

TEXT BOOKS:

1. Organisational Behaviour - S. P. Robbins - Prentice-Hall Of India Pvt. Ltd., New Delhi-15th edition,2013
2. Communicate To Win - Richard Denny - Kogan Page India Private Limited, New Delhi-2009
3. Essentials Of Business Communication - Rajendra Pal And J. S. Korlhalli - Sultan Chand & Sons, New Delhi,1st edition,2012

REFERENCE BOOKS:

1. Business Communication - K. K. Sinha - Galgotia Publishing Company, New Delhi.-4th edition,2012
2. Media And Communication Management - C. S. Rayudu - Himalaya Publishing House,Bombay.2011
3. Business Communication - Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal And Prof. Ravindra Kothavade - Diamond Publications, Pune.2009
4. You Can Win - Shiv Khera - Macmillan India Limited.2012
5. Group Discussion And Public Speaking - K. Sankaran And Mahendra Kumar - M.I. Publications, Agra .2000
6. Basic Managerial Skills For All - Prentice-Hall Of India Pvt. Ltd., New Delhi-2011- E.H.Mc Grath, Habits - Stephen Covey-simon&schusker publisher-2007 edition.
7. Management Thoughts - Pramod Batra-HPB publisher-1st edition-2006
   Produced By Prof. Rooshikumar Pandya - Creative Communication And Management Center, Bombay-R&E publisher kindle edition-2012.
   A) Assertive Training: Four Cassettes-hannah Richards-2012
   B) Self Hypnosis For Goal Achievement: Four Cassettes-kindle edition-ryan cooper-2012