CURRICULUM & SYLLABUS – M.Sc- Biotechnology

(Applicable to the batches admitted from July 2018)

I SEMESTER

S.No.	CATEGORY	SUB. CODE	SUBJECT	Total Contact Hrs	L	T	P	C
THEORY								
1.	MC	P18MCBS101	Core I - General Microbiology	4	3	1	0	4
2.	MC	P18MCBS102	Core II - Cell and Molecular biology	4	3	1	0	4
3.	MC	P18MCBS103	Core III - Advanced Biochemistry	4	3	1	0	4
4.	ME		Major Elective – I	4	3	1	0	4
5.	ME		Major Elective – II	4	3	1	0	4
	PRACTICAL							
6.	MC	P18MCBS1L1	Core IV -General Microbiology Lab	6	0	0	6	3
7.	MC	P18MCBS1L2	Core V - Biochemistry and Molecular Biology	6	0	0	6	3
8.	EEC	P18PRBS1S1	Technical Seminar	0	0	0	2	1
Total					15	5	14	27

II SEMESTER

S.No.	CATEGORY	SUB. CODE	SUBJECT	Total Contact Hrs	L	T	P	C
THEORY								
1.	MC	P18MCBS201	Core VI - Plant and Animal Biotechnology	4	3	1	0	4
2.	MC	P18MCBS202	Core VII -rDNA technology	4	3	1	0	4
3.	MC	P18MCBS203	Core VIII - Immunotechnology	4	3	1	0	4
4.	MC	P18MCBS204	Core IX - Genomics	4	3	1	0	4

			and Proteomics					
5.	ME		Major Elective-III	4	3	1	0	4
PRACTICAL								
6.	MC	P18MCBS2L1	Core X - Plant and Animal Biotechnology Lab	6	0	0	6	3
7.	MC	P18MCBS2L2	Core XI - Immunotechnology and rDNA technology Lab	6	0	0	6	3
8.	EEC	P18PRBS1V1	Internship	0	0	0	0	1
Total					15	5	12	27

III SEMESTER

S.No.	CATEGORY	SUB. CODE	SUBJECT	Total Contact Hrs	L	T	P	C
THEORY								
1.	MC	P18MCBS301	Core XII - Research Methods in Biology	5	3	1	0	4
2.	MC	P18MCBS302	Core XIII - Fermentation Technology and Bioengineering	5	3	1	0	4
3.	MC	P18MCBS303	Core XIV - Food Processing Technology	5	3	1	0	4
4.	MC	P18MCBS304	Core XV- Medical Biotechnology	5	3	1	0	4
`5.	MC	P18MCBS305	Core XVI- Nanotechnology	5	3	1	0	4
6.	EEC	P18ACEN001	**Audit course** English for Research paper	2	2	0	0	0
		P18ACCE002	Disaster Management					
		P18ACEN003	Sanskrit for technical knowledge					

		P18ACBA004	Value Education					
		P18ACLW005	Constitution of India					
		P18ACBA006	Pedagogy Studies					
		P18ACBA007	Personality development through Life Enlightment Skills					
	PRACTICAL							
7.	MC	P18MCBS3L1	Core XVII - Fermentation technology and Food technology Lab	6	0	0	6	3
Total					17	5	6	23

IV SEMESTER

S.No.	CATEGORY	SUB. CODE	SUBJECT	Total Contact Hrs	L	T	P	C
THEORY								
1.	MC	P18MCBS401	Molecular Diagnostic Techniques	4	3	1	0	4
2.	EEC		Open Elective	2	2	0	0	2
3.	HS	P18MCYO001	Stress Management by Yoga	0	0	0	0	0
4.	HS	P18PRBS4T1	Term paper	1	0	0	1	1
5.	HS	P18PRBS4P1	Project	16	0	0	16	8
Total					3	1	19	15

LIST OF MAJOR ELECTIVE – I
CHOOSE ANY ONE IN SEMESTER I

S.No.	Sub Code	Subjects	Total Contact Hrs	L	T	P	C
1	P18MEBS011	Major Elective – I: Metabolic Regulation	4	4	0	0	4
2	P18MEBS012	Major Elective – I: Enzyme Technology	4	4	0	0	4
3	P18MEBS013	Major Elective – I: Bioinformatics	4	4	0	0	4
Total			4	4	0	0	4

LIST OF MAJOR ELECTIVE – II
CHOOSE ANY ONE IN SEMESTER I

S.No.	Sub Code	Subjects	Total Contact Hrs	L	T	P	C
1	P18MEBS021	Major Elective – II: Industrial Biotechnology	4	4	0	0	4
2	P18MEBS022	Major Elective – II: Industrial Microbiology	4	4	0	0	4
3	P18MEBS023	Major Elective – II: Molecular Genetics	4	4	0	0	4
Total			4	4	0	0	4

LIST OF MAJOR ELECTIVE – III
CHOOSE ANY ONE IN SEMESTER II

S.No.	Sub Code	Subjects	Total Contact Hrs	L	T	P	C
1	P18MEBS031	Major Elective-III: Waste Management Technology	4	4	0	0	4
2	P18MEBS032	Major Elective-III: Biostatistics	4	4	0	0	4
3	P18MEBS033	Major Elective-III:Bioethics and IPR	4	4	0	0	4
Total			4	4	0	0	4

LIST OF OPEN ELECTIVES
CHOOSE ANY ONE COURSE IN SEMESTER IV

S.No.	Sub Code	Subjects	Total Contact Hrs	L	T	P	C
1.	P18OEBA001	Advertising and Sales Management	2	2	0	0	2
2.	P18OEBA002	BPO Management	2	2	0	0	2
3.	P18OEBA003	Call Centre Management – Voice & Non Voice	2	2	0	0	2
4.	P18OEBA004	Customer Relationship Management	2	2	0	0	2
5.	P18OEBA005	Entrepreneurship Development	2	2	0	0	2
6.	P18OEBA006	Advanced Human Resource Management	2	2	0	0	2
7.	P18OEBA007	Logistics & Supply Chain Management	2	2	0	0	2
8.	P18OEBA008	Office Management	2	2	0	0	2
9.	P18OEVC001	Photography & Videography	2	2	0	0	2
10.	P18OEEN001	Soft Skills	2	2	0	0	2
11.	P18OEEN002	Mass Media and Communication	2	2	0	0	2
12.	P18OESC001	Computer Applications	2	2	0	0	2
13.	P18OESC002	Multimedia	2	2	0	0	2
14.	P18OESC003	Advanced Excel	2	2	0	0	2
15.	P18OESC004	Web Designing	2	2	0	0	2
16.	P18OESC005	Photoshop	2	2	0	0	2
17.	P18OESC006	Flash	2	2	0	0	2
18.	P18OESC007	Computer Hardware and Networking	2	2	0	0	2
19.	P18OESC008	Computer Programming	2	2	0	0	2
20.	P18OESC009	Office Automation Tools	2	2	0	0	2
21.	P18OEMI001	Clinical Microbiology	2	2	0	0	2
22.	P18OEMI002	Herbal Medicine	2	2	0	0	2

23.	P18OEPH001	Electrical Technician	2	2	0	0	2

FIRST SEMESTER

P18MCBS101	**GENERAL MICROBIOLOGY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the basics of microbiology concepts. Learners will understand the classification, characteristics, techniques, importance of microbes and their applications.

COURSE OUTCOMES (COs)

CO1	Recall the history, basics of microbiology and microscopy.
CO2	Recognize the classification of microbes based on physiological characteristics.
CO3	Apply various techniques in microbiology lab maintenance.
CO4	Apply the microbes based morphological studies using staining techniques.
CO5	Analyze the pathogenicity of microorganisms.
CO6	Analyze the the microbial diseases and their treatments.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					

4	Approval	Academic Council Meeting

UNIT I	**12**
Microscopy – Its principles and application in the field of Microbiology including the following: Dark field, Phase contrast, Fluorescence microscopy. TEM and SEM. Principles, operation and maintenance of: refrigerated and ultracentrifuges, Spectrophotometer. Lyophilizers. Staining methods – Simple, differential and special methods. Sterilization and disinfection methods and their quality control.	
UNIT II	**12**
Bacterial Anatomy, Structure, properties and biosynthesis cellular components of bacteria – Sporulation – Growth and nutrition –Nutritional requirements – Growth curve – Kinetics of growth – Batch culture – Synchronous growth – Measurement of growth and enumeration of cells – Pure culture techniques.	
UNIT III	**12**
Distribution of Algae - Thallus structure in algae - Reproduction in alga - Life cycle patterns in algae - Chlamydomonas – Volvox (Green algae) - Nostoc – Spirogyra (BGA) - Ectocarpus – Sargassum (Brown algae) - Poly siphonia – Batrachospermum (Red algae).	
UNIT IV	**12**
Staining techniques – Classification of stains, Theories and Mechanism of Gram staining, acid fast staining, Negative staining, Capsule staining, Flagella staining, Endospore staining.	
UNIT V	**12**
Common pathogenesis of bacteria, fungi and virus (Morphology, Biochemical characters, pathogenicity, treatment and preventive measures).	
TEXT BOOKS:	
1.	Pelczar MJ, Chan ECS and Kreig NR. Microbiology, McGraw Hill, NewYork, 1999.
2.	Madigan MT, Martinko, JM and Parker J. Brock's Biology of Microorganisms, 9th ed., Prentice Hall, New Jersey press, 1999.
3.	J. M. Willey, K. Sandman and D. Wood. 2019. Prescott's Microbiology, 11th edition. McGraw Hill Higher Education, USA.
REFERENCE BOOKS:	
1.	Prescott LM, Harley JP and Klein DA. Microbiology, McGraw Hill, New Delhi, 1999.
2.	Dubey RC and Maheswari DK. A Textbook of Microbiology, 1st edition, S Chand & Co. Ltd., New Delhi, 2003.
3.	Michael T. Madigan, John M Martinko; 2006. Brock's Biology of Microorganisms, Pearson-Prentice Hall. Ed. 11.
2.	Topley& Wilson's. 2002. Principles of Bacteriology, Virology & Immunology, Edward Arnold. Ed. 9.
Course Coordinator	**HOD**

P18MCBS102	CELL AND MOLECULAR BIOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the basics of cells, origin and evolution. Learners will understand the DNA structure and replication, synthesis of RNA and Protein.

COURSE OUTCOMES (COs)

CO1	Recall the history of cells, theory of cell biology and classification of cells.
CO2	Recognize the DNA repair mechanisms.
CO3	Apply the role of cell organelles in physiology.
CO4	Apply the knowledge of cell cycles and growth of cells.
CO5	Analyze the importance of gene expression and silencing.
CO6	Analyze the familiarity of phages and viruses.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					

4	Approval	Academic Council Meeting

UNIT I	**12**
An overview of cells – Origin and evolution of cells. Cell theory, classification of cells – Prokaryotic cells and eukaryotic cells. Comparison of prokaryotic and eukaryotic cells. Cell cycle – components in cell cycle control – cyclic-CDKs- check points in cell cycle – abnormalities in cell cycle.	
UNIT II	**12**
DNA replication, repair and recombination - unit of replication, enzymes involved, replication origin and replication fork, fidelity of replication, extra-chromosomal replications. DNA damage and repair mechanisms.	
UNIT III	**12**
RNA synthesis and processing: Transcription factors and machinery - formation of initiation complex, transcription activators and repressors, RNA polymerases, capping, elongation and termination. RNA processing - RNA editing, splicing, polyadenylation, RNA transport.	
UNIT IV	**12**
Protein synthesis - formation of initiation complex, elongation and termination – machineries and their regulation. Genetic code. Aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, translational proof-reading, translation inhibitors. Post-translational modification of proteins.	
UNIT V	**12**
Control of gene expression at transcription and translation level -Regulation of phages, viruses, prokaryotic and eukaryotic gene expression - Role of chromatin in regulating gene expression and gene silencing.	
TEXT BOOKS:	
1. Blackburn GM, Gait MJ. Nucleic acids in chemistry and biology, Oxford University Press, 1996.	
2. Hopkins NH, Roberts JW, Steitz JA and Weiner AM. Molecular biology of the gene, 4th edition, Benjamin/Cummings Publishing Company, 1998.	
3. Harvey Lodish, Arnold Berk, Chris A. Kaiser and Monty Krieger, 1999, Molecular Cell Biology, 4th ed., WH Freeman and Co, New York	
REFERENCE BOOKS:	
1. Friedberg EC, Walker GC and Siede W. DNA Repair and Mutagenesis, ASM Press, 2005.	
2. Ajoy Paul. Text Book of Cell and Molecular Biology, Books & Allied (P) Ltd., Kolkata, 2007.	
3. Verma P.S. and Agarwal V.K, 2016, Cell Biology (Cytology, Biomolecules,Molecular Biology),Paperback,S.Chand and Company Ltd.	
4. Karp G,Iwasa J.and Maswall W,2015, Karps Cell and Molecular Biology-Concepts and Experiments.8th Edn.John Wiley and Sons.	
Course Coordinator	**HOD**

P18MCBS103	**ADVANCED BIOCHEMISTRY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the biomolecules. Learners will understand the classification, physical and chemical properties of each biological macromolecule.

COURSE OUTCOMES (COs)

CO1	Recall the basics of Carbohydrates and Protein.
CO2	Recognize the mechanisms behind the macromolecules.
CO3	Apply the role of lipids in biomembranes and biosynthesis.
CO4	Apply the biological significance of double stranded DNA.
CO5	Analyze the mechanism and conformational properties of polynucleotides.
CO6	Analyze and develop the synthetic vitamins and hormones for the benefits of mankind.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I	**12**
Classification, chemical properties of carbohydrates, Chemistry and biological roles of polysaccharides. Structural elucidation of polysaccharides; Structure and role of proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharides).	
UNIT II	**12**
Classification and physico-chemical properties of amino acids and peptides; Peptide bond; Primary, secondary, tertiary and quaternary structures of proteins; Ramchandranplot; Silk fibroin, coiled coils, collagen triple helix and hemoglobin; Denaturation and renaturation of proteins.	
UNIT III	**12**
Classification, structure and functions: Triglycerides; Phospholipids; Steroids and Terpenes; Lipoproteins: Structure and functions of lipoproteins; Role of lipids in biomembranes; Biosynthesis: Fatty acids; Triglycerides; Phospholipids; Sterols.	
UNIT IV	**12**
Structure of double stranded DNA (A, B and ZDNA). The biological significance of double strandedness; Sequence dependent variation in the shape of DNA. Physical properties of double stranded DNA. Types of RNAs and their biological significance. Topology of DNA, Conformational properties of polynucleotides, secondary and tertiary structural features and their analysis.	
UNIT V	**12**
Structure and properties of vitamins and hormones –Definition and nomenclature – biological availability – assessment of vitamins in nutritional status – vitamins B1,B12, K, E and niacin – Protein and peptide hormones – auxin, gibberellins, abscisic acid.	
TEXT BOOKS:	
1.	Freidberg EC, Walker GC and Siede W. DNA Repair and Mutagenesis, ASM Press, 1995.
2.	Geoffrey L Zuba. Biochemistry, Wm. C. Brown Publishers, 4th Edition, 1998.
3.	Stryer, L, Biochemistry, Freeman Company, New York, 4th Edition, 1999.
REFERENCE BOOKS:	
1.	Freifelder D. Molecular Biology, 2nd edition, Narosa Publishing House, 1996.
2.	Campbell MK. Biochemistry, 3rd edition, Saunders College Publishing Harcourt
	Brace College Publishers,1999.
3.	Palmer T, Bonner PL. Enzymes: biochemistry, biotechnology, clinical chemistry. 2007
4.	Voet D, Voet JG, Pratt CW. Fundamentals of biochemistry: life at the molecular level. 2016.

Course Coordinator **HOD**

P18MCBS1L1	**GENERAL MICROBIOLOGY LAB**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	0	0	6	3
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other elated Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the fundamental knowledge in microbial laboratory techniques. Learners will understand the microbial characteristics and identification of microbes in disease perspectives.

COURSE OUTCOMES (COs)

CO1	Differentiate the microbes based on morphology.
CO2	Grasp the microscopic observation of microbes.
CO3	Handle various instruments for culturing the microbes in lab.
CO4	Measure the different medium level for exact microbial culture.
CO5	Sketches the results and identifying the microbes.
CO6	Perform the isolation and identification of microbes.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								H
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

1. Principles and methods of sterilization.
2. Preparation of Media: Nutrient broth, Nutrient agar.
3. Isolation and pure culture of micro organisms from soil and water.
4. Maintenance of micro organisms – Agar slant.
5. Motility determination – Hanging drop method.
6. Staining methods: Simple, Gram staining, Spore.
7. Cultural characteristics of micro organisms and basal medium, selective medium and enriched medium.
8. Biochemical characterization of bacteria – Catalase and Oxidase test.
9. IMVIC test.
10. Urease and TSI test.
11. Study on bacterial extracellular enzymes – Starch hydrolysis.
12. Antibiotic sensitivity test (Kirby Bauer disc diffusion method).

TEXT BOOKS:

1. James T Stanley, Marvin P Bryant. Bergey's Manual of Systematic Bacteriology Vol. II, Nobert Fleming Springer Publishers, 1984.
2. Gerhardt P, Murray RG, Wood WA and Kreig NR. Methods of General and Molecular Bacteriology, American Society for Microbiology, Washington,1994.
3. Kanika Sharma. (2009). Manual of Microbiology – Tools and Techniques. 2nd edition, Ane Books Pvt.Ltd., New Delhi.

REFERENCE BOOKS:

1. Cappuccino and James G. Microbiology a laboratory manual, Addison Wesley Publishing Company Inc., 4th edition, England, California, 1996.
2. David R Brooke. Bergey's Manual of Systematic Bacteriology, Second edition, Vol.III, Eastern Halz, Springer Publication, 2009.
4. Ronald M.Atlas. 1997. Principles of Microbiology, WCB Publishers. 2nd ed.
5. Albert Balows, Hens G. Truper., Martin Dworkin, Wim, Hardes, Karl-heinzSchoeifer (eds). 1992. A Hand book on the biology of bacteria, ecophysiology, isolation, identification and applications, Springer Verlag.

Course Coordinator **HOD**

P18MCBS1L2	**BIOCHEMISTRY AND MOLECULAR BIOLOGY LAB**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	0	0	6	3
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the estimation process of biomolecules. Learners will understand the isolation of genomic DNA from various sources.

COURSE OUTCOMES (COs)

CO1	Perform the estimation of different macromolecules skillfully.
CO2	Operates the electrophoretic apparatus.
CO3	Handle various instruments related to molecular biological experiments.
CO4	Calibrates the values with reference range values.
CO5	Sketches and write the interpretation and inferences.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M						H		
	CO3	H	M						H		
	CO4	H	M						H	M	M
	CO5	H	M						H	M	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

1. Estimation of protein by Lowry method.

2. Estimation of carbohydrate by Anthrone method.
3. Estimation of total amino acid by Ninhydrin method.
4. Estimation of serum cholesterol by Zaks method.
5. Estimation of chlorophyll.
6. Isolation of plant genomic DNA by Dellaporta method.
7. Isolation of genomic DNA from liver tissue.
8. Isolation of genomic DNA from bacteria.
9. Agarose gel electrophoresis
10. Quantitative analysis of DNA

TEXT BOOKS:

1. Wilson K Walker. Practical Biochemistry, Principles and Techniques, Cambridge University Press, 1995.
2. Wilson K and Walker J. Practical Biochemistry, 5th Edition, Cambridge University Press, 2000.
3. Mu P, Plummer DT. Introduction to practical biochemistry. Tata McGraw-Hill Education; 2001.

REFERENCE BOOKS:

1. Joseph Sambrook and David W Russell. Molecular Cloning: A Laboratory Manual, Third edition, Volume 1, 2 and 3, Cold Spring Harbor Laboratory Press, 2001.
2. Dr. Sarma PVGK. Molecular Biology, A Practical Manual Hardcover, MJP Publishers, 2017.
3. Jayaraman J, Jayaraman J. Laboratory manual in biochemistry. Delhi: Wiley Eastern; 1981.
4. Fasman GD. Practical handbook of biochemistry and molecular biology. 1989.

Course Coordinator **HOD**

P18MCBS201	PLANT AND ANIMAL BIOTECHNOLOGY	L	T	P	C
	Total Contact Hours –60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
	Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the basics of plant genomic organization. Learners will understand the plant and animal tissue culture techniques, gene transfer methods and cloning strategies.

COURSE OUTCOMES (COs)

CO1	Recall the principles and technical advances behind the *in vitro* culture
CO2	Recognize the stem cell techniques
CO3	Apply the fundamental knowledge in animal and plant biotechnology and their applications
CO4	Apply the basic principles and techniques in genetic manipulation and genetic engineering.
CO5	Analyze gene transfer technologies for animals and animal cell lines
CO6	Analyze the structure of animal genes and genomes

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							H	
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **10**

Biotechnology: Definition and scope- global impact of biotechnology in agriculture, health care and environment- potentials in modern biotechnology- achievements in biotechnology.

UNIT II **12**

Tissue culture as a source of genetic variability: Introduction-Variation: somaclonal and gametoclonal variation, sources and causes of variation, selection of variants, application in crop improvement- Protoplast: isolation, culture and fusion, selection of hybrid cells, regeneration of hybrid plants-Somatic hybridization and Cybridization- Micropropagation as a tool of in vitro multiplication-secondary metabolite production through plant cell cultures.

UNIT III **12**

Genetic Transformation methods for production of transgenic plants: Direct Gene Transfer Methods, Agrobacterium mediated genetic transformation (Indirect), Chloroplast transformation, transplantomics. Production of genetically modified plants/crops: transgenic plants for biotic and abiotic stress tolerance, transgenic plants for quality traits, herbicide and pest resistance, Industrial enzymes, Plantibodies, Plantigens and Edible Vaccines.

UNIT IV **14**

Animal cell culture: history- requirements for animal cell and organ culture-culture media: natural and synthetic media-sterilization of glassware, equipment and culture media-maintenance of different cell lines-characteristics of animal growth in culture-Cultivation of animal cells in bioreactor-methods of scaling up of cell culture-rimmobilized cell culture -somatic and organ cell culture-whole embryo culture- -hybridoma technology-stem cell culture.

UNIT V **12**

Basic steps in gene cloning-methods of gene transfer: calcium phosphate co precipitation, electroporation and microinjection-Screening of recombinants: marker inactivation technique. Cloning strategies: genomic and cDNA cloning (basic concepts)-Cloning of insulin gene-Development of transgenic animals and applications- DNA finger printing techniques-Biopharming- xeno transplantation- genetically engineered animals- mapping of human genome- ethical issues in animal biotechnology- Intellectual property rights- patenting.

TEXT BOOKS:

1. Ignacimuthu S, Plant Biotechnology, S J Oxford and IBH, New Delhi, 1996.
2. Nigel Jenkins, Animal cell Biotechnology: Methods and protocols, Humana press, New Jersy, 1999. 4.
3. Dube, R.C. (2014). A Text Book of Biotechnology. S. Chand & Company Ltd., New Delhi

REFERENCE BOOKS:

1. Grierson and S N Covey, Plant Molecular Biology, Blackie Acaemic &Professional, 1988.
2. Sudhir M, Applied Biotechnology and Plant Genetics, Domain publishers & distributors, 2000.
3. Ignacimuthu S. Applied Plant Biotechnology, Tata McGraw - Hill, 1996.
4. Gupta, P.K. (2016). Plant Biotechnology. Rastogi Publications, Meerut.

Course Coordinator **HOD**

P18MCBS202	rDNA TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
	Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the basic of mutagenesis and recombination methods. Learners will understand the gene library, nucleic acid hybridization and blotting techniques.

COURSE OUTCOMES (COs)

CO1	Recall the basic genetic engineering experiments
CO2	Recognize the recombination methods
CO3	Apply and acquire knowledge in hybridization techniques
CO4	Apply the recombinant technology in microbes for product formation.
CO5	Analyze the applications of rDNA technology in plants, animals and industries.
CO6	Analyze the new technologies in genetic engineering field.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							H	
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

Gene as a unit of mutation and recombination. Mutagenesis, mutations and mutants biochemical basis of mutations, spontaneous and induced mutations, isolation of mutants, mutagenesis, reversion, suppression, genetic analysis of mutants. Recombination methods – conjugation and transformation.

UNIT II **12**

Enzymes in Genetic Engineering - DNA Polymerase, Polynucleotide kinase, T4 DNA ligase, Nick translation system, Terminal deoxynucleotidyl transferase, Reverse transcriptase Restriction endonucleases Type I & II. Vectors – plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome

UNIT III **12**

Strategy of recombinant DNA technology; Gene library - Genomic library, cDNA library Cloning strategies - Use of linkers, adoptors, homopolymer tails – Nucleic acid hybridization - Colony hybridization, plaque hybridization; Blotting techniques - Southern, Northern, Western and dot blotting

UNIT IV **12**

PCR – principles, techniques and applications. Gene isolation, cloning and expression, DNA sequencing, oligonucleotide synthesis, Southern and Northern hybridization, FISH, RAPD, PCR-RFLP, STRR, LTRR. DNA fingerprinting and their applications for diagnosis of disease, site-directed mutagenesis, Gene silencing, Gene transfer technologies.

UNIT V **12**

DNA chips and microarray gene screen technology; site directed mutagenesis, transgenic animals and gene knockout techniques, cell culture based techniques Genetic diagnosis. Applications in medical field, biology, transgenic plants, transgenic animals, Recombinant vaccines development. Gene therapy molecular basis of genetic diseases, genetic counseling

TEXT BOOKS:

1. Peter J Russell, Genetics,5th edition, Benjamin-Cummings Publishing Company,1997
2. Bernard R. Glick and Jack J. Pasternak, Molecular Biotechnology, 2nd edition ,ASM press,2003
3. Das HK. Textbook of Biotechnology, 4th Edition, Wiley India, 2010.

REFERENCE BOOKS:

1. Brown. T.A, Gene Cloning and DNA analysis, 2nd edition, ASM press, 2004.
2. Sandy Primrose, Principles of Gene Manipulation and Genomics,7th edition, Black Well Publishers,2006
3. Mickloss DA and Freyar GA. DNA Science - A First Course in Recombinant Technology, Cold Spring Harbor Laboratory Press, New York, 1990.
4. Walker MR and Rapley R. Route Maps in Gene Technology, Blackwell Science Limited, Oxford, 1997.

Course Coordinator **HOD**

	IMMUNOTECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
P18MCBS203	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
	Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the basic immune systems. Learners will understand the antigen recognition, mode of activation of complement system and hyper sensitivity reactions.

COURSE OUTCOMES (COs)

CO1	Recall the basic of history and scope of immunology
CO2	Recognize the principles and importance of biological macromolecules
CO3	Apply knowledge in factors governing antigenicity
CO4	Apply the principles of immunology.
CO5	Analyze the molecular basis of antigen recognition, hypersensitivity and Ag-Ab reactions.
CO6	Analyze its applications in treating human diseases.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

History and scope of immunology; Lymphoid tissues and organs. Types of immunity: Innate and acquired, active and passive. Cell mediated immunity and Humoral immunity. Kinetics of antibody production – primary and secondary antibody response.

UNIT II **12**

Haematopoiesis. Ontogeny, origin, development and differentiation of immune cells. Clonal selection theory. B-lymphocytes and their activation. Thymus derived lymphocytes, Antigen presenting cells, mechanism of T-cell activation. T Helper and T-cytotoxic cells, Natural killer cells, Dendritic cells, Langerhan cells, Macrophages, Microphages. Phagocytosis process. Structure and functions of Class I and II molecules. Major Histocompatability Complex

UNIT III **12**

Immunoglobulins - structure, distribution and function. Generation of antibody diversity. Organisation and expression of immunoglobulin genes. Antigenicity: factors governing antigenicity. Antigen types, haptens, epitopes, adjuvants, carriers, bacterial, viral and tumour antigens, autoantigens, blood group antigens, T dependent, T independent antigens. Antigen antibody reactions. Factors governing antigen-antibody interactions: affinity, avidity, valency, cross reactivity

UNIT IV **12**

The complement systems: mode of activation, classical and alternate pathway Transplantation immunity - Organ transplantation and HLA tissue typing. Introduction to autoimmune disorders and immunology of infectious diseases

UNIT V **12**

Hypersensitivity reactions. Immunological tolerance. Immunosuppression. Immunotherapy. Hybridoma and monoclonals. Recombinant antibodies. DNA vaccines and Edible vaccines. Complement system and Autoimmune disorders.

TEXT BOOKS:

1. Roitt IM. Essential Immunology, Blackwell Scientific Publications, Oxford, 1998.
2. Abbas, A.K., Litchman, A.H., Pober. J.S. Cellular and Molecular Immunology, 2nd ed, W.B.Saunders, USA, 1994.
3.. P. Delves, S. Martin, D. Burton and I. Roitt, Roitt's Essential Immunology, Latest Edition, 2006, Wiley – Blackwell.

REFERENCE BOOKS:

1. Joshi KR, Osama NO. Immunology, Agrobios Ltd, India, 2000.
2. Rao CV. An Introduction to Immunology, Narosa Publishing House, India, 2002
3. .J. Kindt, R.A. Goldsby and B.A. Osborne, Kuby, Immunology, 2007, W.H. Freeman and Company.
4. Clemens Van Blitterswijk ,Tissue Engineeering.Elseiver,2nd edition,2014.

Course Coordinator **HOD**

P18MCBS204	GENOMICS AND PROTEOMICS	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
	Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES:-

Learners will be familiar with the genomic and cDNA sequences. Learners will understand the gene ttherapy, transgenic animals and plants, gene expressions and transformations.

COURSE OUTCOMES (COs)

CO1	Recall the basics of Omics studies
CO2	Recognize the techniques in genomics and proteomics analysis
CO3	Apply knowledge of modern techniques in proteomics and Genomics
CO4	Analyse the bioinformatic software in Omics studies
CO5	Evaluate the applications of proteomics and Genomics
CO6	Create the knowledge in futures of genomics and proteomics

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							H	
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
		✓								
4	Approval	47th Academic Council Meeting								

UNIT I **12**

Genomic and cDNA sequence: gene prediction rules – gene prediction softwares – human and Arabidopsis genome projects – mutations.

UNIT II **12**

Gene therapy - applications of genome – transgenic animals and plants – Pathway regulatory networks

UNIT III **12**

Introduction, Serial Analysis of Gene Expression, Microarray, Types of Microarrays, Microarray Fabrication, Microarray hybridization and detection, Microarray Image Processing and analysis, Expression ratios, Transformations of the Expression ratio, Data Normalization

UNIT IV **12**

Proteomics – protein separation - 2DE, protein identification – mass spectrometry. Protein chips. Applications of proteomics – Medical proteomics in disease diagnosis, pharmaceutical proteomics in drug development

UNITV **12**

Discovering a drug - target identification and validation - identifying the lead compound - optimization of lead compound - chemical libraries

TEXT BOOKS:

1. Andreas D. Baxevanis and B. F. Francis Ouellette, Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley Interscience, 2004.
2. Twyman RM. Principles of Proteomics, Taylor & Francis group, BIOS Scientific Publishers, 2004.
3. Bernard R. Glick and Jack J. Pasternak, Molecular Biotechnology, 2nd edition ,ASM press,2003

REFERENCE BOOKS:

1. Nawin C Mishra and Gunter Blobel. Introduction to Proteomics: Principles and Applications, Wiley, 2010.
2. Saraswathy N and Ramalingam P, Concepts and Techniques in Genomics and Proteomics, 1st edition, Woodhead Publishing, 2011.
3. Brown. T.A, Gene Cloning and DNA analysis, 2nd edition, ASM press, 2004.
4. Sandy Primrose, Principles of Gene Manipulation and Genomics,7th edition, Black Well Publishers,2006

Course Coordinator **HOD**

	PLANT AND ANIMAL BIOTECHNOLOGY LAB	L	T	P	C
P18MCBS2L1	Total Contact Hours – 45	0	0	6	3
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
	Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the basic knowledge on plant and animal genetic engineering. Learners will understand the cell viability assays and secondary metabolite production.

COURSE OUTCOMES (COs)

CO1	Grasp the techniques of sterilization and principles of plant tissue culture.
CO2	Perform the procedures for micropropagation techniques.
CO3	Organizes and perform the secondary metabolites production.
CO4	Measure and manipulates MTT assays.
CO5	Operate micro nucleus test.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M								H
	CO4	H	M								
	CO5	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

1. Sterilization Techniques
2. An introduction to plant tissue culture
3. Callus induction from Carrot
4. Production of Secondary metabolite
5. Micropropagation
6. Preparation of primary cell culture
7. Passaging and cell viability by Tryphan blue
8. Trypsinization
9. MTT assay
10. Micronucleus test

TEXT BOOKS:

1. Ignacimuthu S. Plant Biotechnology, S J Oxford and IBH, New Delhi, 1996.

REFERENCE BOOKS:

1. Reinert J and Yeoman MM. Plant Cell and Tissue Culture, A Laboratory Manual ,Springer-Verlag Berlin Heidelberg, New York, 1982.
2. Nigel Jenkins (Ed). Animal cell Biotechnology: Methods and protocols, Humana press, New Jersy, 1999.

Course Coordinator **HOD**

P18MCBS2L2	**IMMUNOTECHONOLOGY & rDNA TECHNOLOGY LAB**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	0	0	6	3
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
	Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the immunological techniques. Learners will understand the diagnostic tests that are used in identifying diseases.

COURSE OUTCOMES (COs)

CO1	Handle various antigen antibody interaction techniques.
CO2	Perform the blotting techniques.
CO3	Calibrates the polymerase chain reaction.
CO4	Manipulates the isolated DNA with the standard.
CO5	Organizes and perform the Enzyme Linked Immune Sorbent Assay.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								H
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

1. Immunodiffusion
2. Radial immunodiffusion
3. Rocket immunoelectrophoresis
4. Enzyme Linked Immuno Sorbent Assay
5. Isolation of peripheral blood mononuclear cells
6. Isolation of bacterial genomic DNA
7. Restriction enzyme digestion of PUC18 DNA
8. Ligation of DNA fragments with cloning vector
9. Polymerase chain reaction
10. Southern blotting

TEXT BOOKS:

1. Karp G. Cell and Molecular Biology – Concepts and Experiments, 6 th Edn., John Wiley and Sons., 1998.
2. Verma PS and Agarwal VK. Cell Biology (Cytology, Biomolecules, Molecular Biology), Paperback, S. Chand and Company Ltd., 2016.

REFERENCE BOOKS:

1. McLennan A, Bates A, Turner P and White M. Bios Instant Notes Molecular Biology, 4 th Edn., Taylor and Francis, 2012.
2. Cox MM, Doudna JA and O'Donnell M. Molecular biology: Principles and Practice, WH Freeman and Company, 2012.

Course Coordinator **HOD**

P18MCBS301	RESEARCH METHODS IN BIOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. V. JanakiDevi & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the research in life sciences. Learners will understand the data collection, analysis and interpretation.

COURSE OUTCOMES (COs)

CO1	Remember the basic research concepts and its types.
CO2	Understand the research topics related to society welfare and design a research using references.
CO3	Apply appropriate methods for data/ sample collection with ethical clearance.
CO4	Apply the data/samples using various methods.
CO5	Analyze the results with previous related research studies.
CO6	Analyze the results and interpret the value and predict the results.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

Research- Meaning, Objectives and Motivation, Types of researches, Research process-steps. Criteria of good research. Data collection method- Primary data-observation method, Interview method, Secondary data.

UNIT II **12**

Need for Research Design, Features of good design, Important concepts relating to research designs, Types of Research Design, Basic Principles of Experimenting design, Developing a research plan.

UNIT III **12**

Interpretation-Technique and precaution in interpreting, Significance of report writing, Different steps in writing report, Layout of the research report. Writing research report. Case study.

UNIT IV **12**

Sampling Concepts for statistical analysis-Mean, median, standard deviation-standard error-ANNOVA, SPSS, R-program, Graph pad prism, origin software, sigma statistics, sigma plot.

UNIT V **12**

Legal and socio-economic impacts of biotech research-biosafety regulation-rDNA guidelines-issues involved in experimenting with animals-Experimental protocol approvals-contaminant level and environmental effects-impact of GM organisms and GM foods-IPR and patents.

TEXT BOOKS:

1. Gurumani N. Research Methodology for biological sciences, MJP publishers, Chennai, 2006
2. Kothari CR. Research Methodology-Methods and techniques, New Age publications, New Delhi, 2009.

REFERENCE BOOKS:

1. Paneerselvam R. Research Methodology, Prentice-Hall of India, New Delhi, 2004.
2. Ranjit Kumar. Research Methodology a step by step guide for beginners, 3rd edition, Sage publications, New Delhi 2011.

Course Coordinator **HOD**

P18MCBS302	FERMENTATION TECHNOLOGY & BIOENGINEERING	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. V. JanakiDevi & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the fermentation technology. Learners will understand to design a fermenter, standardize the conditions, value of products.

COURSE OUTCOMES (COs)

CO1	Recall the basics about fermentation and its types
CO2	Understand the specific fermenter and appropriate conditions for processing
CO3	Apply several techniques to maintain the condition and proper inoculum level in the fermenter
CO4	Apply the byproducts from the fermenter and purify the products
CO5	Analyze the samples by qualitative and quantitative methods
CO6	Analyze and develop a new technique to improve the fermentation products

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

Fermentation processes, Screening and selection of microbial culture, strain development. Design and operation of Fermenters, Packed bed reactor, Fluidized bed reactor, Photobioreactor, Solid state fermenter and Bubble column reactor. Measurement of process parameters temperature, pressure and pH, DO, foam; Flow rate of liquid and gases; Automation (processes computerization).

UNIT II **12**

Media sterilization, Batch and continuous sterilization; fermenter sterilization, filter sterilization. Microbial growth kinetics: Microbial growth cycle, measurement of growth, Batch culture, continuous culture, fed-batch culture. Inoculum production and transfer.

UNIT III **12**

Down Stream processing techniques - Recovery of particulate matter, product isolation, distillation, centrifugation, whole broth processing, filtration, aqueous two-phase separation, solvent extraction, chromatography and electrophoresis.

UNIT IV **12**

Analysis of the final product - Protein-based contaminants and removal, Product potency, Determination of protein and amino acids. Peptide mapping, N-terminal sequencing, Analysis of secondary and tertiary structure. Detection of protein-based product impurities: rapid methods for detection of specific organisms and toxins (immunological/molecular methods).

UNIT V **12**

Production of aminoacids, Vitamins, Organic acids, Antibiotics and Recombinant protein production insulin. Microbial production and purification of lipase. Microbial exopolysaccharides (EPS). Production of cheese-cheddar, sauerkraut, probiotics, Baker's yeast, SCP. Mushroom cultivation. Production of wine and beer.

TEXT BOOKS:

1. Demain AL and Soloman INA. Mammal of Industrial Microbiology and Biotechnology, American society for Microbiology, Washington DC, 1986.
2. Cruger and Cruger. Industrial biotechnology, 2nd Ed, Sutherland MA Sinauer Associates, 1990

REFERENCE BOOKS:

1. Stanburry PF and Whitaker. Principles of fermentation technology, Pergamon Press, II Ed, Butterworth Heinemann-Elsevier, 2005
2. Belter PA, Cussler EL and Hu WS. Bio separation: Downstream processing for Biotechnology, John Wiley and Sons, 2003.

Course Coordinator **HOD**

P18MCBS303	FOOD PROCESSING TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. V. JanakiDevi & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with food processing techniques. Learners will understand to protect the foods from various spoilage, processing and prevention methods.

COURSE OUTCOMES (COs)

CO1	Remember the basics about sources of food spoilage.
CO2	Understand the proper equipment and method depending upon nature of foods.
CO3	Apply various methods for avoid the spoilage of natural and fermented foods.
CO4	Apply food processing and preservation techniques for natural and fermented foods.
CO5	Analyze the quality of foods in post processing operations.
CO6	Analyze novel methods to preserve the food materials from spoilage.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M							H	
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

Food processing industries in India, status, scope and categorization of food processing industries. Food safety, good manufacturing practice and quality assurance - HACCP and hurdle technology. Process control - Automatic and Computer based systems. Enzyme Technology - Application of enzymes in food processing.

UNIT II **12**

Food spoilage causes - biological changes - factors affecting bacterial growth and survival of microbes in food - Intrinsic and Extrinsic factors, Food borne diseases - bacterial and non bacterial agents, Fermented foods - Yoghurt, Cheese, Soy sauce, Sauerkraut, Bread and Idly.

UNIT III **12**

Processing and preservation by heat - Theory, Equipment and Effect on Foods - Blanching, Pasteurization, Sterilization, UHT Processing, Evaporation, Distillation, Extrusion, Baking, Roasting, Frying, Dielectric heating and Infrared heating. Retort processing of Ready to eat (RTE) products. Drying - water activity, Dehydration of fruits, vegetables, milk and animal products.

UNIT IV **12**

Processing and preservation by low temperature - Chilling, MAS, CAS, Freezing, Freeze drying and Freeze concentration. Food irradiation, Electromagnetic spectrum in food processing industry, ionizing and non-ionizing radiations - advantages and disadvantages.

UNIT V **12**

Coating, Enrobing, Dusting, Pan Coating and its types, Packaging - Theory, types of packaging materials, Printing and interactions. Filling and sealing of containers - Rigid, semi rigid, flexible containers and types of sealers, wrapping and labelling. Handling equipment for raw materials, ingredients and processing, waste management and disposal, storage and distribution.

TEXT BOOKS:

1. Adams MR and Mass MO. Food Microbiology, Second Edt., Royal Society of Chemistry,1995.
2. Fellows PJ. Food Processing Technology - Principles and Practice, Second Edition, CRC Press, Woodhead Publishing Limited, Cambridge, England, 2000.

REFERENCE BOOKS:

1. Yin H Hui and Culberston JD. Handbook of Food Science, Technology and Engineering, CRC Press, 2006.
2. Desrosier NW and James N. The Technology of Food Preservation, AVI Publishers, 2007.

Course Coordinator **HOD**

P18MCBS304	MEDICAL BIOTECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. V. JanakiDevi & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with biotechnological application in medical aspects. Learners will understand the diseases, sample collection, diagnosis techniques and therapies.

COURSE OUTCOMES (COs)

CO1	Recall the basic of biotechnological applications in medical aspects
CO2	Recognize the gene therapy techniques for cure the diseases
CO3	Apply various mechanisms in assisted reproductive technology
CO4	Apply the knowledge of genetic material for disease diagnosis and environmental monitoring
CO5	Analyze the samples using DNA technology in medical forensics
CO6	Analyze the knowledge in recent trends in medical biotechnology

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							M	H
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

Gene therapy -Approaches for genetherapy, Exvivo therapy-Vectors in Gene therapy, Human artificial chromosome, Invivo gene therapy-Gene delivery by viruses, Gene therapy for AIDS, Antigen and antisence therapy, Monoclonal antibody production and its applications.

UNIT II **12**

Pharmaceutical products of DNA technology- Human protein replacement –Insulin, Growth hormone, Clotting factors VIII. Therapeutic agents for human diseases-Tissue plasminogen activators-Interferons - Erytropoietin -Alginate lyase.

UNIT III **12**

Assisted Reproductive technology, Manipulation of reproduction in human and animals-Artificial insemination, Embryo transfer, Invitro fertilization, Embryo cloning, causes of infertility and application of ART, Intrauterine insemination (IUI), Methodology of IVF-Cytoplasmic transfer, IVC, PED.

UNIT IV **12**

DNA in disease diagnosis and medical forensics- Methods of DNA assay-DNA in the diagnosis of infectious diseases and DNA and diagnosis of Genetic diseases, DNA analysis for environmental monitoring- DNA profiling.

UNIT V **12**

Recent trends in medical biotechnology-Exosomes in cancer nano medicine and immunotherapy, Neurodegenerative diseases, vaccine- Recombinant vaccines.

TEXT BOOKS:

1. Sathyanarayana U. Biotechnology, Third edition, Books & Allied Pvt. Ltd, New Delhi, 2010.
2. Pratibha Nallari and Venugopal Rao V. Medical Biotechnology, Oxford University Press, 2010.

REFERENCE BOOKS:

1. Bernard R Glick, Terry L Delovitch and Cheryl L Patten. Medical Biotechnology, Second edition, ASM Books Pvt Ltd, 2008.
2. George P Patrinos and Wilhelm Ansorge. Molecular Diagnostics, Academic Press, 2005.

Course Coordinator **HOD**

P18MCBS305	NANOTECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. V. JanakiDevi & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with nanomaterial science. Learners will understand the nanoparticles synthesis, properties and applications.

COURSE OUTCOMES (COs)

CO1	Recall the basic history and future scope of nanotechnology
CO2	Understand physical, chemical and biological methods for nanoparticle synthesis
CO3	Apply the knowledge to develop new methods in particle size reduction and stabilization
CO4	Apply the properties nanoparticles using various techniques
CO5	Analyze the applications of nanoparticles in various fields
CO6	Analyze nano based products and their toxicity effects

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							M	H
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

Scope and overview, length scales, history of nanotechnology, future of nanotechnology. Nanoparticles – size, shape, properties. Metal/metal oxide nanoparticles – polymer based nanomaterials - nano composites - carbon nano tubes - fullerenes – quantum dots – dendrimers.

UNIT II **12**

Synthesis of nanostructure: Physical methods - Chemical methods- Biological methods-Synthesis using microorganism and plant extracts. Characterization techniques- X-ray diffraction, Electron Microscopy -Scanning & Transmission, Energy dispersive analysis, Scanning Probe Microscopy, Atomic Force Microscopy, X-ray photo electron Spectroscopy, Fourier transform Infrared spectroscopy – Ultraviolet and visible spectroscopy– Thermogravimetric Analysis – Differential Scanning Calorimetry.

UNIT III **12**

Biosensors - optical biosensors based on nanoplasmonics, nanobiosesors. Nanorobotics in surgery. Nanocircuitry - S-layer proteins: structure, chemistry and assembly. DNA–protein nanostructures. DNA- gold-nanoparticle conjugates. Magnetic nanoparticles as contrast agents for MRI application and therapeutic application.

UNIT IV **12**

Activation and targeting of nanotechnology-based drug delivery systems- Metal/metal oxide and magnetic nanoparticles, polymer micelles, biodegradable polymers as drug carriers. Targeted drug delivery systems- Antibody conjugated nanoparticles. Ultrasound-responsive nanoparticles as drug and gene delivery carriers.

UNIT V **12**

Polymer-based nanocomposites for food packaging, Insecticides using nanotechnology, nano-fertilizers, Nano finishing in textiles (UV resistant, antibacterial, hydrophilic, self-cleaning, flame retardant finishes). Photocatalytic degradation of specific waterborne pollutants by nanomaterials. Toxicity and environmental risks of nanomaterials.

TEXT BOOKS:

1. Rao CN, Muller A, Cheetham AK. The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Wiley, 2004.
2. David S Goodsell. Bionanotechnology, John Wiley & Sons, 2004.

REFERENCE BOOKS:

1. Brown.PJ and Stevens K. Nanofibers and Nanotechnology in Textiles. Woodhead Publishing Limited, Cambridge, 2007.
2. Pradeep T. Textbook of Nanoscience and Nanotechnology. McGraw Hill Education Private Ltd., 2012.

Course Coordinator **HOD**

	FERMENTATION TECHNOLOGY & FOOD TECHNOLOGY LAB	L	T	P	C
P18MCBS3L1	Total Contact Hours – 45	0	0	6	3
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other elated Life Science Subject.				
	Course Coordinator Name & Department: - Dr. V. JanakiDevi & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the fermented food productions. Learners will understand the fermenter, standardize the fermentation conditions, improvement of quality and quantity of fermented foods.

COURSE OUTCOMES (COs)

CO1	Recall the basics about fermented food products
CO2	Select the specific fermentation method and appropriate conditions for processing
CO3	Organizes and perform the production method sequentially
CO4	Distinguish the byproducts from the fermenter and purify the products
CO5	Fastens the skills to develop a new fermented food product

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								H
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

1. Microbial analysis of food products – bacterial and fungal
2. Microbial spoilage of refrigerated food
3. Extracellular enzyme activities – cellulase, protease, lipase and phosphatase
4. Milk microbiology – direct microscopic count – standard plate count
5. Reductase test (resazurin/methylene blue)
6. Isolation of microbes from yoghurt, curd
7. Field trip to dairy, food industries, sewage treatment plants
8. Inoculum preparation for fermentation
9. Screening of antibiotic producing microorganisms from soil
10. Production of extracellular metabolites from actinomycetes
11. Production of industrially important enzymes by Submerged fermentation

    (Any one enzyme)
12. Production of industrially important enzymes by Solid state fermentation

    (Any one enzyme)

TEXT BOOKS:

1. Hui YH, Lisbeth Meunier Goddik, Jytte Josephsen, Wai Kit Nip, Peggy S Stanfield. Handbook of Food and Beverage Fermentation Technology, CRC Press, 2004.
2. Brian Mcneil and Linda MH. Practical Fermentation Technology, John Wiley & Sons, Ltd, England, 2008.

REFERENCE BOOKS:

1. Neway JO. Bioprocess Technology Fermentation Process Development of Industrial Organisms, T & F Publisher, 1989.
2. Janarthanan S. Practical Manual on Fermentation Technology, I.K International Publishing House Ltd, New Delhi, 2012.

Course Coordinator **HOD**

IV SEMESTER

P18MCBS401	**MOLECULAR DIAGNOSTIC TECHNIQUES**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with disease diagnosis and diagnostic tools. Learners will understand the molecular techniques, biochemical tests and assays.

COURSE OUTCOMES (COs)

CO1	Recall the infection, types of diseases and mode of transmission.
CO2	Recognize the disease diagnosis methods and tools.
CO3	Apply the molecular techniques for diagnosis.
CO4	Apply the biochemical tests for detection of sugar, urea and protein.
CO5	Analyze the importance of PCR and different assays.
CO6	Analyze and design the primers that are needed for PCR analysis.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							H	M
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
					✓					
4	Approval	Academic Council Meeting								

UNIT I **12**

Introduction and History of diagnostics, Genetic basis of diseases, Inherited diseases. Infections - mode of transmission in infections, Types of infectious diseases - bacterial, viral, fungal, protozoan and other parasites. Philosophy and general approach to clinical specimens, Sample collection - method of collection, transport and processing of samples, interpretation of results.

UNIT II **12**

Traditional disease diagnosis methods and tools - Diagnosis of infectious diseases caused by bacteria (*Streptococcus, Salmonella, Vibrio*), fungal (Dermatophytosis, Aspergellosis), viruses (Pox, Adenoviruses, Hepatitis viruses), protozoa (Amoebiasis, Malaria, Leishmaniasis) and Helminthes (Filariasis, *Ascaris lumbricoides*).

UNIT III **12**

Molecular Techniques for diagnosis - PCR, RFLP, ELISA, DHPLC, MALDI-TOF. Disease identification and Genetic tests of disorders (Thalassemia, Sickle cell anaemia, Alzheimer's disease, Muscular Dystrophy), Cardio vascular disorder, Neural tube defects and Male infertility, Ultrasonography, Foetal Blood Sampling (FBS).

UNIT IV **12**

Biochemical tests for detection and quantification of sugar, albumin, urea, protein, globulin and vitamin. Endocrine disorders related to Thyroid and Reproduction (TSH, T3, T4, Estradiol, testosterone, LH, FSH).

UNIT V **12**

Methods and types of PCR and its applications, RT PCR, Real time PCR, Inverse, Multiplex and Nested PCR. Southern and Northern Hybridization, FISH, PAE and Western Blot. Immunoassays Types [RIA, ELISA, Chemiluminescent IA, FIA] and specific applications; Immunohistochemistry – principle and techniques. Different Levels of Biosafety, Containment.

TEXT BOOKS:

1. Carl A Burtis, Edward R Ashwood and David E Bruns. Tietz Textbook of Clinical Chemistry and Molecular Diagnosis, 5th edition, Elsevier, 2007.
2. Leonard DG, Bagg A, Caliendo AM, Deerlin VM and Kaul KL. Molecular Pathology in Clinical Practice, pp. 411 - 424, Springer, 2007.

REFERENCE BOOKS:

1. David E Bruns, Edward R Ashwood and Carl A Burtis. Fundamentals of Molecular Diagnostics, Saunders Group, 2007, ISBN-13: 9781416037378.
2. George P Patrinos and Wilhelm Ansorge. Molecular Diagnostics, Academic Press, 2005 ISBN: 0125466617.

Course Coordinator **HOD**

MAJOR ELECTIVES

P18MEBS011	**MAJOR ELECTIVE-I: METABOLIC REGULATION**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the metabolism of biomolecules. Learners will understand the biosynthesis, biodegradation of each biological macromolecules and metabolic disorders.

COURSE OUTCOMES (COs)

CO1	Remember the basics of Carbohydrates, Lipids and Nucleic acids.
CO2	Recognize the metabolisms behind the macromolecules.
CO3	Apply the role of lipids and aminoacid degradation in eukaryotes.
CO4	Apply the biological significance of nucleic acids.
CO5	Analyze the importance of regulation and salvage pathways.
CO6	Analyze and understand the familiarity regarding purine and pyrimidine disorders.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Aerobic and anaerobic pathways: Glycolysis and its regulation, Gluconeogenesis and its regulation. TCA cycle, amphibolic & anaplerotic reactions. Electron Transport chain, Oxidative phosphorylation, & production of ATP, balance sheet of glucose oxidation, Oxidative stress, Pentose phosphate pathway (HMP shunt) & its regulation.

UNIT II **12**

Beta – oxidations of saturated & unsaturated fatty acids. Biosynthesis of fatty acids – Acetyl-CoA carboxylase reaction, Fatty acid synthase complex, biosynthesis of palmitate, energetics, Regulation of fatty acid biosynthesis. Biosynthesis of triacyl glycerols, Biosynthesis of cholesterol, regulation.

UNIT III **12**

Overview of amino acid synthesis. Biosynthesis of non-essential amino acids and its regulation. Biodegradation of amino acids – deamination, transamination, decarboxylation, urea cycle including its regulation.

UNIT IV **12**

De novo synthesis of purine and pyrimidine nucleotides, regulation and salvage pathways. Digestion of nucleic acids, degradation of purine and pyrimidine nucleotides. Inhibitors of nucleotide metabolism.

UNIT V **12**

Disorders of amino acids metabolism, phenylketonuria, alkaptonuria, maple syrup urine disease, homocystinuria and Hartnup's disease. Disorders of purine and pyrimidine metabolism – Lesch - Nyhan syndrome, Gout, and SCID.

TEXT BOOKS:

1. Freifelder D. Molecular Biology, 2nd edition, Narosa Publishing House, 1996.
2. Campbell MK. Biochemistry, 3rd edition, Saunders College Publishing Harcourt Brace College Publishers,1999.

REFERENCE BOOKS:

1. Geoffrey L Zubay. Biochemistry, Wm C Brown Publishers, 4th Edition, 1998.
2. David W Martin, Peter A Mayes and Victor W Rodwell. Harper's Review of Biochemistry, LANGE Medical Publications, 1983.

Course Coordinator **HOD**

P18MEBS012	MAJOR ELECTIVE-I: ENZYME TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the enzyme systems and kinetics. Learners will understand the classification, properties of enzymes and enzyme assays.

COURSE OUTCOMES (COs)

CO1	Recall the definition, classification and properties of enzymes.
CO2	Recognize the role of enzyme kinetics.
CO3	Apply the enzymatic concept in working of biosensors.
CO4	Apply the biphasic systems of enzymes.
CO5	Analyze the importance of enzymatic assays.
CO6	Analyze and develop the assay kits in diagnosis of diseases.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Introduction-Classification and nomenclature of enzyme –Properties of enzymes –Enzyme purification-selection-isolation and homogenization-separation and purification –gel filtration ,Ion exchange chromatography-Isoelectric focussing - test for purity and catalytic activity-Active site titrations, examples of purification of enzymes.

UNIT II **12**

Enzyme stability-folding and unfolding state-kinetic stability-methods for enzyme stability-enzyme modification, stabilizing agents-concentration-Immobilization-enzyme reactors.

UNIT III **12**

Biosensor-Introduction- components and working of biosensors-categories of biosensors-types of biosensors-Colorimertic-potentiometric-Amperometric-Optical-Pizeo-electric and immune chemical biosensors.

UNIT IV **12**

Biphasic system-aqueous two phase system-aqueous organic biphasic system-Enzyme engineering-solvent engineering/Synzyme - polyfunctional enzymes-coenzyme regenerating system.

UNIT V **12**

Enzyme assay-Spectrophotometric-Radio isotope-Manometric methods-Substrate assays-Immuno assays-Radio immuno assays-Fluorescence-Photoluminescene based immune assay-Delayed enhanced Lanthanide fluorescence immunoassay- Applications of enzymes.

TEXT BOOKS:

1. Robert A Copeland. Enzymes - A Practical Introduction to Structure, Mechanism, and Data Analysis, 2nd edition,Wiley Publishers, 2004.
2. Harwey W Blanch and Douglas S Clark. Biochemical Engineering, CRC Press, 1995.

REFERENCE BOOKS:

1. Berger SL and Kimmel AR. Methods in Enzymology, Vol.152, Academic Press, 1987.
2. Martin F Chaplin, Bucke C. Enzyme technology, Cambridge University Press, 1990.

Course Coordinator **HOD**

P18MEBS013	MAJOR ELECTIVE-I: BIOINFORMATICS	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with biological sequences and databases. Learners will understand the databases searches and sequence analysis.

COURSE OUTCOMES (COs)

CO1	Recall the concept of data storage and retrieval.
CO2	Recognize the different biological software and public database.
CO3	Apply computational techniques for biological data acquisition.
CO4	Apply the importance of computer aided drug design
CO5	Analyze the database searches like BLAST and FASTA.
CO6	Analyze and develop the drug designing methods and molecular modeling.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M							H	
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Introduction: Bioinformatics – scope, history and application of Bioinformatics, Emerging areas in Bioinformatics. Introduction to Genomics and Proteomics, Human Genome Project, Biological Software, # Public Database- GenBank, Current Status of Bioinformatics.

UNIT II **12**

Workstation: Bioinformatics workstation, Unix system, Scripting languages- Perl and Python, markup languages- HTML, XML. General Purpose Language C Language, Types of Operator, Array, Function and Structure. #Basic ideas of C++ and Java based object oriented programming.

UNIT III **12**

Biological sequences and Databases: Introduction to Database Management System. Biological sequences databases – including proteins and nucleic acids sequence – EMBL, DDBJ. Structure databases- CATH, SCOP, Specialized database –Genome data base, #EST-Phylogenetic analysis: PAUP and PHYLIP, Genome Database: GOLD.

UNIT IV **12**

Database searches and sequence alignment: Database searches: FASTA and BLAST, Sequence Alignment- Pair wise sequence alignment and multiple sequence alignment. Sequences retrieval from database - NCBI. # Protein sequence analysis - SwissProt and PDB, GEM Dock.

UNIT V **12**

Applications: Introduction to Drug Design, Drug Design Approaches, and Computer aided Drug Designing Methods. # Molecular modeling drug design, Molecular Decking, ChemSketch.

TEXT BOOKS:

1. Attwood TK and Parry Smith DJ. Introduction to Bioinformatics, Pearson Education Ltd., New Delhi, 2004.

REFERENCE BOOKS:

1. Puneet Mehrotra, Dr. Kumud Sarin Swapna and K.Srivastava, The New Handbook of Bioinformatics, 2005.

Course Coordinator **HOD**

	MAJOR ELECTIVE-II: INDUSTRIAL BIOTECHNOLOGY	L	T	P	C
P18MEBS021	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the production of biotechnological products. Learners will understand the production and application of metabolites and enzymes.

COURSE OUTCOMES (COs)

CO1	Recall the upstream and downstream process.
CO2	Recognize the microbial role in production industries
CO3	Apply the microbes in primary and secondary metabolite production.
CO4	Apply the production of enzymes and other bioproducts.
CO5	Analyze the importance of recombinant proteins having diagnostic applications.
CO6	Analyze and develop the new bioprocess strategies in plant and animal cell culture.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							M	H
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Fermentation - Bacterial, Fungal and Yeast, Biochemistry of fermentation. Traditional and Modern Biotechnology - A brief survey of organisms, processes, products. Basic concepts of upstream and downstream processing in Bioprocess, Process flow sheeting - block diagrams, pictorial representation.

UNIT II **12**

Primary Metabolites- Production of commercially important primary metabolites like organic acids, amino acids, alcohols and vitamins.

UNIT III **12**

Secondary Metabolites- Production processes for various classes of secondary metabolites: Antibiotics and Steroids.

UNIT IV **12**

Production of Industrial Enzymes, Biopesticides, Biofertilizers, Biopreservatives, Biopolymers Biodiesel, Cheese, Beer, SCP & Mushroom culture. Bioremediation.

UNIT V **12**

Production of recombinant proteins having therapeutic and diagnostic applications, vaccines. Bioprocess strategies in Plant Cell and Animal Cell culture.

TEXT BOOKS:

1. Kumar HD. A Textbook on Biotechnology, 2nd Edition, East West Press Pvt. Ltd., 1998.
2. Cruger Wulf and Anneliese Crueger. Biotechnology: A Textbook of Industrial Microbiology, 2nd Edition, Panima Publishing, 2000.

REFERENCE BOOKS:

1. Ratledge Colin and Bjorn Kristiansen. Basic Biotechnology, 2nd Edition, Cambridge University Press, 2001.
2. Presscott SC and Cecil G Dunn. Industrial Microbiology, Agrobios, India, 2005.

Course Coordinator **HOD**

	MAJOR ELECTIVE-II: INDUSTRIAL MICROBIOLOGY	L	T	P	C
P18MEBS022	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the production of various beneficial products. Learners will understand the production and application of feremnted products, sterilization methods and fermentation methods.

COURSE OUTCOMES (COs)

CO1	Recall the industrially important microorganisms.
CO2	Recognize the microbial role in fermentation process.
CO3	Apply the microbes in the production of fermented products.
CO4	Apply microbes in the production of enzymes, antibiotics, beverages, organic acids.
CO5	Analyze the importance of fermented vegetables, SCP and probiotics.
CO6	Analyze and develop new methods in the design of bioreactors.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M								H
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Introduction to fermentation– the range of fermentation process. The development of industrial fermentation industry. The component parts of a fermentation process. Industrial important organisms-Isolation and preservation- and strain improvement.

UNIT II **12**

Development of inoculums-Upstream processing media for industrial fermentation. Downstream processing – Removal of microbial cells and solid matter, foam separation, precipitation, filtration, centrifugation, cell disruptions, liquid – liquid extraction, chromatography membrane process.

UNIT III **12**

Kinetics-batch, fed batch and continuous process: Sterilization methods –batch sterilization, continuous sterilization of medium and air. Solid state and submerged: aerobic and anaerobic fermentation. Development of inoculum for yeast, bacterial mycelia and vegetative fungal process.

UNIT IV **12**

Industrial production of beverages –wine, beer; microbial production organic acids (Vinegar, lactic acid, citric acid), enzymes (amylase and protease) and antibiotics (penicillin). Fermented vegetables, SCP. Probiotics and prebiotics foods.

UNIT V **12**

Types and design of bioreactor : Construction material, Basic components –Agitator, aerator, valves and stream stirrer glands. Fermentor-Air lift, stirred tank ,tower, fluidized bed, packed bed , pulsed, photo reactors, PFR.

TEXT BOOKS:

1. Prescott and Dunn S. Industrial biotechnology, The AVI Publishing Component. Inc., 4th Edition, USA, 1982.
2. Stanbury PF, Whittaker A and Hall SJ. Principles of fermentation, Elsevier, 3rd edition, 1995.

REFERENCE BOOKS:

1. Joc MM, Sivakumar PK and Sukesh. An Introduction to Industrial Microbiology, Chand Publishing, 2010.
2. Casida LEJR. Industrial Microbiology, Second Edition, New Age International (P) Ltd. Publishers, New Delhi, 2011.

Course Coordinator **HOD**

	MAJOR ELECTIVE-II: MOLECULAR GENETICS	L	T	P	C
P18MEBS023	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject.				
	Course Coordinator Name & Department: - Dr. J. Senthil & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with DNA replication, damage mechanism and mutation. Learners will understand the gene transfer mechanisms.

COURSE OUTCOMES (COs)

CO1	Recall the DNA, RNA structure and its types.
CO2	Recognize the DNA replication and damage mechanism.
CO3	Apply the concept of genomics and proteomics.
CO4	Apply the plasmids in gene transfer mechanisms.
CO5	Analyze the plasmids and its function.
CO6	Analyze and design the plasmids for artificial transfer.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							H	
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences BS)	Engg Sciences (ES)	Professional Core PC)	Core Elective (CE)	Non-Major Elective NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Gene as a unit of mutation and recombination - DNA as a genetic material - different types; RNA as a genetic material - different types-genetic code; Mutation - molecular nature - physical and chemical mutagens and its applications.

UNIT II **12**

DNA replication - prokaryotic and eukaryotic DNA replication - Mechanisms of DNA replication - Enzymes and accessory proteins involved in DNA replication - Bacterial genetic system - transformation, conjugation and transduction.

UNIT III **12**

DNA damage - mechanism of repair - excision repair, recombination repair, promoter, operator, terminator and attenuator - SOS, and adaptive responses and their regulation - Heat shock response.

UNIT IV **12**

Genomics and Proteomics: structural and functional genomics; proteomics -definition - analysis and characterization - related technologies, and interrelations with genomics.

UNIT V **12**

Discovery of types and structure of plasmids - artificial plasmid transfer and their applications - Insertion sequence in prokaryotes - Transposable elements - discovery and characterization.

TEXT BOOKS:

1. Watson JD. The Molecular Biology of the Gene, Benjamin Cummings, 1987.

REFERENCE BOOKS:

1. Kumar HDK. Molecular Biology, Vikas Publishing House Private Ltd.
2. Alberts Szent- Gyorgyi. Introduction to Sub Molecular Biology, Academic Press, 1960.
3. Benjemin Lewin. Genes VII, Oxford University Press, Oxford, 1994.

Course Coordinator **HOD**

P18MEBS031	MAJOR ELECTIVE-III: WASTE MANAGEMENT TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
	Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES:-

Learners will be familiar with the biomedical waste and bioremediation. Learners will understand different kinds of wastes and treatment.

COURSE OUTCOMES (COs)

CO1	Recall the classification, disposal and recycling methods
CO2	Recognize the wastes and treatment measures
CO3	Apply the management of different types of wastes
CO4	Apply the basic principles and techniques of waste characterization and treatment.
CO5	Analyze the technologies for bioremediation
CO6	Analyze the disposal and recycling methods

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M							M	H
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship(PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Introduction: Definition and Classification- Disposal methods: Land fill and Incineration – Recycling methods: biological reprocessing and Energy recovery-. Avoidance and Reduction Methods- Waste handling and Transport – Waste management Concepts

UNIT II **14**

Introduction- Waste Consistency- Waste Management Function: Production ,Collection, Storage, Treatment , Transfer, Utilization- Waste Management system Design – Waste Management System: Dairy Waste, Beef Waste, Swine Waste, Poultry Waste, Other animal – Municipal and Industrial Sludge- Food Processing – Agri Chemical Waste Management-Handling..

UNIT III **12**

Introduction- Overview – Characterization of Medical Waste- Waste Generation Methodology – Sterilization- Chemical Disinfection – Thermal Inactivation- Irradiation- Microwave Treatment – Grinding and Shredding – Compaction- Current Practice – Standards.

UNIT IV **12**

Paper and Pulp Industry – Leather Industry – Cement Industry – Chemical Industry – fertilizer Industry – Pharmaceutical Industry – Textile industry – Iron and Steel industry – Mining Industry – Lignite industry – Petroleum Industry – Nuclear Industry.

UNIT V **10**

Bioremediation – Phyto-remediation- Recycling of Plastic and Paper.

TEXT BOOK

1. Agricultural Waste Management Hand Book, USDA, 3rd Ed, 2005.
2. Indu Shekhar Thakur, Industrial Biotechnology Problems and Remedie, 6th Ed, 2006.

REFERENCE BOOKS

1. Lawrence K Wang, Nazik K Shammas and Yung Tse Hung. Advances in Hazardous Industrial Waste Treatment, CRC Press, Taylor &Francis group, 2008.

Course Coordinator **HOD**

P18MEBS032	MAJOR ELECTIVE-III: BIOSTATISTICS	L	T	P	C

Total Contact Hours - 60	3	1	0	4
Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with the biostatistical tools. Learners will understand the measures of central tendency, correlation and regression analysis and probability.

COURSE OUTCOMES (COs)

CO1	Recall the basic in biostatistics
CO2	Recognize the measures of central tendency - Mean, Median, Mode
CO3	Apply the correlation and regression table.
CO4	Apply the probability, poisson and normal distributions
CO5	Analyze the statistical interferences
CO6	Analyze the results and interpret the values.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Statistics - scope, collection, classification, tabulation of Statistical data-Diagrammatic and graphical representation of data-Bar diagram (simple, multiple and subdivided)-Pie diagram. Frequency diagram, histogram, frequency polygon and frequency curve line graphs..

UNIT II **12**

Measures of central tendency; Arithmetic mean-definition-computation for different types of data(ungrouped and discrete and continuous frequency distributions)-other measures such as median, mode, geometric mean, harmonic mean and weighed average may be defined-computation for different types of data(ungrouped and discrete and continuous frequency distributions).

UNIT III **12**

Correlation and regression-correlation table-coefficient of correlation-z transformation-regression-relation between regression and correlation.

UNIT IV **12**

Probability –Probability distributions-Binomial (Gaussian distribution) and negative binomial, compound and multinomial distribution. Poisson distribution-Normal distribution-graphic representation-frequency curve and its characteristics-measures of central value, dispersion, coefficient of variation.

UNIT V **12**

Statistical Interference –Testing of hypothesis-Null hypothesis-Type I and Type II errors. Test of significance of large and small samples based on Normal, t, z distributions with regards to mean, variance, proportions and Correlation coefficient-chi- square test of goodness of fit.

TEXT BOOKS:

1. Zar JH. Bio statistical methods, Prentice Hall, International Edition, 1984.
2. Daniel WW. Biostatistics, John Wiley Sons, New York, 1987
.

REFERENCE BOOKS:

1. Warren J, Gregoru E, Grant R. Statistical Methods in Bioinformatics, 1st edition, Springer, 2004.
2. Ronald Forthofer, Eun Lee, Mike Hernandez, Biostatistics- A Guide to Design, Analysis and Discovery, 2nd Edition, Academic Press, 2006..

Course Coordinator **HOD**

P18MEBS033	MAJOR ELECTIVE-III: BIOETHICS AND IPR	L	T	P	C

Total Contact Hours - 60	3	1	0	4
Prerequisite course – B.Sc. Biochemistry, Biotechnology, Microbiology and other related Life Science Subject				
Course Coordinator Name & Department: - Dr. V. Padmapriya & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with a basic knowledge about Ethics and copyrights. Learners will understand the types of patents and biosafety committee.

COURSE OUTCOMES (COs)

CO1	Recall the basic concepts in bioethics and theories related to biotechnology
CO2	Recognize the research concerns and challenges to public regulations
CO3	Apply knowledge for IPR patents
CO4	Apply the type of patents and their scopes
CO5	Analyze the roles of biosafety committee.
CO6	Analyze patent according to ethics and copyrights.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
						✓				
4	Approval	Academic Council Meeting								

UNIT I **12**

Bio ethics-concepts-Philosophical considerations-epistemology of science, ethical terms, principles and theories relevance to bio technology-Ethical and law issues-Medical techniques-Trans humanism and bio weapons

UNIT II **12**

Research concerns-animal rights, ethics of human cloning, emerging issue biotechnology's impact on society.DNA on the witness stand and use of genetics evidence in civil and criminal court cases. Challenges to public policy regulations, improving public understanding of biotechnology products to correct misconceptions

UNIT III **12**

Introduction to IPR-basics of patents, types of patents indian patent Act1970 recent amendments, filing patent application, precautions before patenting –disclosure and non disclosure. WIP Otreaties, Budapert treaty, PCT and implication, procedure for filing a PCT application, types of IP-patent, trademarks, copyrights. International frame work for the protection of IP and to history of GATT, WTO. WIPO and TRIPS global scenario of patents and Indian position

UNIT IV **12**

Patent filing infringement-application forms and guidelines, fee structure and time frames. Types of patenting-requirement procedure and costs, financial assistance for patenting and publication of patents - gazette of India, status in Europe and us patenting by research students. Patent meaning, scope, litigation case studies and examples.

UNIT V **12**

Biosafety committee, RCGM, GEAC of GMoS and LMoS- Definition –roles of institutional biosafety committee. GMos applications in food and agriculture environmental release of GMoS. Biosafety levels and primary containment for biohazards recommended biosafety levels for infectious levels of specific microorganism

TEXT BOOKS:

1. Ellen frankel Paul, Fred. Miller, Bioethics, Cambridge University Press, 2002.
2. John A Bryant, Linda Baggott la Vella, Bioethics for Scientists, Wiley, 2002.

REFERENCE BOOKS:

1. Emanuel E Crouch and Grady C Baltimore Maryland. John's Hopkins University Press, 2003.

Course Coordinator **HOD**

OPEN ELECTIVES

P18OEBA001	ADVERTISING AND SALES MANAGEMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course –UG Level				
	Course Coordinator Name & Department:- T Manjiniprakash/BBA				

COURSE OBJECTIVES: -

- Identify the terms and concepts that are commonly used in promotion and advertising.
- Demonstrate preparation to comprehend the basic advertising.
- Give the relationship which underlines these terms and concepts To familiarize the students with the basic fundamentals of accounting.
- To impart knowledge on final accounts of sole trading concern.
- To enable the students on the concept of income & expenditure and receipts and payments.

	COURSE OUT COMES (COs)
CO1	Students gain basic knowledge of Advertising its functions, roles and development of advertising.
CO2	Know about Advertising design and its strategies.
CO3	Expose on Advertising, media and about its types.
CO4	To forecast sales and its techniques used in management.
CO5	Students were enriched about salesmanship, sales planning, budgeting.
CO6	Develop an advertising plan and present and defend it persuasively.

Mapping of Course Outcomes with Program outcomes
(POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	L	M						M	L	
	CO2	H	L								
	CO3	L	H								
	CO4	H	L								
	CO5	L	M								
	CO6	M	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval		Academic Council Meeting

	BPO MANAGEMENT	L	T	P	C

UNIT – I	**6**
Introduction to Advertising- Definition -Roles of Advertising- Functions of Advertising- Steps in Development of Advertisement	
UNIT – II	**6**
Advertising Design- Appeals- Structure of an Advertisement - Message Strategies - Cognitive strategy- Executional Strategies-Creating Advertising- Advertising Effectiveness.	
UNIT – III	**6**
Advertising Media - Merit and demerits- Kinds of Advertising - Advertising Media- print media - Broadcasting media- Non-media advertising- online advertising.	
UNIT – IV	**6**
Sales Management - Defining - Objectives -Strategies- Sales Executives – Functions - Qualities - Sales Presentation Techniques - Emerging Trends in Sales Management.	
UNIT – V	**6**
Selling Concept - Objectives- scope and techniques of Salesmanship- Sales Planning- Importance – process- Sales Budget- Objectives-uses of sales Budget.	
TEXT BOOKS	
1. Advertising & promotion: George E.Belch, THM	
2. Advertising Management, Dr. Varma&Aggarwal, kingBooks	
REFERENCES:	
1. Sales promotion and advertising management by M .N.Mishra. Himalaya Publication.	
2. Advertising and sales management by SanjeevChauhan (Astha publication)	
3. Anderson, Hair, Bush: Professional Sales Management, McGraw Hill, Singapore.	
T Manjiniprakash	
Course Coordinator	**HOD**

	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- .P.Srinivasan/ Business Administration				

COURSE OBJECTIVES: -

- To familiarize the students with the basic fundamentals of BPO industry
- To impart knowledge on BPO industry
- To enable the students on the concept of various decisions in Business Process Outsourcing

	COURSE OUT COMES (COs)
CO1	Develop a strategic understanding of the concepts of BPO's and its benefits
CO2	Explaining various models used in functioning of BPO's and Trends.
CO3	Describe the opportunities and challenges in Human Resources BPO
CO4	Analyzes about call centers its functions, processes and classifications
CO5	Developing efficiency in understanding the customers and capabilities in handling calls.
CO6	To understand the future trends in BPO industry

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO3**
2	CO1	H	M						M	L	
	CO2	H	L								
	CO3	H	M								
	CO4	M	H								
	CO5	M	M								
	CO6	L	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT-I	**6**
Business Process Outsourcing – Meaning – definition - Basics - Benefits - BPO Models - - BPO Companies in India.	
UNIT-II	**6**
Healthcare BPO – Structure of the American Healthcare Sector – Activity Profile –Future Trends and Threats – Case Study – Cbay Systems.	
UNIT – III	**6**
Human Resource BPO – Reasons for outsourcing HR – Activities involved in HR BPO – HR Outsourcing Trends – Career in HR BPO – Emerging BPO Domains – Media and Entertainment BPO – Publishing BPO.	
UNIT – IV	**6**
Call Centres – Functions – Processes – classifications – Telemarketing – Tele selling – Preparing for a Job – Approach – Training – Selection Process.	
UNIT – V	**6**
Improving Efficiency – Handling Calls – Team Player – Pleasing the Customers –	
Converse efficiently – Reducing stress.	
TEXT BOOKS:	
1.BPO Industry in India by S K Awasthi by Jain Book	
2.Business Process Outsourcing: Its Prospects and Challenges by Barua.	
REFERENCE BOOKS	
i) SudhindraMokhasi(2009) ,BPO – Sutra : True stories from India's BPO and call centres, -Rupa& Co.	
ii) Kulkarni, Sarika.(2005), Business process outsourcing – Delhi, Jaico Publishing House.	
iii) Shikapur, Deepak(2004), BPO Digest. Ameya Inspiring Books.	
Mr.P.Srinivasan	
CourseCoordinator	**HOD**

P18OEBA003	CALL CENTER MANAGEMENT- Voice and Non Voice	L	T	P	C
	Total Contact Hours –30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:-A.Jhoncy / BBA				

COURSE OBJECTIVES:-

- Develop and motivate a call centre team.
- Get the most out of call monitoring technology and prepare effective management reports.
- React to and plan for operational bottlenecks.
- Give meaningful feedback to call-centre agents and set achievable goals and targets.
- Students will learn about the roles and methods of different kinds of call centers. They will apply this by designing their own call center and trying to anticipate customer needs.

	COURSE OUT COMES (COs)
CO1	Gaining a basic knowledge about call centers its functioning and classifications.
CO2	To know about handling the Issues and problems related to calls in a efficient manner.
CO3	Gives knowledge of technical communications, speech process and educate conversation of oral skills.
CO4	Students acquire knowledge towards pre-interview about Interview questions and answering techniques
CO5	Analyses fully about the medias of communications.
CO6	Demonstrate awareness of the pragmatics of call center planning and operation

Mapping of Course Outcomes with Program outcomes
(POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO3
2	CO1	M	H						M	H	
	CO2	M	H								
	CO3	L	H								
	CO4	L	H								
	CO5	M	H								
	CO6	L	H								

3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval		Academic Council Meeting

UNIT – I **6**

Call centers – Meaning – Functions – Processes - Classifications – Tele selling – Types of call centers.

UNIT – II **6**

Improving Efficiency – Handling calls – Team Players – Components and working of call center – Issues and problems.

UNIT – III **6**

Nature of Technical communication: Stages of communication – Nature of Technical Communication - The speech process – Conversation and Oral skills.

UNIT – IV **6**

Job Interview: Pre – Interview preparation techniques – Interview questions – Answering Strategies – Frequently asked Interview questions.

UNIT – V **6**

Communication media – Telephone – Fax – Internet – Email – Video conferencing.

TEXT BOOKS

1. Brad Cleveland - Call Center Management on Fast Forward: Succeeding in the New Era of Customer Relationships (3rd Edition) Third Edition,
2. Mr. Thomas Anthony Laird - Advice from a Call Center Geek: Rethinking Call Center Operations,

REFERENCE BOOKS

1. W. Stallings "Data and Computer Communication" Pearson Education, 5 Edition, 2001.
2. M. AshrajRizvi," Effective Technical Communication", Tata McGraw – Hill Education, 2005.
3. R.S.N.Pillai&Bagavathi – Modern commercial correspondence.

A.Jhoncy

Course Coordinator **HOD**

P18OEBA004	CUSTOMER RELATIONSHIP MANAGEMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Dr.D.Arun Kumar /BBA				

COURSE OBJECTIVES: -

- To Popularize the students with the basic fundamentals of CRM.
- To improve knowledge & skills on Customer relationship of Marketing strategy.
- To develop the students on the concept of Customer service.

	COURSE OUT COMES (COs)
CO1	To popularize with the basics of CRM.
CO2	Can increase awareness about Customer relationship.
CO3	Able to be aware of the concept of Customer service.
CO4	Can respond to the concept of Customer needs.
CO5	Develop confidence in the practical aspects of Customer Satisfaction
CO6	Identify the main Customer Expectations.

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2	PSO3
2	CO1	M	L						M	L	
	CO2	L	L								
	CO3	M	L								
	CO4	L	L								
	CO5	M	H								
	CO6	H	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT – I	**6**
CRM – Introduction – Definition – Need for CRM – Customer satisfaction – Customer loyalty – Product Marketing – Direct Marketing-	
UNIT – II	**6**
Customer learning relationship – Key stages of CRM - Force driving CRM – Benefits of CRM – Growth of CRM Market in India – Key principles of CRM.	
UNIT – III	**6**
CRM – Program – Ground work for effective use of CRM – Components of CRM – Types of CRM.	
UNIT – IV	**6**
CRM Process - Frame work – Governance process- Performance evaluation process.	
UNIT – V	**6**
Use of Technology in CRM – Call center process – CRM Technology tools – Implementation – Requirements analysis – selection of CRM Package – reasons and failure of CRM.	
TEXT BOOK	
1. Kristin Anderson & Carol Kerr – Customer Relationship Management – McGrawHill 2002	
2.Sheth – Customer Relationship Management – McGraw Hill Edition 1st Edition 2000	
REFERENCE BOOK	
1. Dr. P .Sheela Rani – Customer Relationship Management – Margham Publication.	
2. K. Balasubramaniyam – Customer Relationship Management – GIGO Publication, 2005.	
3. Dr. Ravi Kalakota E – business – Road map for success, Pearson education Asia, 2000.	
Dr.D.ArunKumar	
CourseCoordinator	**HOD**

P18OEBA005	ENTREPRENEUR DEVELOPMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Dr.DArun Kumar /BBA				

COURSE OBJECTIVES: -

- To make publicity on the students with the basic fundamentals of Entrepreneur Development
- To improve knowledge & skills on Entrepreneurship.
- To develop the students on the concept of Entrepreneurial skills.

COURSE OUTCOMES (COs)

CO1	To popularize with the basicsof Entrepreneur development.
CO2	Can increase awareness about Entrepreneurship.
CO3	Able to be aware of the concept of Entrepreneurial skills.
CO4	Can respond to the concept of Entrepreneurial knowledge.
CO5	Develop confidence in the practical aspects of Business Opportunity.
CO6	Identify the main Innovations in Entrepreneurial Development.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/Lindicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	M	L								
	CO2	L	L								
	CO3	M	L							H	
	CO4	L	L								
	CO5	M	H								
	CO6	H	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship(PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT – I	**6**
Introduction to Entrepreneurship: Meaning and concept of entrepreneurship - the history of entrepreneurship development - role of entrepreneurship in economic development	
UNIT – II	**6**
The Entrepreneur: Meaning of entrepreneur - the skills required to be an entrepreneur, and role models, mentors and support system.	
UNIT – III	**6**
Business Opportunity Identification: Business ideas, methods of generating ideas - legal form of new venture, protection of intellectual property -marketing the new venture.	
UNIT – IV	**6**
Preparing a Business Plan: Meaning - significance of a business plan - components -feasibility study.	
UNIT – V	**6**
Financing the New Venture: Importance - types of ownership securities - venture capital - types of debt securities -determining ideal debt-equity mix - financial institutions and banks.	
TEXT BOOK	
1. Robert D. Hisrich, Mathew J Manimala, Michael P Peters, Dean A Shepherd, “Entrepreneurship”, 9e,McGraw Hill Education, 2014.	
2. Peter F. Drucker, “Innovation and Entrepreneurship”,Harper Collins, 2009.	
REFERENCE BOOK	
1. John Bessant, Joe Tidd, “Innovation and Entrepreneurship”,2e,Wiley India Private Limited, 2012.	
2. Robin Lowe, Sue Marriott,"Enterprise: Entrepreneurship and Innovation: Concepts,Contexts and Commercialization"1e,Routledge, 2012.	
3. VeeraBhadrappaHavinal – Management Entrepreneurship – New Age International Publishers.	
Course Coordinator	**HOD**

P18OEBA006	ADVANCE HUMAN RESOURCE MANAGEMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- P.Srinivasan / BBA				

COURSE OBJECTIVES:-

- Today's competitive business environment owes its success to effective management of its human resource.
- The quality of the organization's employees, their attitude, behavior and satisfaction with their jobs, and their behavior towards ethics and values and a sense of fair treatment all impact the firm's productivity, level of customer service, reputation, and survival.
- The students of human resources management must aware of basic aspects of human resource management to understand the functioning of human resource management in an organizational setting.
- Students gained knowledge in the present day human resources development practice by incorporate themselves in the changing environment of HRM.

	COURSE OUT COMES (COs)
CO1	Identify how firms gain a sustainable competitive advantages through people
CO2	To be aware of the responsibility managers of have concerning human resource management
CO3	Identify the importance of change management.
CO4	To implement basics compensation and performance appraisal
CO5	Importance of labour welfare and grievance handling for employment
CO6	Understand the importance of Employee participation and Relations.

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/Pos**	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
2	CO1	H	H						M		
	CO2	M	M								
	CO3	L	H								
	CO4	M	L								
	CO5	M	M								
	CO6	H	H								
3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
								✓			
4	Approval	Academic Council Meeting									

UNIT – I	**6**
Human Resource Function- Human Resource Philosophy – Changing environments of HRM – Strategic human resource management – Role of HR Managers.	
UNIT – II	**6**
Recruitment & Placement: Sources, Developing and using application forms - IT and online recruitment - Selection process, basic testing concepts - types of test - work samples & simulation - selection techniques – interview - Designing & conducting the effective interview - computer aided interview.	
UNIT – III	**6**
Training & Development: Employee Orientation- Training process- Need analysis- Training techniques- special purpose training- Performance appraisal: Methods - Problem and solutions - MBO approach - Performance appraisal in practice.	
UNIT – IV	**6**
Basic Compensation & Pay plans - factors determining pay rate - Current trends in compensation - Computerized job evaluation - financial incentives - benefits - Insurance benefits - retirement benefits – welfare measure	
UNIT – V	**6**
Trade unions - Discipline administration - grievances handling - Labour Welfare: Importance & Implications of labour legislations - Employee health.	
TEXT BOOKS	
1. Dr. R.Venkatapathy& Assissi Menacheri, Industrial Relations &Labour Welfare, Adithya Publications, CBE, 2001. 5. Robert L.Gibson and Marianne H.Mitchell, Introduction to Counseling and Guidance, VI edition, PHI, 2005	
2. L.M. Prasad – Human Resource Management – S. Chand & Sons – 2007.	
REFERENCEBOOKS	
1. Gary Dessler & Biju Varrkey, "Human Resource Management, 15th edition.Pearson.	
2. David A. DeCenzo& Stephen P.Robbins, Personnel/Human Resource Management, Third edition, PHI/Pearson.	
3. VSP Rao, Human Resource Management: Text and cases, First edition, Excel Books, New Delhi - 2000.	
4. P.Srinivasan Human Resource Management", Seventh edition, Prentice-Hall of India P.Ltd., Pearson.	
D.K.Sowmiyalakshmi	
Course Coordinator	**HOD**

P18OEBA007	LOGISTICS & SUPPLY CHAIN MANAGEMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course: UG Level				
	Course Coordinator Name & Department:- T.Manjiniprakash / BBA				

COURSE OBJECTIVES:-

- To make the students to understand the usefulness of logistics and supply chain.
- This document lists the course's major subject areas and the knowledge, comprehension, application, analysis, synthesis and evaluation skills that they are designed to impart.
- Identify the sources of cost in a supply chain.
- Define inventory and types of inventory in a supply chain.
- Define transportation cost and identify the factors that contribute to this cost.
- Calculate inventory cost and transportation cost for a logistics problem.
- Define fixed and variable cost.
- Understand the economies of scale in transportation and inventory cost

	COURSE OUT COMES (COs)
CO1	Identify and Analyze Business Models, Business Strategies and corresponding Competitive Advantage.
CO2	Formulate and implement Warehouse Best Practices and Strategies.
CO3	Plan Warehouse and Logistics operations for optimum utilization of resources
CO4	Apply logistics and purchasing concepts to improve supply chain operations
CO5	Apply quality management tools for process improvement
CO6	Create an ideas about logistics and supply chain management

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO3**
2	CO1	H	H						H		
	CO2	H	M								
	CO3	M	M								
	CO4	L	M								
	CO5	H	M								
	CO6	M	H								

3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval		Academic Council Meeting

UNIT –I	**6**
Logistics management and Supply Chain management - Definition, Evolution, Importance.The concepts of logistics.Logistics relationships -Functional applications - Logistics Organization - Logistics in different industries.	
UNIT –I	**6**
Logistics Activities: – objectives, solution. Customer Service, Warehousing and Material Storage, Material Handling, information handling and procurement Transportation and Packaging - Reverse Logistics - Global Logistics	
UNIT-III	**6**
Fundamentals of Supply Chain - Development of SCM - Strategic Supply Chain Management and Key components -Drivers of Supply Chain Performance – key decision areas – External Drivers of Change.	
UNIT-IV	**6**
Supply Chain Drivers and Design Drivers of supply chain performance: Framework for structuring Facilities warehouse – Inventory – Transportation – Information - Sourcing, and Pricing – Revenue management.	
UNIT-V	**6**
Demand and Inventory Aggregate Planning in a Supply Chain: role - strategies Implementation Responding to predictable variability in supply chain – Types of supply chains - creating responsive supply chains lean	
TEXT BOOKS	
1. Supply Chain Management: Ronald H. Ballou, Samir K. Srivastava, Pearson Education Ltd, Jan 2007.	
2. Supply Chain Management**:** Anil Sinha, McGraw Hill Education, August 2011.	
REFERENCE BOOKS	
1. Logistics and Supply Chain Management: Martin Christopher, Pearson Education Ltd, 2016.	
2. Supply Chain Management: Sunil Chopra, Peter Meindl, Dharma Virus Kalra, Pearson Education Ltd, 2016.	
3. Supply Chain And Logistics Management: V. Anandaraj, S. Kumaran, IshankaSaikira, Airwalk Publication, Jan 2018.	
T.Manjiniprakash.	
Course Coordinator	**HOD**

P18OEBA008	OFFICE MANAGEMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- D.K.Sowmiyalakshmi /BBA				

COURSE OBJECTIVES: -

- To familiarize the students with the basic fundamentals of accounting.
- To impart knowledge on final accounts of sole trading concern.
- To enable the students on the concept of income & expenditure and receipts and payments.

	COURSE OUT COMES (COs)
CO1	To make them understand office management and duties of an office manager
CO2	To give an idea about proper filing and indexing of office documents
CO3	To understand the principles of record management and different types of records in business organization.
CO4	To enable them to aware about safety hazardous and steps to improve office safety.
CO5	To introduce different measures of office work
CO6	Create an ideas about office management

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO3**
2	CO1	H	H						H		
	CO2	M	M								
	CO3	M	H								
	CO4	L	H								
	CO5	H	H								
	CO6	H	M								

3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT -I	**6**
Introduction: Meaning, functions and importance of office management; office management and organization. Principles of office management and organization.Principal departments of modern office.	
UNIT-II	**6**
Office Manager: qualities of office manager. The authorities and responsibilities of an office manager. Office accommodation: Selection of site. Office layout.Environment and working conditions.	
UNIT-III	**6**
Office equipment's - Reproduction equipment - Typewriter - Duplicators - Photo Copier - Communication Equipment - Intercom - Telephone - Use of Computers in Office Management Office System - Procedure - Routine - And methods - Paper work in office Filling functions.	
UNIT-IV	**6**
Office Communication: Various means of communication- Their use, Correspondence through Internet - Office Correspondence -Central vs. Departmental Correspondence - Handling Mail - Postal Services - Oral written - Internal and external communication - Records Management Types - Forms Controls - Principles - Foremost -Continuous stationery	
UNIT-V	**6**
Office Supervisor - Meaning and characteristics of Supervisor - Status - Place and Role of Supervisor - Effective Supervisor - Qualification - skill of Supervisor.	
TEXT BOOKS	
1. Modern Office Management: N. D Sharma, And Publishers, Jan 2006.	
2. Office Management: Prashansa K. Ghosh, S. Chand & Sons, Jan 2010	
REFERENCE BOOKS	
1. Office Management: R.S.N Pillai&Bhagavathi, S. Chandler & Come, Dec 2010.	
2. Office Management: R. Nangia, G. K Gupta, Crescent Publishing House.	
3. Office Management: Dr. R. K Chopra, PriyankaGauri, Himalaya Publishing House, Jan 2017.	
4. Of Non-Trading Organization-Receipts And Payment Account- Income And Expenditure Account	
D.K.Sowmiyalakshmi	
Course Coordinator	**HOD**

P18OEVC001	PHOTOGRAPHY AND VIDEOGRAPHY	L	T	P	C
	Total Contact Hours – 45	2	0	0	2
	Prerequisite – UG Level				
	Course Coordinator Name & Department:- L.Rakesh– Dept of Visual Communication				

COURSE OBJECTIVES

- To understand the fundamentals of Photography and Videography
- To examine the technical factors of indoor and outdoor photography and Videography
- To enable the students to equip themselves to become a photography and Videography professionals.

	COURSE OUT COMES (COs)
CO1	Can analyze the fundamentals of Photography and Videography
CO2	Understanding of the camera operations
CO3	Evaluating the lighting
CO4	Can be aware of the wrong exposures
CO5	Can promote various types of photography and Videography
CO6	Understanding the concept of photo-journalism

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT-I:	**6**
Human Eye and Camera. Basics of Camera (aperture, shutter speed, focal length, f-stop, depth of field etc.,) Camera operations, Introduction to Television Production,Types of telecasting, Television Crew, an overview of direction.	
UNIT-II:	**6**
Types of Still and video cameras. Types of Lenses. Visual Perception, Art direction, floor management- indoor & outdoor, production management, budget preparation. Locations: In-door, set, on-sights sets, - Outdoor on-sight sets, blue matte. Etc.,	
UNIT-III:	**6**
Understanding lighting-indoor and outdoor, Exposing and Focusing, Types of lighting, Natural and Artificial Lights, Controlling lights, Exposure Meters. Camera techniques & operation, Framing, shots & movements (wide, medium, close ups, shadow, zoom, pan, tilt, aerial etc.,),	
UNIT-IV:	**6**
Photography for advertising-Consumer and industrial. Usage of various types of camera lenses (Normal, Tele, Zoom etc.,), usages of various filters (day ,night, colour correcting filter, diffusion filter), objectives TV lighting, various types of Lights (baby, Junior, Senior, etc.,)	
UNIT- V:	**6**
Basics of photo-journalism, Photo-features, Photo - essays, Writing captions, Visual story telling. Planning a shoot-studio, location, set props and casting.Colour temperature, lighting for different situations (interviews, indoor, out-door), types of lighting (Back, Front, full, semi, etc.,)	
TEXT BOOKS:	
1.The Art of Photography: A Personal Approach to Artistic Expression, Barnbaum, Bruce, Rocky Nook.	
2.Photography Demystified: Your Guide to Gaining Creative Control, David McKay, Photography Inc.	
3. Television Productions: A History of All Series and Pilots, by Jon Abbott, Publisher: McFarland & Company (May 13, 2009)	
4. Production Management for TV and Film: The Professional's Guide, Methuen Drama (August 1, 2010)	
REFERENCE BOOKS:	
1.The Photographer's Eye,Szarkowski, John, The Museum of Modern Art, New York (Publisher)	
2.Creative Composition: Digital Photography Tips and Techniques, Davis, Harold, Wiley	
3.From Concept to Screen: An Overview of Film and Television Production, Robert Benedetti, Pearson; 1 edition (June 11, 2001)	
4.The Television Handbook, Routledge, Holland, P (1998)	
Course Coordinator	**HOD**

P18OEEN001	SOFT SKILLS	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite – UG Level				
	Course coordinator name : Mrs.B.CAROLINE– Dept of English				

COURSE OBJECTIVES:- To impart students with the efficient knowledge of important events in through soft skills

	COURSE OUT COMES (COs)
CO1	Remember the personal as well as professionals goals of the students
CO2	Understand the manners during professional meetings
CO3	Apply the confidence and fluency in speaking English.
CO4	Analyze the learners to fine-tune their linguistic skill with communication globally
CO5	Evaluate the excellence in both personal and professional life
CO6	Create the performance of learners at placement interviews and other recruitment procedures.

Mapping of Course Outcomes with Program outcomes
(POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	H	H								
	CO4	H	L								
	CO5	H	L								
	CO6	H	H								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I- LISTENING / VIEWING	**6**
Listening and note-taking – Listening to telephonic conversations – Ted talks – Inspiring Speeches – Watching documentaries on personalities, places, socio-cultural events, TV news programmes and discussions to answer different kinds questions, viz., identifying key idea and comprehension questions… so on.	
UNIT II- SPEAKING	**6**
Elements of presentation skills-Structure of presentation-presentation tools- mock interviews – group discussion – introducing one self and others – welcome address and proposing a vote of thanks- role play – debating.	
UNIT III - READING	**6**
Different genres of text (literature, media, technical) for comprehension – Reading strategies like note-making – reading graphs, charts and graphic organizer – Sequencing sentences – reading online sources like e-books, e-journals and e-newspapers.	
UNIT IV - WRITING	**6**
Resume/Report preparation/Letter Writing-Structuring the resume-comprehension-Describing charts and tables – writing for media on current events.	
UNIT V- PROJECT	**6**
Gender injustice: Dowry-Violence against women -Sexual Harassment -Eve teasing-Female infanticide-Prostitution. **Social problem**: Poverty-unemployment-Child Labour-Terrorism-Drug abuse-Alcoholism-Corruption. **Industrial problem:** Work and Labour organization-Elements-Principles-Staff and Functional Activities. **Industrial Conflict:** Strikes-Disputes-Grievances-Industrial development in India-Steps in Automation process-Industrial policy-Liberation.	
TEXT BOOKS	
1 .Rizvi ashraf ,Effective Technical Communication , Tata amcgraw Hill Education Private Ltd,New Delhi,2011.	
2. Townsend Roz , Presentation skills for the upwardly mobile , Emerald Publishers.	
REFERENCE BOOKS	
1. T.M.Farhathullah, communication skills for Technical students, Orient Longman Ltd,2002.	
2. Andree J Rutherford, Basic communication skills for Technology, Pearson Education,Asia (Singapore) Pte.Ltd, Banglore , 2001.	
Course Coordinator	**HOD**

P18OEEN002	**MASS MEDIA AND COMMUNICATION**	**L**	**T**	**P**	**C**
	Total Contact Hours – 30	2	0	0	2
	Prerequisite – UG Level				
	Course coordinator :– Dr.P.AROCKIA NATHAN Dept of English				

COURSE OBJECTIVES : To impart students with the efficient knowledge of important events in through literature

	COURSE OUT COMES (COs)
CO1	Remember the art of writing, report and editing
CO2	Understand the skills of writing
CO3	Apply the Role & importance in social change
CO4	Analyze the social structure of Indian society
CO5	Evaluate the growth & development of communication and media
CO6	Create the interpreting the meaning from the text

Mapping of Course Outcomes with Program outcomes
(POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
2	CO1	H	L						H	M	L
	CO2	H	L								
	CO3	H	L								
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I -Communication and Media	**6**
Communication & Media: Definition, meaning and concept.	
Different types of communication: verbal and written	
Scope and Process of Mass Media & Communication	
UNIT II -History of Mass media	**6**
History of the development of electric media in India: Radio & TV	
Role of media in society, Impact of media on audience,	
Media effects, limitations and different form of media.	
UNIT- III- Role & Responsibilities	**6**
Role and responsibilities of journalist, ethics, careers,	
Media management, Media laws in India, and freedom of press	
Qualities and Responsibilities of a reporter	
UNIT IV -Theories & Principles	**6**
Theories and Principles of Editing	
Communication and theories of social change,	
Role of media in social change, Development communication	
UNIT V-Technology & Development	**6**
Changing trends of mass communication under the process of globalization	
Technology in the development of media.	
TEXT BOOKS	
1. Vivian, John, Mass Media &communication Boston, Massachusetts : Pearson Allyn and Bacon, c.2008.	
2. Stovall, James Glen, Writing for the mass media, New Jersey : Pearson Education, Inc., c.2012	
REFERENCE BOOKS:	
1. Parthasarathy, Rangaswami, journalism in India, sterling Publisher pvt. Ltd. New Delhi.	
2. D.S. Mehta. Mass communication and Journalism in India New Delhi, Allied Publishers, 2011	
Course Coordinator	**HOD**

P18OESC001	COMPUTER APPLICATIONS	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Dr. S.Thiru Nirai Senthil / BCA				

COURSE OBJECTIVES:-

Learners will be familiar with basic of computer application. Learners will understand the lications of computer & able to know about the operating systems.

	COURSE OUT COMES (COs)
CO1	Gain knowledge in fundamental computer applications
CO2	Understand the concept of input device functions
CO3	Indentify the suitable input devices for application
CO4	Analyze the input and output devices and its processes
CO5	Evaluate data and storage devices for application
CO6	Create an real time application using a system software and application software

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2	PSO3
2	CO1	H	L							H	
	CO2	H	L								
	CO3	H	L								
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approv		Academic Council Meeting

UNIT I	**6**
Brief History of Development of Computers ,Computer System Concept, Computer System Characteristics ,Capabilities and Limitations, Types of Computers-Personal Computer (PCs) - IBM PCs, Types of PCs- Desktop, Laptop, Notebook, Palmtop, etc. Basic Components of a Computer System - Control Unit, ALU, Input/ Output Unit-Memory, Storage Fundamentals - Primary Vs Secondary memory.	
UNIT II	**6**
Input Devices : Keyboard, Mouse, Joystick, Scanners, Digital Camera, MICR,OCR, OMR, ,Light pen, Touch Screen.	
UNIT III	**6**
Output Devices: Monitors - Characteristics and types of monitor, Size, Resolution, Refresh Rate, Dot Pitch, Video Standard - VGA, SVGA, XGA etc. Printers - Daisy wheel, Dot Matrix, Inkjet, Laser. Plotter, Sound Card and Speakers.	
UNIT IV	**6**
Various Storage Devices - Magnetic Disks, Hard Disk Drives, Floppy, Disks, Optical Disks.	
UNIT V	**6**
Computer Software, Need, Types of Software - System software, Application software System Software - Operating System, Compiler , Assemblers, Interpreter.	
TEXT BOOKS:	
1. S.K. Basandra, "Computers Today", Galgotia Publications,2010.	
2. Alexis Leon & Mathews Leon, "Fundamentals of Information Technology", Vikas Publishing House, New Delhi,2009.	
REFERENCE BOOKS:	
1. Rajeev Mathur, "Dos Quick Reference", Galgotia Publications.	
Course Coordinator	**HOD**

P18OESC002	MULTIMEDIA	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Dr. S.Thiru Nirai Senthil / BCA				

COURSE OBJECTIVES:-

To Understand the basic multimedia concepts and designing concepts.

	COURSE OUT COMES (COs)
CO1	Gain knowledge in fundamental computer applications
CO2	Understand the concept of input device functions
CO3	Indentify the suitable input devices for application
CO4	Analyze the input and output devices and its processes
CO5	Evaluate data and storage devices for application
CO6	Create an real time application using a system software and application software

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
2	CO1	H	L								H
	CO2	H	L								
	CO3	H	-								
	CO4	H	-								
	CO5	H	L								
	CO6	H	L								

3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT I	**6**
Multimedia Fundamentals: Concept of multimedia, Fundamental criteria for the design of a multimedia presentation, Multimedia Application Goals & Objectives, opportunities in multimedia production.	
UNIT II	**6**
Role of multimedia-development of team members, avoiding problems in planning a multimedia application.	
UNIT III	**6**
Multimedia Building Blocks: Text, Graphics, Video capturing, Sound capturing, editing.	
UNIT IV	**6**
Basic design principle: proximity, visual hierarchy, Symmetry, Asymmetry, Repetition, unity, Contrast, dynamics, Emphasis, Multimedia Authoring tools.	
UNIT V	**6**
Design, Development and evaluation of multimedia a system, Development of user interface design, Design Process.	
TEXT BOOKS	
1. John Villamil, Casanova, Louis Molina, "An introduction to multimedia",1998.	
2. Mohammad Dastbaz, "Designing Interactive Multimedia Systems",2002.	
Reference Books	
1. Bohdan O. Szuprowicz, "Multimedia Networking",1995.	
2. Stephen McGloughlin, "Multimedia on the web",1997.	
Course Coordinator	**HOD**

P18OESC003	ADVANCED EXCEL	L	T	P	C
	Total Contact Hours – 30	24	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- S.Anupriya / BCA				

COURSE OBJECTIVES:-

To identify the various functions in Excel Sheet

	COURSE OUT COMES (COs)
CO1	Understand the advanced Excel formulas.
CO2	Evaluate IF conditions, AND, OR functions.
CO3	Analyze the advanced filter options.
CO4	Execute the multiple windows, splitting windows management.
CO5	Understand the pivot table methods.
CO6	Create a real time application by creating, modifying Excel sheet.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
2	CO1	H	L								H
	CO2	H	L								
	CO3	H	L	M	M						
	CO4	H	L	M	M						
	CO5	H	L	M	M						
	CO6	H	L	M	M						

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT I	**6**
Uses of Advance Excel Formulas -VLOOKUP, HLOOKUP, SUMIF, SUMIFS, SUMPRODUCT, DSUM, COUNTIF, COUNTIFS, IF, IFERROR, ISERROR, ISNA, ISNUMBER, ISNONTEXT, OR, AND, SEARCH, INDEX, MATCH etc	
UNIT II	**6**
Various Methods and Uses of IF Conditions , Usage of "IF" Conditions? , Creation of Multiple IF Conditions in One Cell , Use the IF Conditions with the Other Advance Functions, How to use nested IF statements in Excel with AND, OR Functions Sorting, Data Forms, Adding Data Using the Data Form, Finding Records Using Criteria	
UNIT III	**6**
Filtering Data, AutoFilter, Totals and Subtotals, Row, Various Methods of Filter and Advance Filter options , Creating and Updating Subtotals , Various Method of Sorting Data ,Creating, Formatting and Modifying Chart.	
UNIT IV	**6**
Customizing the Quick Access Tool Bar , Managing Windows ,Multiple Windows , Splitting Windows.	
UNIT V	**6**
Various Methods and Options of Pivot Table, Using the Pivot Table Wizard, Changing the Pivot Table Layout, Subtotal and Grand total Options, Formatting, and Grouping items	
TEXT BOOKS	
1. Jordan Goldmeler, “Advanced Excel Essentials” ,A Press, 2015 edition.	
REFERENCE BOOKS	
hn Walkenbach, “Microsoft Excel 2013 Bible”, Wiley Publications, 2013.	
Course Coordinator	**HOD**

P18OESC004	WEB DESIGNING	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- V.Ramya/BCA				

COURSE OBJECTIVES:-

To Understand the basic web designing concepts.

	COURSE OUT COMES (COs)
CO1	Gain knowledge in web basics and server side scripting.
CO2	Execute the HTML coding.
CO3	Apply hyper links between webpages
CO4	Evaluate the Embedded Style Sheets & Linking External Style Sheets.
CO5	Create the backgrounds and user style sheets.
CO6	Create a real time application using web designing concept.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								H
	CO2	H									
	CO3	H									
	CO4	H									
	CO5	H	L								
	CO6	H	L								

3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval		Academic Council Meeting

UNIT I	**6**
Introduction - The Internet in Industry and Research - Evolution of the Internet and World Wide Web - Web Basics – Client Side Scripting versus Server Side Scripting.	
UNIT II	**6**
Introduction – First HTML example – Headings – Linking - Images, alt Attribute, Void Elements.	
UNIT III	**6**
Using Images as Hyperlinks-Special Characters and Horizontal Rules – Lists – Tables.	
UNIT IV	**6**
Introduction - Inline Styles - Embedded Style Sheets - Linking External Style Sheets	
UNIT V	**6**
Backgrounds - Element Dimensions - Box Model and Text Flow - Drop-Down Menus - User Style Sheets.	

TEXT BOOKS

1. Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web: How To Program", 5th Edition, Pearson Publication, 2012.

REFERENCE BOOKS

1. Jennifer Niederst Robbins, "Learning Web Design", Fourth Edition, O'Reilly Media, 2012.
2. Thomas Michaud, "Foundations of Web Design, Introduction to HTML & CSS", Pearson Publication, 2014.
3. Bayross, "Web Enable Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", BPB Publications,2010.
4. T. A Powell, "Complete Reference HTML (Third Edition)", TMH, 2002.

Course Coordinator **HOD**

P18OESC005	PHOTOSHOP	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- V.Brindha/BCA				

COURSE OBJECTIVES:-

Learners can Apply methods to specific 3D Images and to identify various designs appropriate for Animation.

	COURSE OUT COMES (COs)
CO1	Gain knowledge to Create and save Images in fundamental computer applications
CO2	Understand the title bar, menu bar, option bar, image title bar in photo shop program.
CO3	Execute Zooming & Panning an Image while Working with Images.
CO4	Analyze Color manipulations & Working with Toolbox
CO5	Gain knowledge in Working with layers.
CO6	Create a real time application using 3D image and Animation.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO3
2	CO1	H	L								H
	CO2	H	-								
	CO3	H	-								
	CO4	H	-								
	CO5	H	L								
	CO6	H	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT I	**6**
Introduction to Adobe photoshop, Getting started with photoshop, creating and saving a document in photoshop, page layout and back ground.	
UNIT II	**6**
Photoshop program window-titlebar, menu bar, option bar, image window, image title bar, status bar, ruler, palettes ,tool box, screen modes, saving files, reverting files, closing files.	
UNIT III	**6**
Images: working with images, image size and resolution, image editing, color modes and adjustments, Zooming & Panning an Image, Rulers, Guides & Grids-Cropping & Straightening an Image, image backgrounds, making selections.	
UNIT IV	**6**
Working with tool box: working with pen tool, save and load selection-working with erasers- working with text and brushes-Color manipulations: color modes- Levels – Curves - Seeing Color accurately - Patch tool	
UNIT V	**6**
Layers: Working with layers- layer styles- opacity-adjustment layers.	

TEXT BOOKS

1. Reema Thareja ,"Fundamentals of Computers",Oxford University Press,2014.

REFERENCE BOOKS

1. Photoshop: Beginner's Guide for Photoshop - Digital Photography, Photo Editing, Color
2. Adobe Creative Team ,"Adobe Photoshop Class Room in a Book",2014.

Course Coordinator **HOD**

P18OESC006	FLASH	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- N.Mathimagal/ BCA				

COURSE OBJECTIVES:-

Learners can identify methods appropriate for Basic Animation. Apply methods to design with flash.

	COURSE OUT COMES (COs)
CO1	Understand in Working with flash, drawing with flash using Animation tools and Mixer.
CO2	Execute working with multiple objects, importing color palettes
CO3	Analyze Basic animation and working in the timeline,
CO4	Create Frames, key frames, deleting, copying and reversing frames
CO5	Evaluate the Shape tweening and shape hinting in motion
CO6	Apply methods to design with flash

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								H
	CO2	H	-								
	CO3	H	-								
	CO4	H									
	CO5	H	L								
	CO6	H	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I	**6**
Working with flash, drawing with flash, drawing with the pencil, modifying lines, drawing with the pen, the oval and rectangle tools, free transform tool, envelope modifier, the brush tool, using the mixer.	
UNIT II	**6**
Adding custom colors to color palette, importing color palettes, working with multiple objects, grouping objects.	
UNIT III	**6**
Basic animation and working in the timeline, the timeline, movie properties.	
UNIT IV	**6**
Frames vs. key frames, deleting, copying, and reversing frames, frame-by-frame vector	
animation, Animation on an image.	
UNIT V	**6**
Shape twining , shape hinting , Shape tweening text , edit multiple frames , animating gradients, basic motion tweening.	
TEXT BOOKS	
1.Nick Vandome ,"FLASH 5 in easy steps", ,Dreamtech press,2001.	
REFERENCE BOOKS	
1. E A Vander Veer &Chris Graver, "Flash CS3",Orelly Publications,2009.	
Course Coordinator	**HOD**

P18OESC007	COMPUTER HARDWARE AND NETWORKING	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- V.Ramya/BCA				

COURSE OBJECTIVES:-

Learners familiar with the basic concepts of Microprosser,Controller, Server and to demonstrate the traditional imperative design of CPUs, cards, PCs and BIOS.

	COURSE OUT COMES (COs)
CO1	Design the structure of Micro Processor and PCs and CPUs
CO2	Understand the structure of PC architecture and the study of various PCs
CO3	Understand the Basics of Processor
CO4	Study the CPU, Chips, Processor and Controllers
CO5	Working with Internal Components cards and Higher Level Processor
CO6	Used to develop the Backups, Switches Routers, BIOS, Floppy Disk and zip Driver

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO2**	**PSO3**
2	CO1	H	L						H	M	L
	CO2	H	L								
	CO3	H	L								
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I	**6**
Microprocessor System - Introduction of System overview, Introduction to Processors, Memory Interfacing, Interfacing I/O Devices, Interfacing Data Converters, Display Interface, Serial I/O and Data Communication, Higher level Processors.	
UNIT II	**6**
Introduction to PC Architecture Study of PC-AT/ATX System, Pentium, Core, Core 2 Cord, Core 2 Duo, I3, I5, I7.	
UNIT III	**6**
Processor Basics of Processor and CPU Block Diagram of Computer and Computer Generation Motherboards, Chipset and Controllers, BIOS and the Boot Process, Computer Memory.	
UNIT IV	**6**
Internal Components IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Fire-Wire Cards, Internal Ports, Cables and Connector Types.	
UNIT V	**6**
Introduction of Network Cable like UTP, STP, Fiber Optics, Hub, Unmanageable Switch, Manageable Switch, Router, Modem, Wi-Fi, Access Point, PCI Wireless Card, USB Wireless Device, Print Server, USB Network Sharer, Backup Device, Server Hardware etc.	
TEXT BOOKS	
1. Ramesh Gaonkar, "Microprocessor Architecture Programming and Application with the 8085", Penram International Publication,October 2013.	
REFERENCE BOOKS	
1. M.L. Gupta, "Electronics and Radio Engineering", Dhanpat rai & Sons, New Delhi.	
2. B. Govinda rajalu, "PC AND CLONES Hardware, Troubleshooting and Maintenance", Tata Mc-graw-Hill Publication.	
3. Stephen J. Bigelow, "PC Troubleshooting and Repair", Dream tech Press, New Delhi.	
Course Coordinator	**HOD**

P18OESC008	COMPUTER PROGRAMMING	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- S.Anupriya/ BCA				

COURSE OBJECTIVES:-

Learners understand the basic concepts of C programming. Practice the use of conditional and looping statements. Implement arrays, functions and pointers. Gain skills to handle strings and files.

	COURSE OUT COMES (COs)
CO1	Understand the concept of data types, loops, functions, array, pointers, string, structures and files.
CO2	Design flow-chart, algorithm and program logic.
CO3	Analyze problems, errors and exceptions.
CO4	Apply programming concepts to compile and debug c programs to find solutions.
CO5	Gain knowledge to use Function, Pointers, Structures, Unions & preprocessor directives
CO6	Construct programs that demonstrate effective use of C.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO3**
2	CO1	H	L								H
	CO2	H	L								
	CO3	H	L	M				H			
	CO4	H	L	M				H			
	CO5	H	L	M				H			
	CO6	H	L	M				H			

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I	**6**
Generation and Classification of Computers, Basic organization of a Computer, Number System, Binary, Decimal, Conversion, Problems.	
UNIT II	**6**
Algorithm, Pseudo code, Flow Chart, Problem formulation, Problem solving , Introduction to "C" programming, Fundamentals, Structure of C Program , compilation and linking processes, Constants, Variables, Data Types.	
UNIT III	**6**
Expressions using operators in C, Managing input and output operations, Decision making and Branching, Looping Statements.	
UNIT IV	**6**
Arrays, Initialization, Declaration, One Dimensional and Two Dimensional Arrays, String, String Operations, String Arrays.	
UNIT V	**6**
Function, Definition of Function, Declaration of Function, Recursion, pointers, pointer and arrays, Structure data type, Structure definition, Structure declaration, Structure within a structure, Union, Storage classes, Pre-processor directives.	

TEXT BOOKS

1. Anita Goel and Ajay Mittal, "Computer Fundamentals and programming in C", Dorling Kindersley (India) Pvt Ltd., Pearson Education in South Asia 2011.
2. Pradip Dey, Manas Ghosh, "fundamentals of computing and programming in c", First edition, Oxford University Press, 2009.
3. Yashavant P. Kanethar, "Let Us C", BPB Publications, 2011.

REFERENCE BOOKS

1.Byron S Gottfried," Programming with C",Schaum'sOutlines,2nd Edition,Tata McGraw-Hill 2006.

2.Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.

3.Kernighan., B.W and Ritchie, D.M, " The C Programming Language", Second Edition, Pearson Education, 2006.

Course Coordinator **HOD**

P18OESC009	OFFICE AUTOMATION TOOLS	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- V.Brindha/BCA				

COURSE OBJECTIVES:-

Learners understand the basic concepts of word, Excel, Power Point.

	COURSE OUT COMES (COs)
CO1	Understand the text manipulations for word documents.
CO2	Analyze the templates and mail merge concepts.
CO3	Apply the cell editing, formulae, built in functions used in the Excel Sheet.
CO4	Develop the power point slide designs and backgrounds.
CO5	Develop the graphics and animations using wizards.
CO6	Create a document and apply various formatting techniques

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO3
2	CO1	H	L								H
	CO2	H	L								
	CO3	H	L	M				H			
	CO4	H	L	M				H			
	CO5	H	L	M				H			
	CO6	M	L	M				H			

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I	**6**
Text Manipulations- font size, style, color. Alignment- left, right and justify, paragraph alignment, Usage of Numbering, Bullets, Footer and Headers, Usage of Spell check, and Find & Replace, Text Formatting, Picture insertion and alignment.	
UNIT II	**6**
Insertion – Table, chart, clip art, shapes, borders. Creation of documents, saving of documents, using templates, Creation templates, Mail Merge Concepts, Copying Text & Pictures from Excel.	
UNIT III	**6**
Creating of Excel sheet, Cell Editing, Usage of Formulae and Built-in Functions, File Manipulations, Data Sorting, Worksheet Preparation, Drawing Graphs, Usage of Auto Formatting.	
UNIT IV	**6**
Start power point, Create blank presentation, Selecting slide layout , Insert new slide, Editing presentation , Designing and formatting presentation , Change font, font color, size, style of text, Bullet and numbering, Slide design, layout, change background , preparing slide show presentation.	
UNIT V	**6**
Inserting Clip arts and Pictures, Frame movements, Insertion of new slides. Preparation of Organization Charts, Presentation using Wizards, Usage of design templates, working with tables, graphics and animation, working with graphs and organization charts.	
TEXT BOOKS	
1.Joyce Cox, Joan Lambert and Curtis Fryc, “Step by Step Microsoft Office Professional 2010”, Microsoft press edition.	
REFERENCE BOOKS	
1. Ralph T.Reilly, “The Handbook of Office Automation”, Universe Publications,2012.	
Course Coordinator	**HOD**

U18OEMI001	CLINICAL MICROBIOLOGY	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Under graduate degree in any discipline				
	Course Coordinator Name & Department:- Dr. J. Senthil & Microbiology				

COURSE OBJECTIVES:-

Learners will be familiar with microbiological related diagnostic techniques. Learners will understand the microbial morphology, structure, characters, classification, diseases and diagnostic tests.

	COURSE OUT COMES (COs)
CO1	Recall the general classification of microbes.
CO2	Recognize the different specimen collection methods and staining methods.
CO3	Apply different diagnostic tests to identify the diseases.
CO4	Apply the role of human pathogens in causing diseases.
CO5	Analyze the importance of antimicrobial compounds.
CO6	Analyze and develop new antimicrobial drugs and antibiotics against wide range of pathogens.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO3**
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I	**6**
General introduction about clinical microbiology, Sterilization and Disinfection., Culture Media preparation, Staining Methods, Collection and Transportation of Specimen - General Principles, Containers, Rejection, Samples - Urine, Faeces, Sputum, Pus, Body fluids, Swab, Blood, Disposal of Laboratory/Hospital Waste.	
UNIT II	**6**
General characters and classification of bacteria, Characteristics - Growth and maintenance of Bacteria, Pathogenicity and diagnosis of bacterial pathogens, antimicrobial compounds against clinical pathogens.	
UNIT III	**6**
Morphology and structure of fungi - Classification of fungi - Nutrition and cultivation of fungus - Cutaneous & Sub cutaneous and Systemic Mycosis - Lab diagnosis of fungal Infections - Opportunistic fungal infections.	
UNIT IV	**6**
General characters of viruses. - Classification of viruses. - Lab diagnosis of viral infections. - Cultivation of viruses. - Bacteriophages - Retro viruses - HIV, Hepatitis virus, Pox virus . - Picrona virus - Polio. - Orthomyxo virus - Influenza. - Arbo virus - Chikungunya, Dengue. - Herpes and Adeno virus.	
UNIT V	**6**
Definition - parasitism, host, vectors etc. Classification of Parasites, Phylum Protozoa- general Pathogenic and non pathogenic protozoa, Phylum Nemathelminthes/Round words (Nematoda), Phylum Platyhelminthes - class - Cestoda, class - Trematoda, Lab diagnosis of parasitic infections.	
TEXT BOOKS:	
1. Monica Chees Brough. Medical laboratory manual for tropical countries, Elsevier Health Sciences, Butter worths, 1987.	
2. Bailey and Scott. Diagnostic Microbiology, Eighth edition, The Mosby Company, 1990.	
REFERENCE BOOKS:	
1. Keith Struthers K. Clinical Microbiology, 2nd Edition, CRC Press, 2017.	
2. Jennie Wilson. Clinical Microbiology -An Introduction for Healthcare Professional,	
8th Edition, Bailièrre Tindall, 2000.	
Course Coordinator	**HOD**

U18OEMI002	HERBAL MEDICINE	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Under graduate degree in any discipline				
	Course Coordinator Name & Department:- Dr. J. Senthil & Microbiology				

COURSE OBJECTIVES:-

Learners will be familiar with medicinal herbs. Learners will understand the importance of herbal drugs and herbal therapies.

	COURSE OUT COMES (COs)
CO1	Recall the herbal medicines used in daily life.
CO2	Recognize the different methods of herbal extraction and its types.
CO3	Apply various herbal medicines in curing the diseases.
CO4	Analyze the role of herbs in drug discovery.
CO5	Evaluate the importance and toxicity studies of herbal extracts.
CO6	Create and develop new drugs from wide range of medicinal plants available worldwide.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT I	**6**
Definition of Herbal drug, Importance of Herbal therapies, Herbs used as nutraceuticals and healing agents. Making and using herbal medicines for common ailments like cold, skin infections and Diarrhea; Analytical Profiles of selected herbs.	
UNIT II	**6**
General methods of extraction, types and principles of extractions - merits and demerits, selection of suitable extraction methods, purification and recovery of solvents	
UNIT III	**6**
Different methods for isolation and estimation of phyto-constituents from medicinal herbs like *Mucuna pruriens*, *Garcinia combogia*, Green tea, *Hypericum species* etc.	
UNIT IV	**6**
Qualitative and Quantitative estimation of standardized extracts by HPTLC, Biological standardization -Pharmacological screening of herbal extracts and Microbiological evaluation of herbal extracts, Toxicity studies of herbal extracts.	
UNIT V	**6**
Herbal drugs acting on brain and nervous system – Rheumatoid arthritis – Psychoactive drugs – Depressants, Stimulants, hallucinogens – sources, effects, basic mechanism of action.	
TEXT BOOKS:	
1. Indian Herbal Pharmacopoeia, Vol.1 & 2, RRL, 1 DMA, 1998, 2000.	
2. Kokate CK, Purohit and Gokhlae. Text book of Pharmacognosy, 4th edition, Nirali Prakashan, 1996.	
REFERENCE BOOKS:	
1. Toxicology and Clinical Pharmacology of Herbal Products, Melanie Johns Cupp.	
2. Choudhary RD. Herbal drug industry, 1st edition, Eastern publisher, New Delhi, 1996.	
Course Coordinator	**HOD**

P18OEPH001	ELECTRICAL TECHNICIAN	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite – B.Sc Physics				
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics				

OBJECTIVES: Students will have an appreciation on the electrical systems and electrical equipment typically used in the Oil and Gas production plant.

	COURSE OUT COMES (COs)
CO1	Analyze and solve routine technical problems related to electrical systems by applying mathematics and science principles.
CO2	Explain how to used electrical tools, operate and maintain specific equipment in the Oil and Gas production plant
CO3	Explain how to perform corrective and preventive maintenance in electrical tasks.
CO4	Understand the work on electrical systems safely and efficiently.
CO5	Understand the electrical system and electrical equipment used in the Oil and Gas production plant.
CO6	To execute the principle and how to working process of the transformer and classification of transformer

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO 2**	**PSO3**
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
								✓		

4	Approval	Academic Council Meeting

UNIT-I	**6**
Basic Principle Of Petroleum - Overview of Oil and Gas Processing -Wellhead Platform and Equipment	
UNIT –II	**6**
Introduction to Instrumentation -P & ID Drawing -Introduction to Distributed Control System (DCS)	
UNIT –III	**6**
Safety in Electrical Maintenance - Batteries and Chargers -Reading Electrical Diagrams - Cables and Conductors - Terminations and Splices - Motor Branch Circuit Protections	
UNIT –IV	**6**
Three Phase AC Induction Motors - AC Generator Maintenance -Fire & Gas Detection and Safety Systems and SIS -DC Generator -Construction& Principle- Types-Series,- Shunt & Compound Generator- EMF equation, Characteristics - (OCC & LCC). Armature reactions,- commutation Efficiency, Regulation & Applications. DC Motor- Construction& Principle. Types- Series, Shunt & Compound Motors. Characteristics curve-Applications. Necessity of starter- Construction and Working of- starters (3 point& 4 point). Speed control of DC Shunt-motor (armature & Field control. Traction System.- Trouble shooting –Care and maintenance.	
UNIT-V	**6**
Transformer –Principle -Construction- Classification of Transformers - EMF equation ,rating - Loading, Losses & Efficiency Regulation. Parallel Operation- Cooling methods, Transformer- oil testing. Care and maintenance,- Protective devices. Tap Changer – ON load and OFF- load. Auto transformer, Instrument- Transformer- CT & PT. Welding Transformer.	
TEXT BOOKS	
1. Fundamental Electrical circuits by Charles K.Alexandeer and Matthew NO Sadiku(2003)	
2. Fundamental of Digital circuits 3rd edition by Kumar A Anandh	
Course Coordinator	**HOD**

P18ACEN001	AUDIT COURSE : ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
	Total Contact Hours – 30	2	0	0	0
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Mr.V.C.Jain/Department of English				

COURSE OBJECTIVES:-

Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission.

	COURSE OUT COMES (COs)
CO1	Recognize to prepare and Plan the word order, breaking of long sentences, structural formation of paragraph and being concise without any ambiguities.
CO2	Describe how to write abstract and introduction to any topic or project.
CO3	Relate the skills require for the discussions and conclusions.
CO4	Express the quality of paper and time management in writing skills.
CO5	Categorize the useful phrase and how to ensure the paper is as good.
CO6	Prepare the oral presentation in class using effective delivery strategies.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1		H	L					H		
	CO2		H	L							
	CO3		H	L							
	CO4		H	L							
	CO5		H	L							
	CO6		H	L							

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	

4	Approval	Academic Council Meeting

UNIT – I PLANNING AND PREPARATION : 6

Planning and Preparation - word order - breaking up long sentences, structuring, paragraphs and sentences, being concise and removing redundancy, avoiding ambiguity and vagueness.

UNIT-II ABSTRACT 6

Clarifying who did what - highlighting your findings - hedging and criticizing - paraphrasing and plagiarism - sections of a paper - abstracts - introduction.

UNIT -III DISCUSSION AND CONCLUSION 6

Review of the literature - methods - results - discussion - conclusions, the final check - key skills are needed when writing a title - key skills are needed when writing an abstract - key skills are needed when writing an introduction - skills needed when a review of the literature.

UNIT –IV WRITING SKILLS 6

Skills are needed when writing the methods - skills needed when writing the results - skills are needed when writing the discussion - skills are needed when writing the conclusions.

UNIT –V QUALITY AND TIME MAINTAINANCE 6

Useful phrases - how to ensure paper is as good as it could possibly be the first -time submission.

TEXT BOOKS :

1. Goldbort R (2006) Writing for Science, Yale University Press (Available on Google Books).
2. Day R(2006), How to Write and Publish a Scientific Paper, Cambridge University Press.

REFERENCE:

1. HighmanN, Handbook of Writing for the Mathematical Sciences, SIAM, Highman's Book, 1st, Edition, 1998.
2. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht
3. Heidelberg London, 2nd Edition, 2011.

Course Coordinator HOD

P18ACCE002	DISASTER MANAGEMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	0
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Mr.V.C.Jain/Department of English				

COURSE OBJECTIVES:-

Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission.

	COURSE OUT COMES (COs)
CO1	Recognize to prepare and Plan the word order, breaking of long sentences, structural formation of paragraph and being concise without any ambiguities.
CO2	Describe how to write abstract and introduction to any topic or project.
CO3	Relate the skills require for the discussions and conclusions.
CO4	Express the quality of paper and time management in writing skills.
CO5	Categorize the useful phrase and how to ensure the paper is as good.
CO6	Prepare the oral presentation in class using effective delivery strategies.

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO3
2	CO1						H				
	CO2						H				
	CO3						H				
	CO4						H				
	CO5						H				
	CO6						H				

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	

4	Approval	Academic Council Meeting

UNIT – I INTRODUCTION: **6**

Disaster : Definition - Factors and Significance - Difference between Hazard and Disaster - Natural and Manmade Disasters - Difference - Nature - Types and Magnitude.

UNIT – II REPERCUSSIONS OF DISASTERS AND HAZARDS: **6**

Economic Damage - Loss Of Human And Animal Life - Destruction Of Ecosystem - Natural Disasters: Earthquakes - Volcanisms - Cyclones - Tsunamis - Floods - Droughts And Famines - Landslides And Avalanches - Man-made disaster.

UNIT –III DISASTER PRONE AREAS IN INDIA: **6**

Study Of Seismic Zones - Areas Prone To Floods And Droughts - Landslides And Avalanches - Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami - Post-Disaster Diseases And Epidemics.

UNIT -IV DISASTER PREPAREDNESS AND MANAGEMENT **6**

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard - Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies - Media Reports: Governmental And Community Preparedness.

UNIT -V RISK ASSESSMENT **6**

Disaster Risk: Concept And Elements - Disaster Risk Reduction, Global And National Disaster Risk Situation - Techniques Of Risk Assessment - Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment - Strategies for Survival.

TEXT BOOKS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sanskrit for Beginners by Dr. M. Narasimhacharyand Dr.S. Ramaratnam, N&R Publications, Chennai & New Delhi.

REFERENCE:

1. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.

2. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

Course Coordinator **HOD**

P18ACEN003	AUDIT COURSE : SANSKRIT FOR TECHNICAL KNOWLEDGE	L	T	P	C
	Total Contact Hours – 30	2	0	0	0
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Ms.Subathra / Dept. of English				

COURSE OBJECTIVES:-
Learners will get a working knowledge in illustrious Sanskrit, the scientific language in the world.

	COURSE OUT COMES (COs)
CO1	Define the learning of Sanskrit to improve brain functioning
CO2	Review the Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
CO3	Practice the engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature
CO4	Identify the uses of basic Sanskrit language
CO5	Estimate Ancient Sanskrit literature about science & technology can be understood
CO6	Develop the projects either individual or group on presentations.

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1		H	L							
	CO2		H	L							
	CO3		H	L							
	CO4		H	L							
	CO5		H	L							
	CO6		H	L							

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	

4	Approval	Academic Council Meeting

UNIT I INTRODUCTION: **6**

Alphabets, Consonants, Nouns Declensions; Nominative, Accusative(singular, dual andplural)

UNIT - II BASIC OF SANSKRIT LIERATURE: **6**

Instrumental case, Dative, Ablative, and Indeclinables, verbal conjugation: first person, second person, third person: Present Tense.

UNIT – III FUNDAMENTALS OF SANSKRIT ARCHITECTURE: **6**

Genitive, locative and Vocative Absolute, Masculine Gender, Feminine Gender and Neuter Gender.

UNIT -IV VERBAL CONJUGATION: **6**

Verbal Conjugation: Past Tense and Future Tense Declensions ending in Rāmaḥ, Kaviḥ, Bhānuḥ, Mātṛ , Mālā

UNIT - V TRANSLATION: **6**

Translation of simple sentences, Stories & selected Subhashitas

TEXT BOOKS:

1. Abhyaspustakam– Dr.Vishwas, Samskrita-Bharti Publication, New Delhi.

2. Sanskrit for Beginners by Dr. M. Narasimhacharyand Dr.S. Ramaratnam, N&R Publications, Chennai & New Delhi.

REFERENCE :

1. Teach Yourself Sanskrit Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication.

2. India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Coordinator **HOD**

P18ACBA004	AUDIT COURSE : VALUE EDUCATION	L	T	P	C
	Total Contact Hours – 30	2	0	0	0
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Mr.Srinivasan/ Dept. of Business Administration				

COURSE OBJECTIVES:-

Our objectives are to promote a new understanding and framework help learners to achieve positive and purposeful lives for themselves and their communities through engaging with values to guide and inform their behaviour.

	COURSE OUT COMES (COs)
CO1	Identify and describe feelings of self-worth that arise through striving for personal success in physical activity and sport
CO2	Demonstrate the tolerance of other people's abilities during physical activity and sport
CO3	Generalize the Values,attitudes that they need to develop in their class programmes
CO4	Choose the essential steps to become good leaders.
CO5	Select their role and contribution to the nation building.
CO6	Prepare to understand value of education and self- development

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2	PSO3
2	CO1				H			L			
	CO2				H			L			
	CO3				H			L			
	CO4				H			L			
	CO5				H			L			
	CO6				H			L			

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	

4	Approval	Academic Council Meeting

UNIT-I: **6**

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II: **6**

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III: **6**

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV: **6**

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V: **6**

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

TEXT BOOKS:

1. T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995).
2. Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.

REFERENCE:

1. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
2. Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
3. S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
4. .M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life \Promotion - Family Life Education, Bangalore, 1993.

Course Coordinator **HOD**

P18ACLW005	AUDIT COURSE : CONSTITUTION OF INDIA	L	T	P	C
	Total Contact Hours – 30	2	0	0	0
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Mr.Prakash/Dept. of Law				

COURSE OBJECTIVES:-

To Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.

	COURSE OUT COMES (COs)
CO1	Underline to address the growth of Indian opinion regarding modern Indian intellectuals
CO2	Express the constitutional role and entitlement to civil and economic rights
CO3	Utilize the emergence of nationhood in the early years of Indian nationalism.
CO4	Distinguish the role of socialism in India
CO5	Judge the commencement of the Bolshevik Revolution
CO6	Predict its impact on the initial drafting of the Indian Constitution

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/ Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2	PSO3
2	CO1				H			L			
	CO2				H			L			
	CO3				H			L			
	CO4				H			L			
	CO5				H			L			
	CO6				H			L			

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	

4	Approval	Academic Council Meeting

UNIT -I HISTORY OF MAKING OF THE INDIAN CONSTITUTION: 6
History - Drafting Committee, (Composition & Working)

UNIT -II PHILOSOPHY OF THE INDIAN CONSTITUTION: 6

Preamble - Salient Features - Directive Principles of State Policy - Fundamental Duties.

UNIT - III CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: 6

Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies.

UNIT -IV ORGANS OF GOVERNANCE: 6

Parliament - Composition - Qualifications and Disqualifications - Powers and Functions - Executive President - Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.

UNIT - V LOCAL ADMINISTRATION & ELECTION COMMISSION : 6

District's Administration head: Role and Importance - Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation - Pachayati raj: Introduction, PRI: Zila Pachayat - Elected officials and their roles - Introduction of Election Commission - Election Commission: Role and Functioning - Chief Election Commissioner and Election Commissioners - State Election Commission: Role and Functioning - Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

REFERENCE:

1. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Coordinator **HOD**

P18ACBA006	AUDIT COURSE : PEDAGOGY STUDIES	L	T	P	C
	Total Contact Hours – 30	2	0	0	0
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Dr.Arunkumar / Dept. of Business Administration				

COURSE OBJECTIVES:-

To inform programme design and policy making undertaken by the DfID, other agencies and researchers.

	COURSE OUT COMES (COs)
CO1	List common training so everyone teaches from the same curriculum
CO2	Describe to learners what is expected of them
CO3	Illustrate the teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.
CO4	Inspect the review existing evidence on the review topic to inform programme design.
CO5	Assess how the outcomes of a single course align with larger outcomes for an entire program
CO6	Plan appropriate teaching strategies, materials and assessments

Mapping of Course Outcomes with Program outcomes (POs)

(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO3**
2	CO1		H	L							
	CO2		H	L							
	CO3		H	L							
	CO4		H	L							
	CO5		H	L							
	CO6		H	L							

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	

4	Approval	Academic Council Meeting

UNIT – I INTRODUCTION AND METHODOLOGY: 6

Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning - Curriculum - Teacher education - Conceptual framework, Research questions - Overview of methodology and Searching.

UNIT - II THEMATIC OVERVIEW: 6

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

UNIT III EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES :-

Methodology for the in depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change - Strength and nature of the body of evidence for effective pedagogical practices.

UNIT - 4 : PROFESSIONAL DEVELOPMENT: 6

Alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the community - Curriculum and assessment - Barriers to learning: limited resources and large class sizes

UNIT - 5 : Research gaps and future directions:- 6

Research design - Contexts - Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

TEXT BOOKS:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal o Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education
4. research project (MUSTER) country report 1. London: DFID.

REFERENCE:

1. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of
2. basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

3. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
4. Chavan M (2003) Read India: A mass scale, rapid, ‘learning to read’ campaign.

Course Coordinator HOD

P18ACBA007	AUDIT COURSE : PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	L	T	P	C
	Total Contact Hours – 30	**2**	**0**	**0**	**0**
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- Mr.Srinivasan/Dept.of Business Administration				

COURSE OBJECTIVES:-

To become a person with stable mind, pleasing personality and determination

	COURSE OUT COMES (COs)
CO1	Identify the way to achieve the highest goal happily
CO2	Review to awaken wisdom for learners
CO3	Schedule to study of Shrimad-Bhagwad-Geeta will help the student
CO4	Developing his personality and achieve the highest goal in life
CO5	Evaluate the person who has studied Geeta will lead the nation and mankind to peace and prosperity
CO6	Propose to study of Neetishatakam will help in developing versatile personality of students

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	**COs/ Pos**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**
2	CO1		H					H			
	CO2		H					L			
	CO3		H					H			
	CO4		H					L			
	CO5		L					H			
	CO6		H					H			

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	

4	Approval	Academic Council Meeting

UNIT – I HOLISTIC DEVELOPMENT OF PERSONALITY- I **6**

Neetisatakam-Holistic development of personality : Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) - Verses- 26,28,63,65 (virtue) - Verses- 52,53,59 (dont's) - Verses- 71,73,75,78 (do's).

UNIT - II BHAGWADGEETA: **6**

Approach to day to day work and duties. ShrimadBhagwadGeeta: Chapter 2-Verses 41, 47,48. Chapter 3- Verses 13, 21, 27, 35.

UNIT - III BHAGWAD GEETA:- **6**

ShrimadBhagwadGeeta: Chapter 6-Verses 5, 13, 17, 23, 35, Chapter 18-Verses 45, 46, 48.

UNIT – IV BASIC KNOWLEDGE: **6**

Statements of basic knowledge. ShrimadBhagwadGeeta: Chapter2-Verses 56, 62, 68. Chapter 12 -

Verses 13,14, 15, 16,17, 18.

UNIT – V ROLE MODEL : - **6**

Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, - Chapter 4-Verses 18, 38,39 - Chapter18 – Verses 37,38,63.

TEXT BOOK:

1. P.Gopinath, "Bhartrihari's Three Satakam (Niti-sringar-vairagya)", Rashtriya Sanskrit Sansthanam, New Delhi.
2. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

REFERENCE :

1. Srimad Bhagavad Gita by Swami SwarupanandaAdvaita Ashram (Publication Department),
    a. Kolkata.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal o Curriculum Studies, 36 (3): 361-379.

Course Coordinator **HOD**