



**UNIVERSITY OF MYSORE**  
**YUVARAJA'S COLLEGE, MYSORE**  
**(A Constituent Autonomous College with Potential for Excellence)**  
**(Accredited "A" Grade with CGPA 3.34 by NAAC)**  
**JLB Road, Mysuru 570 005, Karnataka , INDIA**



**Under graduate (Bachelor) Programs offered in Yuvaraja's College (Autonomous):2016-17**

1. Bachelor of Science (B.Sc.)
2. Bachelor of Computer Applications (BCA)
3. Bachelor of Business Administration (B.B.A.)

The objectives and outcomes of the above Programs have been set since the CBCS syllabus is during introduced the year of introduction.

Sl. No	Program	Program Code	No of Program specific disciplines with code	Program Specific code	Page No. PSO & CO
1	B.Sc.	BSCCBCSYCM	<b>Core Disciplines: Any three opted (Fourteen):</b>		
	B.Sc.	BSCCBCSYCM	1.Biochemistry	BSCCBCSBICYCM	05
	B.Sc.	BSCCBCSYCM	2. Biotechnology	BSCCBCSBITYCM	10
	B.Sc.	BSCCBCSYCM	3.Botany	BSCCBCSBOTYCM	15
	B.Sc.	BSCCBCSYCM	4. Computer Science	BSCCBCSCOMYCM	17
	B.Sc.	BSCCBCSYCM	5.Electronics	BSCCBCSELEYCM	24
	B.Sc.	BSCCBCSYCM	6.Environmental Science	BSCCBCSENSYCM	29
	B.Sc.	BSCCBCSYCM	7.Food and Nutrition	BSCCBCSFSNYCM	34
	B.Sc.	BSCCBCSYCM	8.Geology	BSCCBCSGEOYCM	37
	B.Sc.	BSCCBCSYCM	9.Mathematics	BSCCBCSMATYCM	41
	B.Sc.	BSCCBCSYCM	10. Microbiology	BSCCBCSMICYCM	45
	B.Sc.	BSCCBCSYCM	11. Physics	BSCCBCSPHYCM	50
	B.Sc.	BSCCBCSYCM	12. Sericulture	BSCCBCSSERYCM	54
	B.Sc.	BSCCBCSYCM	13. Statistics	BSCCBCSSTAYCM	59
	B.Sc.	BSCCBCSYCM	14. Zoology	BSCCBCSZOOYCM	68
Ability Enhancement Disciplines (AECC) Four have to be completed : Language disciplines: Compulsory (Two); One is English and the other can be chosen					
	B.Sc.	BSCCBCSYCM	English This is included as one of the four ability Enhancement compulsory courses	BSCCBCSENGYCM	73

AECC: MIL: Optional any one (out of eight )					
	B.Sc.	BSCCBCSYCM	Kannada	BSCCBCSKANYCM	76
	B.Sc.	BSCCBCSYCM	Hindi	BSCCBCSHINYCM	77
	B.Sc.	BSCCBCSYCM	Sanskrit	BSCCBCSSANYCM	78
	B.Sc.	BSCCBCSYCM	Malayalam	BSCCBCSMALYCM	81
	B.Sc.	BSCCBCSYCM	Persian	BSCCBCSPERYCM	81
	B.Sc.	BSCCBCSYCM	Tamil	BSCCBCSTAMYCM	81
	B.Sc.	BSCCBCSYCM	French,	BSCCBCSFREYCM	81
	B.Sc.	BSCCBCSYCM	Arabic	BSCCBCSARAYCM	81
Compulsory two AECC					
	B.Sc.	BSCCBCSYCM	Environmental Studies	BSCCBCSICNYCM	82
	B.Sc.	BSCCBCSYCM	Indian Constitution	BSCCBCSESTYCM	82
Skill Enhancement Courses (Four) (SEC 1 and 3): the ones specified below are Compulsory : Other two are department specific ones as SEC2 and SEC4					
	B.Sc.	BSCCBCSYCM	SEC1/3: Disaster management	BSCCBCSCOMYCM	83
	B.Sc.	BSCCBCSYCM	SEC1/3: Computer Application	BSCCBCSDIMYCM	83
2	B.C.A	BCACBCSYCM	Bachelor of Computer applications	BCACBCSCOAYCM	84
3	B.B.A	BBACBCSYCM	Bachelor of Business Administration	BBACBCSMANYCM	98

**1. Program: Bachelor of Science (B.Sc.)**  
**Program Code: BSCCBCSYCM**

**Program objectives: (PO):**

Objectives all Bachelor of Science degree program is

1. To train critical thinking.
2. To develop effective communication
3. To train good social interaction.
4. To become effective citizenship.
5. To have environmental concerns.
6. To motivate them for self-directed and lifelong learning process.
7. To develop belongingness to our locality and nation.

**Program outcome (PO):**

Students of all B.Sc. degree Programmes at the time of graduation will be able to develop.

1. **Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions, (intellectual, organizational, and personal) from different perspectives.
2. **Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
3. **Social Interaction:** Elicit views of others, mediate, disagreements and help reach conclusions in group settings.
4. **Effective Citizenship:** Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
5. **Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
6. **Self Directed learning:** The ability to engage in independent and life-long learning in the context of socio-technological changes which gives them self-directed and lifelong learning capabilities.
7. **Belongingness:** The importance of locally available resources and knowledge with pride and this helps them to think locally and act globally and have belongingness to our nation.

### **1. Program: Bachelor of Computer Applications (BCA)**

**Program Code: BCACBCSYCM**

#### **Program Objectives (PO):**

1. To provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software.
2. To provide the students with options to specialize in legacy application software, system software or mobile applications.

#### **Program Outcome (PO):** Students will able to

- 1) Recognize and appreciate the role of computing in a wide variety of activities such as applications of Modern society, including commerce, education and communication.
- 2) Analyse a given problem and develop an algorithm to solve the problem.
- 3) Demonstrate the basic technicalities of creating word document, creating power point presentation, design spreadsheet for office use.
- 4) Develop the software projects by understanding the client requirement.
- 5) Define fundamental account concept, conventions & terminologies.

- 6) Implement the software models in various programming languages like C, C++, VB. Net, Java  
Construct in the right way.
- 7) Master the basic concept and understand the database management system.
- 8) Acquire options to pursue MCA/ M.Sc.-CS/IT/ MBA/ MS (IT).
- 9) Become a responsible citizen with sensitivity towards environmental concerns.

### **3. Program: Bachelor of Business Administration (BBA)**

#### **Program Code: BBACBCSYCM**

#### **Program Objectives:**

1. To Understand of Business Functions
2. To Provide Global Perspectives
3. To Develop Critical and Analytical Thinking Abilities
4. To Develop Interpersonal Skill
5. To Create Social Sensitivity in understanding CSR
6. Demonstrate sensitivity to social, ethical and sustainability issues
7. To Develop Entrepreneurship Insight
8. To prepare students for managerial positions in business and industry.
9. To develop entrepreneurial skills
10. To develop critical thinking and analysing skills
11. To inculcate ethical values, corporate social responsibilities and sustainable business practices.
12. To provide an environment that facilitates all-round development of the student's personality
13. To foster thinking minds that are sensitive to societal needs and issues thus making them good human beings and responsible members of the society.
14. To understand the problems faced by the business sector in the Current scenario.

#### **Program Outcome:**

1. Acquiring Conceptual Clarity on Various Functional Areas
2. Demonstrating ability to evolve strategies for organizational benefits
3. Develop analytical ability for Decision Making
4. Demonstrate the ability to develop models / frameworks to reflect critically on specific business contexts
5. Demonstrate capability in Oral and Written Communication
6. Demonstrate Ability to work in Groups

7. Demonstrate capability in understanding social cues for decision making
8. Develop ethical practices and values for Better Corporate Governance.

Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	1. Biochemistry , BSCCBCSBICYCM

### B.Sc., Biochemistry – 2016-17

Sl. No	Sem	Title of the Paper
1	I	Bioorganic and Biomolecules-I Practical: Volumetric Estimations
2	II	Biomolecules-II Practical: Carbohydrates and Lipids Extraction And Preparation
3	III	Biochemical Techniques and Enzymology Practical: Proteins Biochemical Techniques and Enzyme Assay
4	IV	Metabolism-I Practical: Colorimetric Estimations
5	V	Metabolism–II and Human Physiology Practical: Enzyme Assays
6		Molecular Biology Practical: Biochemical and Biophysical Experiments
7	VI	Nutrition Practical: Nutrition
8		Clinical Biochemistry and Immunology Practical: Clinical Biochemistry and Immunology

#### Program Specific Objectives:

- Adopt strong foundation with skills, relevant training and education towards understanding Biochemistry.
- Apply appropriate tools and techniques for conducting scientific investigations to solve the problems in life science domain.
- Acquire higher degree of work in academics and research.
- Adapt lifelong learning with continuous improvement.

#### Program Specific Outcome:

- Ability to analyze the various biological components through analytical tools in living cells and molecular machinery.
- Development of practical laboratory skills and strong speculative foundation in the discipline of Biochemistry.
- Understanding of the applications of Biochemistry in various fields such as Clinical Biochemistry, Genetic Engineering, Molecular biology & Biotechnology.
- Acquire practical skills that will prepare for a future career in the interdisciplinary subjects.
- Comprehending fundamental concepts in modern biology to meet the emerging trends, Handling microbial and biochemical systems, Procuring hands on real time experience in the industries.

### I Semester

## **Bioorganic and Biomolecules-I**

### **Course objectives:**

- To study the fundamentals of the chemistry, since basic chemistry knowledge is essential for biochemistry subject.
- To study the basics of bioorganic aspects.
- To study the chemistry, occurrence, types and biological role of carbohydrates.

### **Course outcome:**

- To study the biomolecules, which are the pillars of the biochemistry
- To understand the bioorganic components such as reaction intermediates, attacking reagents and stereochemical aspects. They can describe chemistry of vitamins, heterocyclic compounds, terpenes, alkaloids, steroids, flavanoids, hydroxy acids, dicarboxylic acids and keto acids.
- To understand the definitions, classification, chemical reactions, occurrence and functions of carbohydrates that includes monosaccharides, disaccharides, polysaccharides and other carbohydrate derivatives.
- To understand the Chemical basis of the qualitative tests for the carbohydrates.

## **II Semester Biomolecules-II**

### **Course objectives:**

- To study the biomolecules, which are the pillars of the biochemistry.
- To study the chemistry, occurrence, types and biological role of carbohydrates, proteins, lipids, nucleic acids.

### **Course outcome:**

- To understand the definitions, classification, chemical reactions, occurrence and functions of carbohydrates that includes monosaccharides, disaccharides, polysaccharides and other carbohydrate derivatives.
- To understand the definitions, classification, chemical reactions, occurrence and functions of lipids and their derivatives.
- To understand the methods involved in the isolation of proteins, their types and functions. Structure of amino acids and colour reactions and the role of biologically important peptides,
- To understand the isolation methods of nucleic acids, their structure, types and functions.

### **III Semester**

## **Biochemical Techniques and Enzymology**

#### **Course objectives:**

- To study the structure, classification, nature, types, biological role and applications of enzymes.
- To study the biophysical techniques which allow to learn different methods of isolation and purifications of molecules

#### **Course outcome:**

- To understand the biophysical techniques which allow to learn different methods of isolation and purifications of molecules.
- To understand the definitions, classification, nature, types, biological role and applications of enzymes.

### **IV Semester**

## **Metabolism-I**

#### **Course objectives:**

- To understand the basic aspects of metabolic pathways and regulation of biomolecules.
- To study and understand the structural and functional aspects of mitochondrial electron transport chain in detail.
- To gain deeper insights on photosynthesis and its associated process.

#### **Course outcome:**

- Students will acquire the concept of anabolism, catabolism, anapleurotic reactions, redox balance etc. and the role of high energy compounds in the cell.
- They will acquire knowledge related to regulation of various pathways.
- The role of lipids as storage molecules and structural component of bio membranes will be understood in detail.
- Students will learn about importance of high energy compounds, electron transport chain, and synthesis of ATP under aerobic and anaerobic conditions will be understood.
- Students will gain knowledge about the fundament aspects of photosynthesis and its associated processes in depth.

### **V Semester**

## **Metabolism–II and Human Physiology**

#### **Course objectives:**

- To study about the importance of, nitrogen containing compounds, porphyrins, and steroid hormones.
- To study and appreciate the integrated approach of interrelated pathways of catabolism and anabolism.
- To emphasizes on metabolic disorders at molecular level.
- To learn the regulatory aspects of metabolism for better understanding of physiology and therapeutic applications.

**Course outcome:**

- Students will learn about the importance of nitrogen and nitrogen containing compounds in biological system.
- Students will learn to explain/describe the synthesis, degradation and functional aspects of amino acids, nucleic acids, steroid hormones and vitamins in detail.
- Students will learn about the regulatory aspects of metabolic pathways at various phases like transcriptional, translational, and post-translational levels.

## **Molecular Biology**

**Course objectives:**

- To give deeper knowledge on cellular processes that drive biological systems.
- To build the fundamental concepts of cellular structural organization and functional understanding of sub-cellular components.

**Course outcome:**

- Students will obtain understanding of the molecular aspects of biology.
- It also helps in understanding the concepts of cellular function.
- Students obtain fundamental knowledge required for understanding the cancer/apoptosis at molecular level.
- The course addresses molecular mechanisms underlying several central themes in cellular biology like cell division and replication, the transport of proteins and other macromolecules within cells.
- Students of this course will obtain an elementary introduction to the study of molecular biology

## **VI Semester Nutrition**

**Course objectives:**

- To understand the role of nutrition in health.
- To understand about the physiological and biochemical aspects of the nutrition.
- To plan the therapeutic diet and monitor the evaluation of nutrition therapy according to the disease conditions.

**Course outcome:**

- Students will learn about the fundamentals of nutrition from the angle of clinical perspective.
- They will understand the concepts like glycemic index, balanced diet, micronutrient deficiencies and their remedies, nutraceuticals and their importance, junk foods and their hazards in the holistic manner.
- The course will assist the students to gain employability in diagnostic and research institutes.



# Clinical Biochemistry and Immunology

## Course objectives:

- To understand the concept of health & diseases, communicable, non-communicable diseases. Metabolic diseases & deficiency.
- To give knowledge on various bio-molecules and their use in diagnosis and treatment of diseases.
- To create awareness of different lifestyle diseases including its management.
- To give insights to the recent developments in clinical diagnosis.
- To gain knowledge of the development of the various cells and tissues of the human immune system.
- To model the physiological and pathological functions of the immune system at a molecular level.
- To demonstrate some of the major modern techniques influenced by immunology and to understand types of immune responses seen in the body in normal and pathological conditions.
- To acquire knowledge about research and development of novel vaccines and immune therapeutics.

## Course outcome:

- It illustrates the mechanism of metabolic disorders at molecular level.
- Students will learn about the normal constituents of urine, blood and their significance in maintaining good health.
- Students will get the knowledge of marker enzymes useful in diagnosis of various diseases.
- It is directed towards the employability in diagnostic centers.
- Students will have knowledge of different types of immunity, protection barriers, different cells which are participating in the immune responses. Applications of monoclonal antibodies. Immunology of cancer and other disorder.
- Students will understand the importance of ongoing research like production of vaccines for emerging pathogens, also in immunotherapy, autoimmune diseases.
- This will help the students in advancing understanding of basic immunology which is essential for clinical and commercial application and will facilitate the discovery of new diagnostics and treatments to manage a wide array of diseases.
- Students will understand the role of immune responses in numerous disciplines of medicine, particularly in the field of organ transplantation, oncology etc.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	2. Biotechnology , BSCCBCSBITYCM

### **Program Specific Objectives:**

- Biotechnology is an undergraduate course aims to impart knowledge to the students on application of biotechnology in various fields such as medical, environmental, industrial, agricultural and many more.
- The main motto is to create biotechnological awareness.
- To encourage students a critical appreciation of the integrated nature of biotechnological problems.
- To make them realise that the biotechnological problems are global.
- To induce the spirit of competitiveness.
- To impart specialised knowledge and skills to students in particular areas of the national or regional biotechnological issues.

### **Programme Specific Outcome:**

#### **After successful completion of B.Sc. Biotechnology Course:**

- Graduates in biotechnology will be eligible for pursuing higher education, M.Sc. programmes in Biotechnology and also in the different field of life science.
- Graduates will exhibit contemporary knowledge in Biotechnology and students will be eligible for doing jobs in pharmaceutical and biotechnological Industry.
- Graduates will be able to understand the potentials, and impact of biotechnological innovations on environment and their implementation for finding sustainable solution to issues pertaining to environment, health sector, agriculture, etc.
- Graduates will be able to design, conduct experiments, analyze and interpret data for investigating problems in BT and allied fields.
- Graduates will be able to work individually as well as in team to survive in multidisciplinary environment.
- Graduates will possess oral and written communication skills.

## B.Sc., Biotechnology – 2016-17

Sl. No	Sem	Title of the Paper
1	I	Cell biology & Biomolecules
2	II	Enzymology & Cellular Metabolism
3	III	Cell biology & Genetics
4	IV	Plant Cell, Tissue Culture & Animal Cell Culture
5	V	Molecular Biology & Medical Biotechnology
6		Genetic Engineering & Immunology
7	VI	Microbial Technology & Bioinformatics
8		Agricultural & Environmental Biotechnology

### I Semester Cell Biology & Biomolecules

#### Course objectives:

- To understand the basics of biotechnology through molecular structure and functions of biomolecules.
- To execute the experiments on biomolecules to understand their properties.
- To understand cellular compartments and their structure.
- To know about functions of cell organelles and their interactions.

#### Course outcome: On completion of the courses students will be able:

- To gain knowledge about structure and function of biomolecules in living organisms.
- To gain knowledge on cell organelles of prokaryotic and eukaryotic system.

### II Semester Enzymology & Cellular Metabolism

#### Course objectives:

- Basic understanding of enzymes, their classification and functional aspects.
- Basic understanding of metabolism, different metabolic processes at cellular level, metabolism of biomolecules and metabolic disorders, and Bioenergetics,
- It explores the knowledge of interconnections among all the biomolecules and their metabolism at cellular level.
- To understand the structure and functions of enzymes, their role in metabolism and metabolic disorders.

**Course outcome:**

- Students will acquire new knowledge of the interdependence between enzymes, bioenergetics and metabolism that is vital for normal metabolic activities, in maintaining normal health and in metabolic disorders and diseased conditions
- They understand the role of enzymes to maintain normal functions in the body that ensures the survival of human being, and also different living organisms.
- They will learn how enzymes play vital role in normal metabolic activities, diseased conditions/metabolic disorders. Generation of energy via ETC and their utilization for synthesis of ATP which have important role to play in various metabolic processes of the body.

**III Semester****Cell Biology & Genetics****Course objectives:**

- The focus is on interactions between the cell biology, genetic constitution of an organism and various immunological aspects of living organisms.
- To understand the basic unit of the organism.
- To differentiate the organisms by its cell structure.
- To know Components of the Cell and their division.
- To explain the arrangement of Genes and their interaction.
- To describe the influence of environment on gene expression.
- To understand extra nuclear inheritance, linkage & crossing over.
- It deals with the interactive cellular processes, genetic makeup, and role of various immunologically active organs and cells in the immune system.
- Immune system is a very important part in the protection of body against deleterious effects caused by various harmful microorganisms.

**Course outcome:**

- Cell is an important and integral part of living organisms. Genetic constitution of of an organism plays a key role in normal development of an organism. Immune system plays a vital role in protection of organism.
- Students gain knowledge about how these relationships are important in maintaining normal life, and also in various metabolic disorders and diseases.
- They also strive to understand the functions of cell, variations in gene, chromosome and abnormal functions due to variations in chromosomes.
- Exploring more about functions of cell, importance of genetic constitution of an organism and functions of immune system.

## **IV Semester**

### **Plant Cell, Tissue Culture & Animal Cell Culture**

#### **Course objectives:**

- The paper aims to build a conceptual understanding of students by exposing them to the basic principles behind various processes of plant tissue culture and animal cell culture.
- Plant & Animal biotechnology is the study of the history and development of plant tissue culture various biotechnological processes such as applications of plant tissue culture, Transgenic plants and Animal biotechnology discusses the historical background, a brief account of importance and development of animal cell culture, cloning techniques, and transgenic animals.
- It gives a clear knowledge on the plant tissue culture, animal cell culture, gene cloning, production of transgenic plants and animals, and their advantages.

#### **Course outcome:**

- This paper enables students to learn various methods and procedures of plant tissue culture and animal cell culture.
- Students gain knowledge about gene cloning techniques
- Students will be able to gain the knowledge on the production of transgenic plants and animals.
- Advantages of transgenic plants and animals.

## **V Semester**

### **Molecular Biology & Medical Biotechnology**

#### **Course objectives:**

- To understand the concept of molecular basis of life through study on gene expression and protein synthesis in living system.
- To understand the basic concept of gene and their mutations.
- To know about diagnostic and prognostic markers in living system.

### **Genetic Engineering & Immunology**

#### **Course objectives:**

- To understand manipulation of genes and their recombination in living system.
- To understand the transfer of genes through vectors to produce important proteins.
- To understand the functions of immune cells and their defence mechanism.
- To understand the interactions between antigen and antibodies in various pathological conditions.

**Course outcome:**

- Gain knowledge on isolation and manipulation techniques on genes.
- Obtained knowledge on pattern of genes and hands on experts in gene mutations.
- Gain knowledge on properties of antibodies and their interactions with antigens to fight against diseases.
- Gain knowledge on using of immune cells to produce vaccines and monoclonal antibodies.

**VI Semester**

**Agricultural, Environmental & Industrial Biotechnology**

**Course objectives:**

- To make them understand the use of plants in the application field especially in agriculture
- To make them understand the protection of environment through biological applications
- To develop the concept of use of various living organisms to obtain industrial products which can have medicinal, agricultural or environmental protections applications

**Course outcome:**

- Students will come to know, how to produce various biofertilizers, biopesticides and genetically engineered plants
- Students will develop environmental friendly approaches through biological applications
- Students will come to know how living organisms can be used to obtain industrial products which can have medicinal, agricultural or environmental protections applications

**Microbial Technology & Bioinformatics**

**Course objectives:**

- To understand importance of microbial cells and production of medically important molecules through fermentation technology.
- To understand the techniques of isolation and strain developments of industrially important microorganisms.
- To understand the molecular structure and functions through applications of computational algorithms.

**Course outcome:**

- Gaining of knowledge on science of microorganisms and their fermentation technology.
- Obtaining knowledge on microbial strain development technology.
- Usage of computers and stored biological information to study molecular interactions in living system.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	3. Botany , BSCCBCSBOTYCM

**Program specific objectives:**

- To bring awareness of plant wealth around us which has to be protected with utmost care
- To make them understand the diversity of plant kingdom
- To make them understand morphology, anatomy, cell biology, microbiology related to plants, physiology, molecular biology genetics, plant propagation, plant breeding evolution of plants
- To train them to enter into higher studies, teaching, research, and industry related profession in botanical science.
- To prepare them to competitive examinations like KPSC, UPSC and IFS etc

**Program specific outcome:**

- Student will become the torch bearers of conservation of plant wealth
- They will become competent in naming the common plants around them which the general public usually will be interested.
- In-depth study of plant science sub disciplines help them to enter into the institutes which require specific skill sets
- Many students enter into B.Ed programs which generates many good teachers
- Students after completion of the course get opportunities for higher studies in plant science in India and abroad or job opportunities related to plant science as well as in general service fields.

**B.Sc., Botany – 2016-17**

Sl.	Sem	Title of the Paper
1	I	Microbial diversity, Phycology, Mycology, Lichens
2	II	Bryology Pteridology, Gymnosperms and Paleobotany
3	III	Pteridology, gymnosperms, paleobotany and anatomy of angiosperms
4	IV	Reproductive biology of angiosperms, plant propagation, plant breeding and tissue culture
5	V	Taxonomy, Economic botany & Ethnobotany
6		Cell biology, molecular biology and plant breeding
7	VI	Plant physiology and evolution
8		Genetics genetic engineering, ecology and phytogeography

**I Semester**

**Microbial diversity, Phycology, Mycology, Lichens**

**Course outcome:**

- To understand the General characters, Classification and Economic importance of Molecules, Viruses, Bacteria, Cyanobacteria, Algae, Fungi, Lichens.
- To Learn the Structure and Reproduction of various forms included in the syllabus.
- To acquire the basic knowledge of various plant diseases mentioned in the syllabus and their management.

**II Semester**  
**Bryology Pteridology, Gymnosperms and Paleobotany**

**Course outcome:**

- To understand the Salient features, Classification and Economic importance of Bryophytes, Pteridophytes and Gymnosperms.
- To study the Morphology, Anatomy and Reproduction of Pteridophytes and Gymnosperms included in the syllabus.
- To acquire the knowledge of Geological time scale, Fossils and Fossilization.

**III Semester**

**Pteridophytes, gymnosperms, paleobotany and anatomy of angiosperms**

**Course outcome:**

- To understand the General characters, Classification and Economic importance of bryophytes, pteridophytes included in the syllabus.
- To acquire the knowledge of Geological time scale, Fossils and Fossilization.
- To study the structure and function of tissues in the growth and development of plants.

**IV Semester**

**Reproductive Biology of Angiosperms, Plant Propagation, Plant breeding & Tissue culture**

**Course outcome:**

- To study the development and structure of Male and Female Gametophyte, Embryo, Endosperms
- To acquire the knowledge of Experimental Embryology
- To learn the principles, techniques and applications of Plant Breeding
- To learn the principles, techniques and applications of Plant propagation
- To learn the principles, techniques and applications of Plant biotechnology

**V Semester**

**Taxonomy, Economic Botany and plant breeding (V) and  
Cell Biology, Molecular Biology and plant breeding (VI)**

**Course outcome:**

- To study the types of classification- Artificial, Natural, Phylogenetic and Recent trends in Taxonomy
- To acquire the knowledge about Botanical Survey of India (BSI), Herbarium,
- Brief study of the Economic products of Angiosperms and Ethnobotany
- To study the ultra structure of cell organelles
- To acquire the knowledge of underlying principles of different microscopes
- To learn chromosomal aberrations and their significance



**VI Semester**  
**Plant physiology and evolution (VII) and**  
**Genetics, genetic engineering, ecology and phytogeography (VIII)**

**Course outcome:**

- To understand Mendel’s principles, deviations from Mendelism, Mutation and its significance
- To acquire the knowledge of principles, techniques and applications of Plant Biotechnology
- To understand methods of gene transfer in Recombinant DNA technology
- Applications of Biotechnology in Human welfare, IPR, Biosafety and Bioethics
- To understand the principles, tools and techniques of Genetic Engineering
- To study the concept of different classes of secondary metabolites of plants.
- To acquire the knowledge of Biodiversity, conservation and biolegislations
- To study the geographical distribution of plants
- To acquire the knowledge and techniques of Plant Propagation and Horticulture
- To acquire the knowledge on chemistry, structure, types of genetic material and protein synthesis
- To learn the concepts of gene and mechanism of gene regulation

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Sl. No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	1. Computer Science , BSCCBCSCOMYCM

**Program specific objectives:**

- To impart basic knowledge in computer science
- To give the skills required related to computer science
- To make the students aware of the various facets of computer science
- To make the students ready for placements in various software and other companies which need computer science skill sets

**Program specific outcome:** After completing this program specific discipline the students

- Get basic knowledge of computer science and this helps them to go for higher studies and do better in their profession
- Trained with skills required for their higher studies and jobs
- Students are placed in various software companies and regularly enter to higher studies also.

## B.Sc., Computer Science - 2016-17

Sl. No	Sem	Title of the Paper
1	I	Computer Fundamentals And Organization
2		Core course-1A Practical
3	II	Problem Solving In C
4		Core course-1B Practical
5	III	Advanced Programming In C++
6		Core course-1C Practical
7	IV	Data Base And Information System
8		Core course-1D Practical
9	V	Java And Web Programming
10		Elective Course-5.1 Practical
11		Software Systems
12		Elective Course-5.2 Practical
13		Data Mining And Warehousing
14		Elective Course-5.3 Practical
15	VI	Computer Architecture & Microprocessor
16		Elective Course-6.1 Practical
17		Data Communications And Networks
18		Project Work
19		Software Engineering
20		Project Work

### I Semester Computer Fundamentals and Organization

**Course objectives:** Students will try to learn:

- Conceptualize the basics of organizational and architectural issues of a digital computer.
- Demonstrate and perform computer arithmetic operations on integer and real numbers.
- Explain the representation of data and information in computer systems

**Course outcome:** On completion of the course the student should be able to:

- Familiar with parts of computer
- Understand the input and output devices.
- Basic ideas of storage devices, RAM, ROM
- Understand the design of sequential Circuits such as Flip-Flops, Registers, and Counters.
- Obtain a basic level of Digital Electronics knowledge and set the stage to perform The analysis and design of Complex Digital electronic Circuits
- Perform conversions among different number systems, became familiar with basic logic Gates and understand Boolean algebra and simplify simple Boolean functions by using basic Boolean properties & design of combinational circuits.

**Course objectives:** Students will try to learn:

- Learn the basics of logic gates.
- To understand the basic digital circuits and to verify their operation
- Construct basic combinational circuits and verify their functionalities
- Apply the design procedures to design basic sequential circuits
- Learn about counters
- Learn about Shift registers

**Course outcome:**

- To explain the concepts and design the Combinational circuits.
- To explain the concepts of flip-flops, registers and counters

### II Semester

### Problem Solving in C

**Course objectives:** Students will try to learn:

- To learn problem solving techniques.
- To make the student learn a programming language.
- To develop logics, this will help them to create programs, applications in C.
- Also learn the basic programming constructs they can easily switch over to any other language in future.

**Course outcome:** Students will be able to:

- Analyze a given problem and develop an algorithm to solve the problem
- Use the 'C' language constructs in the right way
- Design programs involving decision structures, loops and functions
- Understand the dynamics of memory by the use of pointers and Structures
- Design, develop and test programs written in 'C'

### Problem Solving in C Lab

**Course objectives:** Students will try to learn

- A programming language
- Problem solving techniques
- How to write programs in C and to solve the problems

**Course outcome:** Upon successful completion of the course, a student will be able to:

- Demonstrate use of data types, simple operators (expressions)
- Demonstrate decision making statements (if and if-else, nested structures)
- Demonstrate decision making statements (switch case)
- Demonstrate use of simple loops
- Demonstrate use of nested loops
- Demonstrate menu driven programs and use of standard library functions
- Demonstrate writing c programs in modular way (use of user defined functions)
- Demonstrate recursive functions
- Demonstrate use of arrays (1-d arrays) and functions
- Demonstrate use of multidimensional array (2-d arrays) and functions
- Demonstrate use of pointers
- Demonstrate concept of strings (strings and pointers)
- Demonstrate array of strings
- Demonstrate structures (using array and functions)
- Demonstrate nested structures

### **III Semester**

#### **Advance Programming in C++**

**Course objectives:** Students will try to learn:

- To develop programming skills , using object oriented programming concepts,
- learn the concept of class and object using C++
- develop classes for simple applications

**Course outcome:** On successful completion of the course students will be able to:

- Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.
- Able to make use of objects and classes for developing programs.
- Understand the difference between object oriented programming and procedural oriented language and data types in C++.
- Program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.

#### **Advanced Programming in C++ Lab**

**Course objectives:** Students will try to learn:

- Develop solutions for a range of problems using objects and classes.
- Programs to demonstrate the implementation of constructors, destructors and operator overloading.
- Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.
- Understand generic programming, templates, file handling.

**Course outcome:** On completion of the course, the student will be able to write:

- Programs using Control Structures
- Programs using Functions
- Programs using Arrays
- Programs using Inline Functions
- Programs using Classes
- Programs using Constructors and Destructors
- Programs using Friend Functions
- Programs using Operator Overloading
- Programs using Inheritance
- Programs using Virtual Functions
- Programs using Files
- Programs using Strings

### **IV Semester**

#### **Database and Information System**

**Course objectives:** Students will try to learn:

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and usage of Relational Algebra.
- To introduce the concepts of basic SQL as a universal Database language
- To demonstrate the principles behind systematic database design approaches by covering Conceptual design, logical design through normalization

**Course outcome:** On successful completion of the course, a student will be able to:

- Gain a good understanding of the architecture and functioning of database management systems as well as associated tools and techniques, principles of data modeling using entity relationship and develop a good database design and normalization techniques to normalize a database.
- Construct an Entity-Relationship (E-R) model from specifications and to transform to relational model
- Construct unary/binary/set/aggregate queries in relational algebra.
- Understand the use of structured query language and its syntax, transactions, database recovery and techniques for query optimization
- Acquire knowledge in fundamentals of Data Base management system
- Analyze the difference between traditional file system and dbms.

### **Database Management System Lab**

**Course objectives:** Students will try to learn:

- To describe a sound introduction to the discipline of database management systems.
- To introduce the concepts of basic SQL as a universal Database language
- To demonstrate the principles behind systematic database design approaches by covering Conceptual design, logical design through normalization.
- To design forms and reports through Visual Basic.

**Course outcome:** Students will able to:

- Explain the features of database management systems and Relational database.
- Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
- Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
- Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
- Design the forms and reports through the usage of front end designing tool.

### **V Semester Java and Web Programming**

**Course objectives:** Students will try to learn:

- Basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
- To understand the importance of Classes & objects along with constructors, Arrays and Vectors.
- Discuss the principles of inheritance, interface and packages and demonstrate through problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
- To understand importance of Multi-threading & different exception handling mechanisms.
- To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events.

**Course outcome:** Students will be able to:

- Implement Object Oriented programming concept using basic syntaxes of control
- Structures, strings and function for developing skills of logic building activity.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
- Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
- Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events.

### **Java Lab (Practical –I)**

**Course objectives:** Students will try to learn:

- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.

**Course outcome:** Students will able to:

- Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Write Java application programs using OOP principles and proper program structuring.
- Demonstrate the concepts of polymorphism and inheritance.
- Write Java programs to implement error handling techniques using exception handling.

### **Software System**

**Course objectives:** Students will try to learn:

- To understand the main components of an OS & their functions.
- To study the process management and scheduling.
- To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
- To understand the concepts and implementation Memory management policies and virtual memory.
- To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS.
- To study the need for special purpose operating system with the advent of new emerging Technologies.

**Course outcome:** Students will able to:

- Distinguish between Operating Systems software and Application Systems software.
- Describe commonly used operating systems.
- Identify the primary functions of an Operating System.

### **Linux Lab (Practical –II)**

**Course objectives:** Students will try to learn:

- The basic commands of Linux operating system
- To write shell scripts
- To create processes background and fore ground etc..by fork() system calls

**Course outcome:** Students will able to:

- Understanding the basic set of commands and utilities in Linux systems.
- To learn to develop software for Linux systems.
- To learn the important Linux library functions and system calls.
- To understand the inner workings of UNIX-like operating systems.

### **Data Mining and Warehousing**

**Course objectives:** Students will try to learn:

- They come to know how to write program in Assembly level language and know how to Implement the Programs in 8085 kit.
- Know the basic concepts 8085 program.
- Get hands on experience with Assembly Language Programming

**Course outcome:** On successful completion of the course, a student will be able to:

- To write program in Assembly level language and know how to implement the Programs on 8085 kit.
- Know the basic concepts 8085 program.

## **VI Semester**

### **Computer Architecture and Microprocessor**

**Course objectives:** Students will try to learn

- Study various data transfer techniques in digital computer.
- Learn microprocessor architecture and study assembly language programming

**Course outcome:** On successful completion of the course, a student will be able to:

- Describe basic organization of computer and the architecture of 8085 microprocessor.
- Implement assembly language program for given task for 8085 microprocessor
- Learn about the architecture and programming of the microprocessor 8085 and 8086.
- Know the basic concepts of Motherboard and function of 8085 processor.

## Data Communications and Networks

**Course objectives:** Students will try to learn:

- To understand the basic concepts of data communication, layered model, protocols and interworking between computer networks and switching components in telecommunication systems.
- Discuss the nature, uses and implications of internet technology.
- An overview of security issues related to data communication in networks

**Course outcome:** On successful completion of the course, a student will be able to:

- Explain how communication works in computer networks and to understand the basic terminology of computer networks
- Explain the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.
- Understand design issues in network security and to understand security threats, security services and mechanisms to counter.

## Software Engineering

**Course objectives:** Students will try to learn:

- To offer students a glimpse into real world problems and challenges that need IT based solutions
- To enable students to create very precise specifications of the IT solution to be designed.
- To introduce students to the vast array of literature available of the various research challenges in the field of IT
- To create awareness among the students of the characteristics of several domain areas where IT can be effectively used.
- To enable students to use all concepts of IT in creating a solution for a problem
- To improve the team building, communication and management skills of the students.

**Course outcome:** Students will be able to:

- Discover potential research areas in the field of IT
- Conduct a survey of several available literature in the preferred field of study
- Compare and contrast the several existing solutions for research challenge
- Demonstrate an ability to work in teams and manage the conduct of the research study.
- Formulate and propose a plan for creating a solution for the research plan identified
- To report and present the findings of the study conducted in the preferred domain

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	2. Electronics , BSCCBCSELEYCM

**Program Specific Objectives (PSO):**

- To pass on advanced and comprehensive knowledge in the area of Electronic Science
- To train the students to be inquisitive and think in an innovative way
- To impart basic and translational research skills with technical excellence and make them research and industry ready



### Program specific Outcome (PSO):

- In depth knowledge gained during the course of three years helps the students to join the higher courses or industries as beginners.
- Helps the students to answer the questions with confidence in competitive examination
- Develop practical skills along with their theory components.
- They develop entrepreneurial skills with the help of skill-based courses and alumni interaction.
- Overall goal is reached towards Professional Competence.

### B.Sc., Electronics - 2016-17

Sl. No	Sem	Title of the Paper
1	I	Network Analysis and Analog Electronics
2	II	Linear and Digital Integrated Circuits
3	III	Communication Electronics
4	IV	Microprocessor and Microcontroller
5	V	Electronics Instrumentation
6		VHDL
7	VI	Photonic Devices and Power Electronics
8		Digital Signal Processing

#### I Semester

### Network Analysis and Analog Electronics

**Course objectives:** This course will enable students:

- To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
- To introduce students with the fundamental concepts of network theorems and analysis.
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.
- 4. To design and demonstrate diode circuits.
- To explain various BJT, FET and UJT connections and configurations.
- To analyse the different RC and LC oscillator circuits to determine the frequency of oscillation.

**Course outcome:** After successful completion of the course student will be able to

- Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computer simulation.
- Understand various functions of network and also the stability of network.
- Synthesize the network using passive elements.
- Design the different oscillator circuits for various frequencies.

- Know about the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.

## II Semester

### Linear and Digital Integrated Circuits

**Course objectives:** Students will try to learn:

- To understand the concepts, working principles and key applications of linear integrated circuits.
- To perform analysis of circuits based on linear integrated circuits.
- To design circuits and systems for particular applications using linear integrated circuits.
- To understand number representation and conversion between different representation in digital electronic circuits.
- To analyse logic processes and implement logical operations using combinational logic circuits.
- To understand characteristics of memory and their classification.
- To understand concepts of sequential circuits and to analyse sequential systems in terms of state machines

**Course outcome:** After successful completion of the course student will be able to

- Understand the fundamentals and areas of applications for the integrated circuits.
- Analyse important types of integrated circuits.
- Demonstrate the ability to design practical circuits that perform the desired operations.
- Understand the differences between theoretical, practical & simulated results in integrated circuits.
- Select the appropriate integrated circuit modules to build a given application.
- Develop a digital logic and apply it to solve real life problems.
- Analyse, design and implement combinational logic circuits.
- Classify different semiconductor memories.
- Analyse, design and implement sequential logic circuits.

## III Semester

### Communication Electronics

**Course objectives:** This course will enable students:

- To introduce the concepts of analog and digital communication systems.
- To equip students with various issues related to analog and digital communication such as modulation, demodulation, transmitters and receivers and noise performance.
- To make the students understand the concepts AM, FM, PM.
- Explain the basics of sampling and quantization, ASK, FSK, PSK.
- To study the concept of satellite communication and various frequency bands, orbits etc.
- To understand the concepts of mobile communications.

**Course outcome:** After study through lectures and assignments, students will be able to

- Gain the knowledge of components of analog communication and digital communication systems.
- Analyse various methods of baseband/band pass Analogue transmission and detection.
- Analyse and allocate performance of components of an analogue communication system and to design analogue communication systems.
- Generation and detection of pulse modulation techniques and multiplexing.

#### **IV Semester**

### **Micro Processor and Microcontroller**

**Course objectives:** This course will enable students:

- To develop background knowledge and core expertise of microprocessor and microcontroller.
- To know the importance of different peripheral devices and their interfacing to microcontrollers.
- To know the design aspects of microprocessor and microcontrollers.
- To write assembly language programs of microprocessor and microcontrollers for various applications.
- To introduce the concept of embedded systems.

**Course outcome:** At the end of course, a student will be able to:

- Draw and describe architecture of 8085 microprocessor and 8051 microcontroller.
- Interface various peripheral devices to the microcontrollers.
- Write assembly language program for microprocessor and microcontrollers.
- Analyse architecture of embedded systems.

#### **V Semester**

### **Electronics Instrumentation**

**Course objectives:** This course will enable students to:

- Define and describe accuracy and precision, types of errors, statistical and probability analysis.
- Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters. .
- Describe functional concepts and operation of various Analog and Digital measuring instruments.
- Describe and discuss functioning and types of Oscilloscopes, Signal generators, AC and DC bridges.
- Recognize and describe significance and working of different types of transducers.

**Course outcome:** After studying this course, students will be able to:

- Describe instrument measurement errors and calculate them.
- Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters.
- Describe functional concepts and operation of Digital voltmeters and instruments to measure voltage, frequency, time period,
- Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers.
- Utilize AC and DC bridges for passive component and frequency measurements.

## **VHDL**

**Course objectives:** This course will enable students to:

- Learn different VHDL constructs.
- Familiarize the different levels of abstraction in VHDL.
- Understand timing and delay Simulation.
- Learn VHDL at design levels of data flow, behavioural and structural for effective modelling of digital circuits.
- Study the concepts of generics, configuration and sub-programs.
- Get an introduction to Verilog

**Course outcome:**

- At the end of this course, students should be able to
- Write VHDL programs in gate, dataflow, behavioural and structural modelling levels of Abstraction.
- Write simple programs in VHDL in different styles.
- Design and verify the functionality of digital circuit/system using test benches.
- Identify the suitable Abstraction level for a particular digital design.
- Perform timing and delay Simulation

## **VI Semester**

### **Photonic Devices and Power Electronics**

**Course objectives:** This course will enable students:

- To understand the classification of photonic devices like LEDs, LCDs, Photodetectors, Photoconductors and Solar Cells.
- Understand the working of various power devices like SCR, DIAC, TRIAC POWER MOSFET and IGBT.
- Study and analysis of thyristor circuits with different triggering techniques.
- Learn the applications of power devices in controlled rectifiers.
- Study of power electronics circuits under different load conditions.

**Course outcome:** After studying this course, students will be able to:

- Determine the wavelength of different light.
- Understand the application of various photonic devices.
- Describe the characteristics of different power devices and identify the applications.
- Determine the output response of a thyristor circuit with various triggering options.
- Determine the response of controlled rectifier with resistive and inductive loads.

## **Digital Signal Processing**

**Course objectives:** This course will enable students to:

- Understand the mathematical description of continuous and discrete time signals and systems.
- Analyse the signals in time domain using convolution difference/differential equations
- Classify signals into different categories based on their properties. .
- Analyse Linear Time Invariant (LTI) systems in time and transform domains.
- To study the bilinear transformation, digital filters and DSP processor.

**Course outcome:** At the end of the course, students will be able to:

- Classify the signals as continuous/discrete, periodic/apperiodic, even/odd, energy/power and deterministic/random signals. .
- Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
- Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum.
- Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis.
- Compute Z-transforms, inverse Z- transforms and transfer functions of complex LTI systems.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	6 Environmental Science BSCCBCSENVYCM

**Program specific objectives:**

- To impart basic knowledge in Environmental science
- To give the skills required related to Environmental science
- To make the students aware of the various facets of Environmental Science
- To make the students ready for placements in Environmental related organizations

**Program specific outcome:**

After completing this program specific discipline the students

- Get basic knowledge of Environmental science and this helps them to go for higher studies and do better in their profession
- Trained with skills required for their higher studies and jobs
- Students are placed in various organizations and companies and they regularly enter to higher studies also.

### **B.Sc., Environmental Science – 2016-17**

<b>Sl. No</b>	<b>Sem</b>	<b>Title of the Paper</b>
1	I	Atmosphere and climate change
2	II	Ecology and environment
3	III	Earth and environmental science
4	IV	Environmental chemistry
5	V	Environmental microbial technology
6		Natural resource management and sustainability
7	V	Industrial safety, health and environment
8	VI	Environmental pollution analysis, control & management
9		Environmental legislation and policy
10	VI	Watershed Management
11		Environmental Studies

### **I Semester**

### **Atmosphere and Climate Change**

#### **Course objectives:**

- To understand the dynamics of atmospheric processes.
- Highlights the anthropogenic intervention which has led to global climate change.
- The paper explores the effects of global changes on human communities and initiatives taken at global and regional levels to combat them.

#### **Course outcome:**

- Students will understand the Earth's atmosphere, meteorology, pollution, gas emissions, and airborne contaminants, thereby the dynamics of atmosphere.
- Studying climate and a changing climate is important, which will affect people around the world.
- Analysis of atmospheric circulation and/or temperature alone can be used for modelling or prediction purposes.
- Climatic Change is important since it helps to determine future climate expectations.
- Preparing for climate change — also known as climate change adaptation — is about reducing the risk of climate change impacts to people, places and resources.

### **II Semester**

### **Ecology and Environment**

#### **Course objectives:**

- Basic understanding of ecosystem and its structural and functional aspects.
- It explores the knowledge of interconnections among all the biotic and abiotic components of environment.
- To understand the dynamic nature of the ecological processes in maintaining the equilibrium.

**Course outcome:**

- Students will acquire new knowledge of the interdependence between people and nature that is vital for food production, maintaining clean air and water, sustaining biodiversity.
- They understand to maintain a mosaic of habitats that ensures the survival of a rich variety of species.
- They will learn how Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play.
- Students will have an insight like larger number of plant species means a greater variety of crops. Greater species diversity ensures natural sustainability for all life forms.
- Inculcates conservation aspects which help in preventing soil erosion, desertification, deforestation, natural disasters etc.

**III Semester****Earth and Environmental Science****Course objectives:**

- The focus is on interactions between the solid Earth, its water, its air and its living organisms, and on dynamic, interdependent relationships between these four components.
- A good exposure to basic structure and composition of the Earth.
- It deals with the interactive processes in the inner as well as outer Earth's surface.
- Natural disasters education is a very important part in the prevention of natural disasters.

**Course outcome:**

- Earth Science is important because most human activities are related to interaction with the planet Earth.
- Students gain knowledge about how these relationships produce environmental change at different timescales.
- They also strive to understand past and present environmental processes so that reliable and scientifically based predictions can be made about the future.
- It is a good platform to learn the physical and chemical properties of soil which enables them to understand how they affect the plant growth and thereby fertilizing management practices.
- Students acquire sufficient knowledge about rainwater harvesting which enhances stored water capacity, revitalize the groundwater level and reduce surface runoff and soil erosion.
- Exploring more about natural disasters yield positive results by reducing the risks and consequences.

**IV Semester****Environmental Chemistry****Course objectives:**

- The paper aims to build a conceptual understanding of students by exposing them to the basic principles behind various processes.
- Environmental Chemistry is the study of the changes chemicals make in the environment, such as contamination of the soil, pollution of the water, degradation of chemicals, and the transport of chemicals upon the plants and animals of the immediate environment.
- It gives a clear knowledge on the chemically induced soil, its effects and its relationship with the plants and animals of the environment.

**Course outcome:**

- This paper enables students to develop methods and procedures to reduce the contaminants or the chemicals in the air, water or soil.
- Students gain knowledge about the health impacts of various types of pollution.
- Students understand the processes occurring in the environment which are impacted by humankind's activities.
- They get to know about the different chemical reactions, sampling and analytical techniques.
- Students are exposed to the effects of chemical fertilizers and pesticides on the environment and also encourage the use of bio-fertilizers and bio-pesticides.

**V Semester****Environmental Microbiology****Course objectives:**

- The course focuses on the variety of microbes, their habitats and interactions and their significance.
- It gives a wide vision on the spread of various diseases through microbes and a proper treatment for the disease.
- The paper presents an objectives view of the application of biotechnological aspects in tackling the environmental problems.
- The course also provides knowledge on how to avoid the use of hazardous pollutants and wastes that affect the natural resources and the environment.

**Course outcome:**

- Students get a valuable knowledge about the role of microbes in the environment.
- They are also exposed to the various effects of microbes on the environment and how it can be reduced.
- Students will get to know how the contaminated soil might be corrected or remedied on-site or loaded into containers and transported for treatment.
- It is a good platform for them to learn and transform plants into biofuels.
- Develop procedures to convert waste into biogas or other cleaner sources of energy.
- This study explains the contributions of bioenergy and how it can offer to reduce the use of fossil fuels in cities.
- They get opportunities for investment in biofuels which boosts the growth of economy which means that there will be more jobs and new sources of income.

**Natural resource management and sustainability****Course outcome:**

- Students get a valuable knowledge about the role of natural resources of the environment.
- Students will get to know how the natural resources can best used without causing harm to the environment.
- It is a good platform for them to learn about the sustainable way of approach to environment which is the need of the hour.



## **Industrial safety, health and environment**

### **Course outcome:**

- Students get a valuable knowledge on safety concerns to be followed in an industry which should be environmental friendly.
- They are also exposed to the various aspects related to health protection of common man.
- Students will get to know how economic growth by establishing industry always should be associated with safe and environmental friendly waste treatment.

### **VI Semester**

#### **Environmental Pollution Analysis, Control & Management**

### **Course objectives:**

- This paper throws light upon the pollution prevention approaches that can be applied to all potential and actual pollution-generating activities.
- Further it emphasises on prevention practices that are essential for preserving wetlands, groundwater sources and other critical ecosystems - areas in which we especially want to stop pollution before it begins.
- Here we even study Environmental Impact Assessment (EIA) which is the project of policies, plans and programs, which are related to the proposed program associated with the organ of the state.
- This paper gives an overview of Environmental laws which play an important role in the protection of human health as well as the environment.

### **Course outcome:**

- Students learn that pollution prevention can reduce environmental damages with suitable action.
- They can analyse the pollutants qualitatively and quantitatively and based on the results action can be taken.
- EIA is a formal study process through which they can predict the environmental consequences of any development project.
- EIA study will ensure that the potential problems are foreseen and addressed at an early stage in project planning and design, to achieve sustainable development. Students understand the role of the Environmental Law, to make sure that the practices used in the environment do not cause harm to the environment, human or animal health.

### **VI Semester**

#### **Environmental legislation and policy**

### **Course outcome:**

- Students learn various Environmental legislation and policies of the governments
- This is very much needed for them in the future course of action

#### **Watershed Management**

### **Course outcome:**

- Students learn various aspects of watershed management
- This is very much needed for them to plan effective utilisation of water in a sustainable way

## AECC 3A- ENVIRONMENTAL STUDIES

### Course objectives:

- To understand the multidisciplinary nature of natural resources their associated problems.
- To develop the concept of conservation of biodiversity and ecosystems for future generations.

### Course outcome:

- Students will understand the uses and exploitation of various natural resources like forest, water, minerals food and energy, along with case studies to preserve and sustain our environment.
- It will enable them to understand the concept and types of ecosystems.
- Conservation of biodiversity, endangered, endemic species are studied at global, national and local levels.
- Help the students to understand the causes, effects and control measures of various environmental pollution also by taking into account the social issues associated with it.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	7.Food and Nutrition BSCCBCSFSNYCM

### Program Specific Objectives:

- To provide students with the knowledge of basic terminology and several aspects of nutrition and the functions of food in healthy life sustenance;
- To ensure that students are familiar with the food classification, nutrition during special conditions and role of special functional food;
- To equip students with knowledge and understanding of modern aspects of nutritional science and novel food usage.
- To build competent professional in Food Science and Processing and work in Food Research Laboratories, Research institutes, baking industry, dairy industry, etc.
- To build competent professional Nutrition & Dieticians in hospitals and specialty clinics and for Sports nutrition. Thereby, the professionals can find job prospects in the field as Nutrition and Diet consultants in Food service organizations like Hotels, Hospitality services, Geriatric homes and also as administrators of Industrial canteens and other specialties.

### Program Specific Outcome:

- A successful completion of this course will enable students to: summarize and critically discuss/ understand both fundamental and applied aspects of food science and nutrition.
- They will be able to explain functions of specific nutrients in maintaining health, identifying nutrient specific foods and apply principles from the various facets of food science and related disciplines to solve practical as well as real-world problems.
- Use current information technologies to locate and apply evidence-based guidelines and protocols and get imparted with critical thinking to take leadership roles in fields of health, food research laboratories, dietetics, special nutritional needs and nutritional counseling.

Sl. No	Sem	Title of the Paper
1	I	Human Physiology I
2	II	Human Physiology II
3	III	Principles of Nutrition I
4	IV	Principles of Nutrition II
5	V	Food Science
6		Family Nutrition
7	VI	Food Processing and Quality Control
8		Therapeutic Nutrition

**I Semester  
Human Physiology I**

**Course objectives:**

- To understand the basic physiological principles and structure of various organs.
- To understand the importance & integrated function of various physiological systems including skeletal, muscular, lymphatic, cardiovascular, digestive and nervous systems.

**Course outcome:** students will acquire knowledge on

- Basics of human physiology
- The structure, specific functions & regulatory mechanisms of the systems of the human body.
- Anatomical and physiological terminology to comprehend and communicate information on body structure and function.

**II Semester  
Human Physiology II**

**Course objectives:**

- To have an enhanced knowledge and appreciation of human physiology and human genetics
- To understand the structure, functions and physiological processes of various organ systems.

**Course outcome:** students will acquire knowledge on

- Basics of human genetics and the physiology of respiratory, excretory, endocrine and reproductive system.
- The structure, importance, normal functioning of the organ systems of the body and their regulatory mechanisms.

**III Semester  
Principles of Nutrition-I**

**Course objectives:**

- To obtain a better understanding of the principles of nutrition and its role in cellular and physical growth.
- To provide an overview of the major macronutrients relevant to human health.
- To understand the techniques of measurement of energy expenditure and protein quality.

**Course outcome:** students will acquire knowledge on

- Classification, metabolism, and importance of macronutrients
- Determination of energy and its metabolism

## IV Semester Principles of Nutrition-II

### Course objectives:

- Provide a solid knowledge base from which can describe and explain the importance of water, micronutrients and identify their roles within a functioning organism.
- Discuss the scientific rationale for defining nutritional requirements in healthy individuals and populations.
- To provide an understanding of the composition of body and the various methods of studying body composition.

**Course outcome:** students will acquire knowledge on

- The importance of water and micronutrients in functioning of human body.
- Composition of the body and methods to assess the same.
- Computation of Nutrients requirements.

## V Semester Food Science

### Course objectives:

- To obtain knowledge on different food groups and their contribution to nutrition.
- To understand the structures, compositions, processing methods, preparations and quality characteristics of different food groups.

**Course outcome:** students will gain knowledge on

- Different food groups, nutritional composition, preparations, and quality parameters.
- Different processing techniques and its effect on nutritional composition.

## Family Nutrition

### Course objectives:

- To attain knowledge on nutrition needs & demands of different age groups.
- To understand various deficiency disorder & the importance of their intervention programmes on community level

**Course outcome:** students will get knowledge on

- Developing skills in nutrition sector on community level & NGO's.
- Identifying & preventing nutritional disorders.

## VI Semester Food Processing and Quality Control

### Course objectives:

- To provide basic understanding on principles and methods of Food preservation by traditional and modern technologies
- To gain knowledge of micro-organisms in relation to food and food preservation
- To understand the role of micro-organisms in spoilage of various foods
- To gain knowledge on food safety, hazards and designing of new food products

**Course outcome:** students will acquire knowledge on

- The principles behind Food preservation by traditional and modern technologies
- Microorganisms responsible in the spoilage of different food groups.
- Food borne disease, infections and mycotoxins
- Commercial techniques of food preservation and packaging

# Therapeutic Nutrition

**Course objectives:**

- To understand the concepts, principles of nutrition in diet therapy and develop the ability to plan and prepare diets for therapeutic conditions and role of dietitian.
- To apply knowledge of ethical practice in medical nutrition therapy, intervention programmes.

**Course outcome:** students will acquire knowledge on

- role of dietitian in the hospital and community
- role of diet in different disease conditions planning and preparation of therapeutic diets.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	8.Geology BSCCBCSGEOYCM

**Program specific objectives:**

- To impart basic knowledge in Geology
- To give the skills required related to Geology
- To make the students aware of the various facets of Geology
- To make the students ready for placements in various organizations like Geological survey of India and other companies which need skill sets of geology
- To enable to set their own consultancy/start ups

**Program specific outcome:**

After completing this program specific discipline the students

- Get basic knowledge of Geology and this helps them to go for higher studies and do better in their profession
- Trained with skills required for their higher studies and jobs
- Students are placed in various organizations and regularly enter to higher studies also.
- Students have started their consultancy services

**B.Sc., Geology-2016 - 17**

Sl. No	Sem	Title of the Paper
1	I	Earth Systems Science
2	II	Mineral science
3	III	Petrology
4	IV	Palaeontology and stratigraphy
5	V	Economic geology
6		Engineering geology and hydrogeology
7		Gemology, Environmental Geology and Medical Geology
8	VI	Structural geology and exploration geology
9		Remote sensing, GIS, disaster and natural hazards management
10		Mining Geology and Remote Sensing

## **I Semester Earth Systems Science**

### **Course outcome:**

- The study of this paper strengthens students knowledge with respect to understanding the essentials of the structural dynamics of the earth.
- The students will understand the origin of our solar system and planets, including earth. The students are exposed to the Geological time scale and be able to appreciate the dynamics of earth evolution through time.

## **II Semester Mineral Science**

### **Course outcome:**

#### Mineral Kingdom:

- Studying the basics of mineralogy and crystallography helps in understanding and building the overall knowledge in Geology.
- The students will be able to identify common rock-forming minerals in hand specimens as well as in thin sections. Besides, they will familiarise themselves with various crystal lattice and crystal systems.

## **III Semester Petrology**

### **Course outcome:**

- On completion of the course the students will have gained an understanding of the processes involved in the formation of igneous, sedimentary and metamorphic rocks, their textures, structures, classifications and their importance.
- Students learn to identify, describe and classify rocks using hand specimens. The students will also acquire skills to determine and interpret geochemistry of rocks.

## **IV Semester Palaeontology and Stratigraphy**

### **Course outcome:**

- The study of stratigraphy and Palaeontology encompasses the aspects of the age of the earth, chronological arrangement of rocks and appearance and evolution of life through the geologic time. The knowledge of the concepts in stratigraphy, correlation, and paleontology would enable the students to understand the changes that occurred in the history of the earth and relate them to their field observations and also, in understanding the framework of the stratigraphy of India
- The students will acquire skills of discovering and describing fossils and their taxonomic classification. They will also be introduced to interpreting paleoclimate and paleoenvironment conditions.

## **V Semester Economic Geology**

### **Course outcome:**

- By the end of this course the student will have learnt about the distribution of mineral deposits both metallic and non-metallic, techniques of mineral exploration and exploitation, estimation of ore reserves, environmental impact of mining, and the importance conservation of mineral resources.
- Upon completion of this course, the student will acquire all knowledge and skills required for himself/herself becoming a mining geologist.

# **Engineering Geology and Hydrogeology**

## **ENGINEERING GEOLOGY:**

### **Course outcome:**

- Upon completion of the course the student will become aware of the importance of geological studies and its applicability to various engineering problems.
- The student will be educated on geological site investigations for engineering structures and will provide skills in geological mapping and making geotechnical measurements.

## **HYDROGEOLOGY:**

### **Course outcome:**

- On completion of the course, the student will have gained an understanding of hydrogeological concepts, exploration, exploitation and recharge of groundwater and methods of monitoring groundwater quality and sources of pollution
- Students will be able to acquire skills of systematic hydrogeological surveys and water quality Monitoring

## **Gemology, Environmental and Medical Geology**

### **Gemology:**

#### **Course outcome:**

- The basic idea is to make students well versed with the different terminologies used in the gem industry and to provide skills to become a successful gemmologist.
- The students will acquire skills which will be useful to them in the gem industry.

### **Environmental Geology:**

#### **Course outcome:**

- Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment. Understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.
- Students will be able to test and evaluate water quality for drinking and agricultural use. They will also have knowledge about various natural disasters.

### **Medical Geology**

#### **Course outcome:**

- On completion of the course the student will be able to understand the distribution of trace elements and its cyclic movement through the abiotic-biotic environment and their influence on human health, flora and fauna.
- The course provides a basic understanding of geogenic and anthropogenic distribution of trace elements, their toxic effects on human health and that of flora and fauna.

**VI Semester**  
**Structural Geology & Exploration Geology**

**Structural Geology:**

**Course outcome:**

- The course deals with geological structures resulting from the action of these forces on rocks.
- The student will gain knowledge of the geometry of the rock structures, understand the mechanism of the evolution of rock structures and its application in the field.
- The students learn the skills of identifying different structure and measurements using Brunton compass. This is fundamental to geological mapping. This course also helps to know how to use structures and help students appreciate the dynamic nature of the Earth lithosphere. Learn how to read geologic maps and solve simple map problems using strike and preparations of cross sections.

**Exploration Geology:**

**Course outcome:**

- The course provides the student essential and basic concepts of mineral exploration techniques and the art and science of mining mineral resources. Geophysics deals with methodologies for extracting geological information out of geophysical datasets generated from different petrophysical properties. In Geophysical exploration the student will gain first-hand knowledge dealing with the principles and their significance.
- This course tries to impart skills related to Geology in mining and enable him/her to perform duties of a geologist at the mining site. The students will acquire skills to use GPS, Electrical Resistivity and other methods for exploration. These have wide application in mineral exploration, groundwater studies, petroleum geology, etc.

**Remote Sensing, GIS, Disaster and Natural Hazards Management**

**Remote Sensing:**

**Course outcome:**

- The course is meant to address the fundamental techniques used for remote sensing. At the end of this course, the student will be appraised with all the theoretical knowledge, information and skills to use Remotely Sensed data for geological applications.
- After completion of this course, the student will be well versed with the world of Remote Sensing and the applications and Interpretation of data related to geosciences.

**GIS:**

**Course outcome:**

- This course provides a theoretical and practical, hands-on approach to spatial database design and spatial data analysis with Geographical Information Systems as applied to the various fields of geosciences.
- The course provides knowledge of the fundamentals of GIS theory, and the stages of developing and using a GIS platform of various geological applications. It also promotes proficiency in the use of the GIS softwares for visualization, query, mapping, and analytical purposes.



## Disaster and Natural Hazards Management:

### Course outcome:

- Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment. Understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.
- Students will be able to test and evaluate water quality for drinking and agricultural use. They will also have knowledge about various natural disasters.

## Mining Geology and Mineral Processing

### Course outcome:

- By the end of this course the student would have learnt about techniques of mineral exploration and exploitation, estimation of ore reserves, environmental impact of mining, and the importance conservation of mineral resources.
- Upon completion of this course, the student will acquire all knowledge and skills required for himself/herself becoming a mining geologist.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	1. Mathematics BSCCBCSMATYCM

### PROGRAM SPECIFIC OBJECTIVES:

- To equip students knowledge to learn and explain mathematics on their own.
- To ensure students read and understand mathematical ideas in real \_ world problems.
- To provide students with the knowledge of mathematics necessary for their employment.
- To build competent professionals in mathematics having experience in using technology to address mathematical ideas.
- To provide students with the knowledge to read, write and understand basic proofs and problem solving skills.

### PROGRAM SPECIFIC OUTCOME:

- A successful completion of the course will enable the students to demonstrate the ability to effectively utilize variety of techniques and strategies of fundamental and advanced mathematics in daily life.
- Students will be able to demonstrate the ability to analyse data and draw appropriate conclusions in varies branches of mathematics and related disciplines in solving practical as well as real world problems.

## B.Sc., Mathematics - 2016-17

Sl. No	Sem	Title of the Paper
1	I	Algebra and Calculus I
2	II	Algebra and Calculus II
3	III	Analysis and Calculus
4	IV	Algebra and Calculus II
5	V	Algebra and Analysis II
6		Applied mathematics I
7		Statistics and Probability
8	VI	Numerical Analysis and complex analysis
9		Linear Algebra
10		Applied mathematics II

### I Semester

#### Algebra and Calculus I

**Course objectives:** Students will try to learn:

- To understand the basic concept of equations and graphical representation.
- Demonstrate and perform on functions like limits, continuity & differentiability.
- Explain the representation of data and information related to curves and angles.

**Course outcome:** On completion of the course the student should be able to:

- Familiar with numbers and functions.
- Understand the concepts like radius vector & tangent of curves.
- Basic ideas like symmetry, transformation & reciprocal of equations.

### II Semester

#### Algebra and Calculus II

**Course objectives:** Students will try to learn:

- To learn problem solving techniques on matrices.
- To make the student learn theorems like Rolle's & Mean value.
- To learn & develop concepts related to line and multiple integrals.

**Course outcome:** Students will be able to:

- Analyze a given problem and develop the solution of problems.
- Use different techniques to solve Differential equations.
- Understand the logics to find the area by integration

### III Semester

#### Analysis and Calculus

**Course objectives:** Students will try to learn:

- To develop the concept of sequence of a function and partial derivatives.
- Learn the concept of Asymptotes & Envelopes.
- To learn the concept of vectors and scalars.

**Course outcome:** On successful completion of the course students will be able to:

- Identify importance of sequence of a function, convergent, divergent & oscillatory.
- Demonstrate proficiency in calculus.
- Understand the difference between Differentiation and partial differentiation.

### IV Semester

#### Algebra and Analysis I

**Course objectives:** Students will try to learn:

- To describe a sound introduction to the Groups theory.
- To give a good formal foundation on the infinite series
- To demonstrate the principles cossets of group

**Course outcome:** On successful completion of the course, a student will be able to:

- Gain a good understanding of the knowledge on groups theory as well as normal group, homomorphism of groups.
- Acquire knowledge in fundamentals of infinite series, convergent, divergent & oscillatory.
- Analyze the difference between Sequence and series.

### V Semester

#### Algebra and Analysis II

**Course objectives:** Students will try to learn:

- Conceptualize the basics of Rings, fields and related areas.
- Explain the representation of an integral as a Riemann integral and improper integral.
- Construct clearly written proofs which use correct terminology and cite previous theorems

**Course outcome:** On successful completion of the course, a student will be able to:

- Construct clearly written proofs which use correct terminology and cite previous theorems.
- Familiar with Fields and ideals
- Understand the techniques of integration

## Applied mathematics I

**Course objectives:** Students will try to learn:

- To understand the concept of D operators in differential equations.
- To understand the concepts and implementation laplace transformations.
- Evaluate derivatives for complexly constructed elementary functions

**Course outcome:** Students will able to:

- Distinguish between ordinary differential equation and partial differential equation.
- Evaluate functions using laplace transformations.
- Identify the primary functions like even and odd functions.

## Statistics and Probability

**Course objectives:** Students will try to learn

- Develop problem solving skills through diverse applications of the integral.
- Learn to read and understand mathematical/statistical results and proofs as well as formulate his/her own proof to various problems
- Apply knowledge and skills in probability and statistics related sciences
- Gain a solid foundation in the theory of probability, which provides the foundation for modern statistical inference

**Course outcome:** On successful completion of the course, a student will be able to:

- Distinguish between discrete and continuous random variables and give examples of each.
- Define the mean and the variance for a random variable and calculate the expected values and variances of discrete and continuous random variables
- Define the probability distribution for discrete and continuous random variables and list examples of distributions of some common random variables.
- Define the concepts of joint, marginal, and conditional distributions essential to finding the probabilities of various sample outcome

## VI Semester

### Numerical Analysis and complex analysis

**Course objectives:** Students will try to learn:

- To learn problem solving techniques on complex analysis.
- To make the student learn theorems like cauchy's Riemann equation.
- To learn & develop concepts related to transformation in complex plane.

**Course outcome:** Students will be able to:

- Analyze a given problem and develop the solution in numerical methods like bisection method and Runge kuttas method.
- Use different techniques to solve finite difference and forward and backward difference.
- Understand the logics to find the analytic function and harmonic function

## Linear Algebra

**Course objectives:** Students will try to learn:

- Develop methods and problem solving skills in solving systems of linear equations
- Apply the knowledge and skills in natural and social sciences
- Learn theory of matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors

**Course outcome:** On completion of the course the student should be able to:

- Model and systematically solve systems of linear equations using matrix notation
- Demonstrate factual knowledge of the fundamental concepts of spanning, linear Independence and linear transformations.
- Use matrix algebra to analyze and solve equations arising in many applications that require a background in linear algebra.
- Utilize vector space terminology and describe how closely other vector spaces resemble  $\mathbb{R}^n$

## Applied Mathematics II

**Course objectives:** Students will try to learn:

- Understanding of series solution of differential equations and techniques involved in learning special functions.
- Understanding of the role and relation of Fourier transforms in different areas of mathematics
- Understanding of different problems and concepts in Z-transforms and Boolean algebra.

**Course outcome:** Students will able to:

- Select and implement different problem solving techniques.
- Develop some basic level methods and formulae to solve problems.
- Define the basic concepts and importance of Fourier transforms and related areas

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Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	10. Microbiology BSCCBCSMICYCM

**Program specific objectives (PSO):**

- To reveal and explore basic and modern knowledge in the area of invisible microbial world
- To up skill the students intellectual and encourage their critical as well as innovative way of thinking
- To train students for academics, research, industries as well as for entrepreneurship by directing their fundamental theory and practical research skills with technical excellence.

### Program specific outcome (PSO):

- Knowledge acquired over the course of three years aids students in rapidly acclimating to the work environment such trainees, researcher, teaching and entrepreneur.
- Supports student's confidence in answering questions during competitive exams and interviews.
- Acquire sufficient information to suggest research ideas with the help of the subject teacher.
- Gain enough knowledge to propose research ideas with guidance from the concerned subject teacher.
- Apply learned practical skills and approach along with their theory concepts, when selected for various positions in both academic institutions and R & D programmes of industries.
- Build entrepreneurial skills through skill-based courses and networking with alumni.
- Professional Competence is attained through the development of effective communication and interactive skills for teaching the subject at the graduate and postgraduate levels.

### B. Sc., Microbiology - 2016-17

Sl. No	Sem	Title of the Paper
1	I	General Microbiology
2	II	Microbial Diversity
3	III	Microbial Physiology, Metabolism & Molecular Biology
4	IV	Recombinant DNA Technology and Food Microbiology
5	V	Environmental Microbiology
6		Soil and Agricultural Microbiology
7	VI	Industrial Microbiology
8		Immunology and Clinical Microbiology

#### I Semester

#### General Microbiology

#### Course objectives:

- Students will be acquainted with the basic concept microbial taxonomy such as identification, classification and nomenclature taxonomy.
- To know the different classification system
- To acquire knowledge on different biosafety regulatory framework for prokaryotes.
- To understand scope of the various branches of the microbiology
- Student will know the use of various microbial techniques to study microbial diversity.

#### Course outcome:

- Master aseptic techniques and be able to perform routine culture handling tasks safely and effectively.
- Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes.
- Understand the salient features, structural similarities and differences among various physiological groups of bacteria/archaea along with classification, nomenclature and significance of microbes.
- To know the applications and understand mode of actions of physical and chemical means of sterilization to control the growth of microorganisms.
- Acquire knowledge regarding principles and applications of different types of staining and microscopes for the identification of bacteria, fungi and algae.
- Comprehend the various methods for identification of unknown microorganisms

## **II Semester Microbial Diversity**

### **Course objectives:**

- To get knowledge on different domains/ classification system of living organisms.
- students will be able to demonstrate a knowledge and understanding of microbial taxonomy
- For classical conventional and modern molecular characterization technological tools
- To acquire knowledge of cellular organization, ultrastructure, life cycle and economic importance of prokaryotic (Eubacteria, Archaea, Cyanobacteria) and Eukaryotic (Algae, Fungi and protozoans) with acellular entities viruses.

### **Course outcome:**

- Understanding of basic classification and microbial structure and similarities and differences among various groups of microorganisms such as bacteria/archaea/cyanobacteria/fungi/protozoans.
- Acquaintance on study of microbial diversity using different methods and systematic of bacteria and archaea using polyphasic approach.
- Understand the various methods for identification of isolated and unculturable microorganisms.

## **III Semester Microbial Physiology, Metabolism and molecular Biology**

### **Course objectives:**

- The course learning objectives is to provide the core principles and specialized knowledge of microbial physiology.
- To develop understanding about microbial metabolism, growth and energy generation
- Gain knowledge of various fermentation pathways
- Familiarize students with concepts of nitrogen and phosphate assimilation, electron transport chain and transfer of genetic information among microbial communities.
- Overview and conceptual knowledge microbial enzyme types, structure, classification, nomenclature, mechanism, factors influencing enzyme action /kinetics with inhibition and regulation.
- To acquire knowledge on historical milestones and development in molecular biology.
- To up skill student knowledge and concepts of genome organization, structure and chemical composition prokaryotes, eukaryotes and viruses.
- To gain knowledge on mechanism of replication, transcription, translation and regulation gene expression
- To know and understand the concept of molecular basis of mutations and recombination among microorganisms.

### **Course outcome:**

- Acquaint with basics of microbial physiology and metabolism
- Understand major fermentation, aerobic and anaerobic pathways for energy generation in microbial cells.
- Students will be able to demonstrate a knowledge and understanding of:
- The basic principle of biochemistry including important molecules their economic and scientific importance inside the cell.

- The students will be able to understand the biochemical pathways of synthesis and degradation of biomolecules and the uptake and transport of different metabolites.
- Students will have comprehensive knowledge of the molecular biology of the bacteria, viruses and eukaryotes.
- Students will be trained for handling various advanced molecular biology techniques and the knowledge gained will help them to get a job in molecular biology laboratories and the knowledge can be applied for advanced research.

#### **IV Semester**

### **Recombinant DNA Technology and Food Microbiology**

#### **Course objectives:**

- To impart knowledge on historical background, achievements and milestones in theories, tools and techniques of rDNA Technology.
- To understand the significance rDNA Technology for commercial application in various fields.
- To introduce concept, methods and techniques employed in molecular cloning experiments.
- To up skill students knowledge with various fermented food products, their production techniques and prevention of spoilage.
- To understand food borne-illnesses with food sanitation and control.

#### **Course outcome:** Students will be able to demonstrate a knowledge and understanding of:

- rDNA principle in the development of novel microbial strains with an application in agriculture, bioremediation, vaccine development, gene therapy and disease detections.
- The students will be motivated to utilize the skills towards further research in their area of interest.
- Can become independent researchers and make impactful contributions to the field of Food Microbiology.
- It will assists student to get jobs of Quality control and Quality Assurance in various organizations besides research and academics.
- Instead of becoming job seekers, students are trained to become job providers by developing start-up industries as entrepreneurs.

#### **V Semester**

### **Environmental Microbiology**

#### **Course objectives:**

- To demonstrate a knowledge and concept of microbiology of air, sewage and water for environmental monitoring.
- To up skill students knowledge on distribution and diversity of microorganisms in air and aquatic environments (Sewage/water/ solid waste management)
- To understand role microorganisms in management and treatment process of solid and liquid wastes.
- To impart different methods of bioremediation of various types of industrial waste.
- To address the concept of xenobiotics and their management environmental monitoring of air pollution and their management.



**Course outcome:**

- Students develop the skill to think independently, plan research and execute it in different fields of Microbiology especially the environment sustainability, entrepreneurship and become job providers,
- Students can excel in academics, consultancy, industry and pollution control boards, industry as well as policy makers.
- Students will acquire knowledge of sampling, analyzing and executing environmental monitoring plans (Air and water-sewage/water/solid waste)
- Students are encouraged to undertake research on their area of interest in Environmental Microbiology.
- Students will gain knowledge of identification of a research topic, research planning and its execution.

### **Soil and Agricultural Microbiology**

**Course objectives:**

- To gain knowledge physiochemical properties of soils for the sustainability of soil microbial diversity
- To study and understand soil microflora, their role and interaction between them in biosphere
- To acquire knowledge of role of microorganisms in agriculture for the sustainable crop production and protection
- To up skill the concept of host-pathogen interaction by studying etiology, symptoms, epidemiology and management of various plant diseases (Bacterial/fungal/viral)

**Course outcome:** Students will be able to demonstrate a knowledge and understanding of:

- To understand the concept and development of biofertilizers, biocontrol, biopesticides, microbial herbicide production and their application.
- To understand the concept and development Concept of transgenic crop technology, development and its application.
- To understand the concept and development Concept of Composting and biofuels, types and applications.

### **VI Semester Industrial Microbiology**

**Course objectives:**

- Students will be able to demonstrate a knowledge and understanding of: Basic fermentations processes,
- To design of various fermenters and their types.
- To understand steps involved in up and down stream process of typical microbial fermentation process.
- Students will be able to select industrially important microbes for economical use including protein products. Students will learn the economics of the fermentation for the total cost of production.

**Course outcome:**

- To understand the history, development of applications industrial important microorganisms.
- Student will up skill their practical knowledge to isolate and screen ideal industrially important microbes.
- To understand and design typical microbial fermentation process and economics.
- To acquire knowledge on microbial production industrial products for commercial applications.

**Immunology and Clinical Microbiology**

**Course objectives:**

- To understand role of different cells and organs of immune system
- To gain knowledge on immunity and its significance
- To study concept of nature, types and role of antigens and immunoglobulins
- To train students to understand the concept of antigen-antibody reaction through various serological reactions.
- To understand the concept microbial pathogenicity and infections.
- To acquire knowledge on medical important pathogenic microbes and antimicrobial chemotherapy.

**Course outcome:**

- This Course acquaints students with the advanced concept of medical microbiology and its application
- Student will be motivated to plan and execute research work in the field of medical microbiology
- Student will trained to apply their theoretical and practical knowledge in diagnosis and chemotherapy

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	11.Physics BSCCBCSPHYCM

**Program specific objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The course structure and detailed contents of the courses regarding the various components like the class room teaching (theory), laboratory (experiments), tutorials and industrial/field visits and projects can be designed and planned to achieve by the students.

**Program specific outcome:**

The Learning outcomes based curriculum framework in Physics should also allow for the flexibility and innovation in the program design of the UG education, and its syllabi development, teaching learning process and the assessment procedures of the learning outcomes. The process of learning is defined on the basis of final assessment of the program.

## B.Sc., Physics - 2016-17

Sl. No	Sem	Title of the Paper
1	I	Mechanics & Properties of Matter
2	II	Heat & Thermodynamics
3	III	Waves, Acoustics, Optics and Scattering of Light
4	IV	Dielectric Properties of Sound, Electricity and Electromagnetism,
5	V	Atomic and molecular physics.
6		Nuclear Physics
7	VI	Condensed matter Physics.
8		Electronics OR Astrophysics and solid-state physics

### I Semester

#### Mechanics & Properties of Matter

##### Course objectives:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre University and Post graduate levels of Physics, by providing a complete and more logical framework of basic Physics. The systematic and planned curricula from first semester to second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

##### Course outcome:

By the end of the first semester, the students would have attained a common understanding in basic mechanics, properties of matter, Heat and thermodynamics. The students developed their experimental and data analysis skills through a wide range of experiments in the practical laboratories.

### II Semester

#### Heat & Thermodynamics

##### Course objectives:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre University and Post graduate levels of Physics, by providing a complete and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

##### Course outcome:

By the end of the second semester, the students would have been introduced to powerful tools for tracking a wide range of topics in heat and thermodynamics become familiar with additional relevant Maxwell's formulation. Further developed their experimental skills through a series of experiments which illustrate major themes of the lecture courses

### **III Semester**

#### **Waves, Acoustics, Optics and Scattering of Light**

##### **Course objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre University and Post graduate levels of Physics, by providing a complete and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

##### **Course outcome:**

By the end of the third semester, the students would have been introduced to powerful tools for tracking a wide range of topics in optics, acoustics and scattering of light become familiar with additional relevant fourier formulation. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

### **IV Semester**

#### **Dielectric Properties of Sound, Electricity and Electromagnetism**

##### **Course objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre University and Post graduate levels of Physics, by providing a complete and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

##### **Course outcome:**

By the end of the fourth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in dielectric properties of sound, electricity and electromagnetism become familiar with additional relevant maxwells formulation. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

### **V Semester**

#### **Atomic and Molecular Physics**

##### **Course objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre University and Post graduate levels of Physics, by providing a complete and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

**Course outcome:**

By the end of the fifth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in atomic Physics and structure of molecules become familiar with additional relevant maxwells formulation. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

### **Nuclear Physics**

**Course objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that its brides the gap between the pre university and Post graduate levels of Physics, by providing a complete and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

**Course outcome:**

By the end of the fifth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in fission and fusion, calculation of number of atoms become familiar with additional relevant maxwells formulation. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

### **VI Semester**

### **Condensed Matter Physics**

**Course objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that its brides the gap between the Pre University and Post graduate levels of Physics, by providing a completer and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

**Course outcome:**

By the end of the sixth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in condensed matter physics become familiar with additional relevant maxwells formulation. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

### **Electronics\*\***

**Course objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that its brides the gap between the Pre University and Post graduate levels of Physics, by providing a completer and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

**Course outcome:**

By the end of the sixth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in electronics become familiar with additional relevant maxwells formulation. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

**Astrophysics and Solid-State Physics**

**Course objectives:**

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that its brides the gap between the Pre University and Post graduate levels of Physics, by providing a completer and more logical framework of basic Physics. The systematic and planned curricula from second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

**Course outcome:**

By the end of the sixth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in heat and thermodynamics become familiar with additional relevant maxwells formulation. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

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Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	12.Sericulture BSCCBCSSERYCM

**Program specific objectives (PSOs):**

- To impart advanced and in-depth knowledge in the area of agriculture, animal husbandry and industry in general and sericulture in particular.
- To train the students to become progressive and innovative.
- To prepare the students for industry ready with basic and translational research skills with v
- technical excellence.

**Program Specific outcomes (PSOs):**

- In depth knowledge gained during the course of three years helps the students to quickly acclimatize to the work environment when they join as trainees or positions in public and private sector.
- Helps the students to face competitive exams in confidence for the masters as well as in civil service exams.
- Gain enough knowledge to propose research ideas in their higher studies.
- Develop practical skills along with their theory components, which helps in various positions selected in both academic institutions and R & D programs of industries.
- To develop entrepreneurial skills, with effective communication and interactive skills.

Sl. No	Sem	Title of the Paper
1	I	Sericultural Botany and Silkworm Biology
2	II	Mulberry Cultivation and Silkworm Rearing
3	III	Mulberry and Silkworm Crop Protection
4	IV	Physiology of Mulberry and Silkworm
5	V	Cytogenetics and Breeding of Mulberry and Silkworm
6	(any 1)	Silkworm Seed Technology
		Seribiotechnology
7	VI	Silk Technology
8	(any 1)	Non Mulberry Sericulture, Sericulture Extension and Economics
		Applied Entomology

**I Semester****Sericultural Botany and Silkworm Biology****Course objectives:**

- To introduce the concepts of origin & growth of sericulture & study sericulture as an art, science and industry.
- To acquaint with general aspects of sericulture industry and the organizational setup.
- To introduce to the basic aspects of Mulberry plant and silkworm races/breeds.

**Course outcome:**

- Gain the knowledge of origin and history of sericulture.
- Will gain the knowledge of the organizations and industrial setup.
- Will understand the classification and biology of mulberry and silkworm.

**II Semester****Mulberry Cultivation and Silkworm Rearing****Course objectives:**

- To understand the scientific approach of mulberry cultivation & production.
- To acquaint with ecology and ethology of silkworm rearing.
- To familiarize with improved technologies in mulberry cultivation and silkworm rearing & its impact on cocoon productivity.

**Course outcome:**

- Students will gain the traditional and scientific approach of mulberry cultivation and production and silkworm rearing and production,
- Make them industry ready by hands on training in practical classes and field exposure.
- Acquires knowledge of improved technologies used and adopted in mulberry cultivation and silkworm rearing.

### **III Semester**

#### **Mulberry and Silkworm Crop Protection**

##### **Course objectives:**

- To study the incidence, symptoms & damage caused by different pests and diseases of mulberry.
- To study the incidence, symptoms & damage caused by different pests and diseases of Silkworm.
- To acquaint with the management of pests and diseases through different methods to prevent crop loss (cocoons).

##### **Course outcome:**

- They gain the knowledge of disease incidences in mulberry to manage and avoid crop loss.
- They also gain the knowledge of diseases of silkworm and to manage it.
- They acquaint with the integrated management of pests and diseases through different methods to prevent crop loss (mulberry leaves and silkworm cocoons production).

### **IV Semester**

#### **Physiology of Mulberry and Silkworm**

##### **Course objectives:**

- To impart the in-depth knowledge of external and internal factors on mulberry and silkworm.
- To study the physical and biochemical aspects of mulberry plant and requirements for good growth.
- To study the physical and biochemical aspects of silkworm organ systems and their management.

##### **Course outcome:**

- Students will gain the knowledge of importance of external and internal aspects of mulberry and silkworm.
- Gain the importance of environmental factors and nutritional requirements in mulberry and silkworm crop production.
- Understand the insect organ system functions and as well as in other systems also.

### **V Semester**

#### **Cytogenetic and Breeding of Mulberry and Silkworm**

##### **Course objectives:**

- To gain the knowledge of germplasm bank, need of the present situations to protect, preserve and use the genetic resources.
- To make the students understand the concept of reproduction and hereditary traits.
- To familiarize with the basic principles and recent approaches in mulberry and silkworm genetics and breeding.



**Course outcome:**

- Gain the knowledge on the importance of plant and animal species preservation and utilization in general and mulberry and silkworm in particular.
- Understanding the importance of heredity in the expression of characters in offspring.
- They acquaint with the concept of evolution of new mulberry varieties and silkworm races for increased productivity.

### **Silkworm Seed Technology**

**Course objectives:**

- To study the developmental biology of silkworm.
- To study the silkworm seed organization and to practice the silkworm egg preparations.
- To understand the importance of disinfection and hygiene in egg production.

**Course outcome:**

- Gains the knowledge of embryo development and its organization.
- Understand the organizational setup of silkworm egg production industry.
- They familiarize with the disease-free silkworm egg production. practically, as it is the backbone of sericulture industry.

### **Seribiotechnology**

**Course objectives:**

- To introduce the students to understand the scope of plant biotechnology.
- To familiarize the students to plant hybridization and techniques involved.
- To impart the knowledge in biotechnological tools.

**Course outcome:**

- The students will understand the scope of biotechnology in plant improvement programme.
- The students will familiarize with plant hybridization techniques.
- Gain the knowledge in application of biotechnological tools in plant improvement programme.

### **VI SEMESTER Silk Technology**

**Course objectives:**

- To introduce the concept of cocoon as raw material & its significance in reeling technology and to acquaint with the technologies of silk reeling & importance of reeling. devices as well as to understand the significance of raw silk production & processing of yarn.
- To study non-mulberry sericulture as one of the occupations of millions of tribal people of north eastern India and its importance in protection of and development of forest resources.
- To gain the knowledge of extension services.

**Course outcome:**

- Students will expose to the hands-on training of silk reeling will help them to take up silk reeling as a profession if they wish.
- Study of non-mulberry sericulture will motivate the students to protect and preserve the natural resources of our country for the wellbeing of the countryman.
- Students will understand the importance of communication, leadership qualities and extension of education.

**Non Mulberry Sericulture, Sericulture Extension and Economics**

**Course objectives:**

- To introduce the concept of cocoon as raw material & its significance in reeling technology and to acquaint with the technologies of silk reeling & importance of reeling. devices as well as to understand the significance of raw silk production & processing of yarn.
- To study non-mulberry sericulture as one of the occupations of millions of tribal people of north eastern India and its importance in protection of and development of forest resources.
- To gain the knowledge of extension services.

**Course outcome:**

- Students will expose to the hands-on training of silk reeling will help them to take up silk reeling as a profession if they wish.
- Study of non-mulberry sericulture will motivate the students to protect and preserve the natural resources of our country for the wellbeing of the countryman.
- Students will understand the importance of communication, leadership qualities and extension of education.

**Applied Entomology**

**Course objectives:**

- Aimed at understanding the types of beneficial/social insects.
- To gain the knowledge of benefits of beneficial insects to humans.
- To study the insect's behaviour and their protection for the betterment of humans.

**Course outcome:**

- Students will understand the types of beneficial/social insects.
- They will gain the knowledge of benefits of beneficial insects.
- Impart the knowledge of protection of beneficial insects for future use.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	13.Statistics BSCCBCSSTAYCM

**Program Specific Objectives:**

- To prepare graduates who are not only statistically sound but also capable of using their appropriate statistical skills in interdisciplinary areas such as finance, health, agriculture, government, business, industry, telecommunication, and bio-statistics. As a result, they can pursue their future career either in the core field or in the applied field of Statistics.
- To familiarize students with computational techniques and software used in the statistical arena.
- To prepare students for undertaking further study.
- To teach students to construct practical statistical models for several processes in the real-world.
- To prepare the students to enrich with ability to examine basic statistical issues in a more logical and methodical manner. It is expected that the students will strengthen themselves both computationally and analytically.
- Communication Skills and Team Work: The students are expected to develop effective and confident Communication skill after completion of the course. They will have an ability to work in a team as well as in isolation.
- Moral and Ethical Awareness: After completion of the course, the students are expected to develop ethical and social responsibility as well. As a result, the students will be able to identify ethical issues, avoid unethical behavior such as fabrication, falsification or misrepresentation and misinterpretation of data.
- Scientific Reasoning: The students will be able to analyze, interpret and draw appropriate conclusions from both quantitative and qualitative data and critically evaluate ideas, evidence and experiences with an unbiased and consistent approach.

**Program Specific Outcomes:**

- Self-directed Learning: The students are expected to be familiar with data collection, compilation, analysis and interpretation and writing of project reports independently.
- Demonstrate the ability to use skills in Statistics and different practicing areas for formulating and tackling Statistics related problems and identifying and applying appropriate principles and methodologies to solve a wide range of problems associated with Statistics.
- Recognize the importance of statistical modeling and computing, and the role of approximation and mathematical approaches to analyze the real problems using various statistical tools.
- Plan and execute Statistical experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate statistical software including programming languages, and report accurately the findings of the experiment/investigations.
- The students are expected to be familiar ICT skills
- The students are prepared for personal skills such as the ability to work both independently and in a group.

<b>Sl. No</b>	<b>Sem</b>	<b>Title of the Paper</b>
<b>1</b>	<b>I</b>	Basic Statistics-1
<b>2</b>	<b>II</b>	Basic Statistics- II
<b>3</b>	<b>III</b>	Probability Distributions and R-Language
<b>4</b>	<b>IV</b>	Statistical Inference
<b>5</b>	<b>V</b>	Applied Statistics-1
<b>6</b>		Sampling Techniques and Design of Experiments
<b>7</b>		Applied Statistics-II
<b>8</b>		Operations Research
<b>9</b>		Statistical-Data Analysis Using Software Packages
<b>6</b>	<b>VI</b>	Financial Statistics
<b>7</b>		Actuarial Statistics
<b>8</b>		Survival Analysis & Biostatistics
<b>9</b>		Project Work
<b>10</b>		Statistical Data Analysis Using R

### **I Semester Basic Statistics-1**

**Course objectives:**

- To introduce the students to new field/subject Statistics, and understand the types of data, identification, and their segregation.
- To develop the ability in organizing, classifying and presenting the data using various forms of tables, diagrams, graphs, charts and plots especially used in the field of statistics.
- To develop the ability in students to deal Statistical methods, Probability and its applications in various applied fields.
- To introduce the students into various applied fields of statistics like Biometry, Econometrics, Demography, Engineering, Medicine, Agriculture, Social sciences etc.

**Course outcome:**

- Students will gain knowledge regarding theoretical aspects and practical approach in statistical methods like measures of central tendency, dispersion, Skewness, probability and its applications.
- The theory and practical of sample or population survey, data collection methods creates a strong foundation in students, which enhances and prepares them in conducting a research survey even in other curriculum aspects.
- Statistical survey methods and sampling methods majorly helps students in conducting research activities in the field of agriculture, forest etc., and it helps them in successfully understand the other methods and techniques of the subject to be taught in the coming semesters.

- The knowledge of probability gained here prepares the student for advance studies/concepts of statistics like inferential statistics, Bayesian statistics, and their application.
- Knowledge and experience gained here can be used in handling data efficiently, which arises from any field and students could develop a career in any of the applied field easily.

## **II Semester Basic Statistics-II**

### **Course objectives:**

- Students will gain knowledge regarding theoretical aspects and practical approach in statistical methods like, correlation, regression, and their applications.
- To develop the ability in students to deal and understand the types of random variable and their properties.
- To introduce the students to vast field of random variables and discrete probability distributions, in studying real life situations/practical problems.
- The practical classes help to introduce them into various real life problems which could be dealt using random variable and probability techniques.
- To understand and enable the use of statistical tools and techniques available to deal with univariate and bivariate random variables.

### **Course outcome:**

- Students will gain knowledge regarding theoretical and practical approach to discrete random variables (RVs), PMF, sketching of probability distribution and density functions, expectation and variance of RVs, Joint PMF, marginal and conditional probabilities, correlation coefficient of random variables and their applications.
- Knowledge of Binomial, Poisson etc., probability helps in successfully understanding methods and techniques which will develop ability in students to understand and solve real life problems.
- The knowledge of probability and random variable gained here prepares the student for advance studies/concepts of statistics like inferential statistics, Bayesian statistics, and their applications.
- The tools and techniques collectively learnt from I and II semester helps a student to enter into a field of data science, IT etc to successfully build career.

### III Semester

## Continuous Probability and Sampling Distributions

#### Course objectives:

- To introduce the students to vast field of continuous random variables and continuous probability distributions such as normal, exponential, etc., in studying real life situations/practical problems.
- To introduce the concept of transformation of RV's into various probability functions which could help in modeling real world problems.
- To introduce the concept of sampling distributions, the shape, center, and spread of sampling distributions of sample statistics.
- To Understand the need for t,  $\chi^2$ , and F distributions, similarities, relation and differences between sampling distributions with the standard normal distribution.
- To get knowledge of R- language and its use in research/project.
- To develop knowledge of statistics in students through an in-depth research/project experience/ real world models.

#### Course outcome:

- Students will gain knowledge regarding theoretical and practical approach to discrete random variables (RVs), PMF, sketching of probability distribution and density functions.
- Expectation and variance of RVs, Joint PMF, marginal and conditional probabilities, correlation coefficient of random variables and their applications.
- Students will be able to apply transformation of RV's in modeling real world problems.
- Students will be able to generate sampling distributions of means to observe, empirically.
- Students will be able to describe the distributions of various statistics like , t,  $\chi^2$  & F.
- Students will be able to determine the mean and standard deviation of a sampling distribution of means, t,  $\chi^2$  and F.
- Students will be able to understand how the degrees of freedom determines the shape of a sampling distribution.
- Ability to apply R language in the field of real data analysis

### IV Semester

## Statistical Inference

#### Course objectives:

- To introduce the concept of Limit Theorems, central limit theorems.
- To develop the knowledge and importance of inferential statistics.
- To enhance the knowledge of estimation of parameters.
- To enable the use of parametric and nonparametric inferential statistics

**Course outcome:** Having successfully completed this module, students will be able to:

- Recognize situations in which the CLT does/does not apply; Use the Central Limit Theorem in approximating distributions of sample means; Interpret law of large numbers and central limit theorem.
- Learn the basic theory and techniques of estimation of parameters, namely, unbiasedness, consistency, MLE, MME etc.
- A good understanding of basic theory and techniques of tests of hypotheses, likelihood ratio tests and their applications.
- Get the knowledge of applying large and small sample tests to real life problems.
- Knowledge of applying parametric and nonparametric test to a data.

**Course objectives:**

- To introduce the students to vast field of continuous random variables and continuous probability distributions such as normal, exponential, etc., in studying real life situations/practical problems.
- To introduce the concept of transformation of RV's into various probability functions which could help in modeling real world problems.
- To introduce the concept of sampling distributions, the shape, center, and spread of sampling distributions of sample statistics.
- To Understand the need for t,  $\chi^2$ , and F distributions, similarities, relation and differences between sampling distributions with the standard normal distribution.
- To get knowledge of R- language and its use in research/project.
- To develop knowledge of statistics in students through an in-depth research/project experience/real world models.

**Course outcome:**

- Students will gain knowledge regarding theoretical and practical approach to discrete random variables(RVs), PMF, sketching of probability distribution and density functions.
- Expectation and variance of RVs, Joint PMF, marginal and conditional probabilities, correlation coefficient of random variables and their applications.
- Students will be able to apply transformation of RV's in modeling real world problems.
- Students will be able to generate sampling distributions of means to observe, empirically.
- Students will be able to describe the distributions of various statistics like, t,  $\chi^2$  & F.
- Students will be able to determine the mean and standard deviation of a sampling distribution of means, t,  $\chi^2$  and F.
- Students will be able to understand how the degrees of freedom determines the shape of a sampling distribution.
- Ability to apply R language in the field of real data analysis

## **V Semester Applied Statistics-1**

### **Course objectives:**

- To understand the concepts, formulation and application of index numbers in different economic and business situations.
- To learn and develop scientific view to understand the time series data and its analysis and to estimate model parameters and compare models in terms of their estimation and prediction accuracy.
- To identify appropriate source of data and to perform basic demographic analysis using various techniques across population and learn to measure theories used to understand population studies.
- To learn and develop scientific view to study the statistical challenges of clinical comparison of two or more treatments in human subjects.

### **Course outcome:**

- Students gain knowledge/ability to formulate, analyse the use of index numbers to the real world problems and to calculate an indices from a given data.
- Knowledge of time series and its components helps in measuring variations in the data and making predictions through graphical representation.
- Students should have developed a clear understanding of vital statistics, collection of data using different sources, basic measures of mortality, fertility and population growth, concept of stable and stationary population and describes the concept of life table.
- Ability in students to understand need and ethics of clinical trials and to apply designs of clinical trials and drug interaction study.

## **Sampling Techniques and Design of Experiments**

### **Course objectives:**

- To estimate population parameters from a sample.
- To find out the degree of reliability of the estimate.
- To analyse when more than two samples are to be tested at a time on the basis of equality of several means.
- Providing an understanding of interactions among contributory factors.
- Minimizing experimental error.



**Course outcome:** Having successfully completed this module, students will be able to:

- Apply various types of sampling methods, such as simple random sample, stratified random sample and systematic sample for some real life problems.
- Knowledge of drawing a sample using with/without replacement.
- Compute sample size using proportional allocation, optimum allocation, systematic sample procedures.
- To make generalisation about the population/universe from the studies based on samples drawn from it.
- Knowledge of applying of Designs of experiments such as CRD, RBD, LSD and factorial experiments.
- Understand theoretical knowledge of estimation of missing values, efficiency.
- Knowledge of estimation of parameters, like unbiasedness of sample mean, sample variance, mean sum of squares due to error, treatment, total, block etc.
- Knowledge of factors, levels, blocking.
- Knowledge of analysing data on Agriculture, Biology, Statistics, Marketing, etc.

## **Applied Statistics -2**

**Course objectives:**

- To introduce the role of statistics in all manufacturing firms.
- To provide knowledge to the students about statistical quality control.
- To introduce seven basic quality tools for quality improvement.
- To introduce control chart as a tool for studying the variability of a system for managers to determine how to improve a process/system.
- To introduce the tools of product control in manufacturing system.
- To provide knowledge to the students about reliability and basic concepts and applications.
- To provide knowledge of demand and supply of commodities, market equilibrium etc.

**Course outcome:** On successful completion of this course the students will be able to:

- Describe the various charts in SQC.
- Interpretation of these charts in real life situations.
- Understand the concept of product control.
- Understand single and double sampling inspection plans, OC and ASN functions.
- To understand reliability and basic concepts and applications.
- To be able to understand the variations occurring in demand and supply of commodities, market study etc.

## Operations Research (O.R)

### Course objectives:

- To introduce the students to different OR models and their importance.
- Formulate and solve LPP, Assignment problems, Transportation problems. Inventory problems game theory, CPM & PERT.
- To introduce the tools of product control in manufacturing system

**Course outcome:** On successful completion of this course the students will be able to

- Will be able to Formulate and solve LPP, Assignment problems, Transportation problems, game theory, CPM & PERT.
- Understand the concepts in inventory and build basic inventory models indifferent conditions.
- To understand and solve problems on game theory

## VI Semester Financial Statistics

### Course objectives:

- Provides an introduction to financial mathematics and basic statistics within a financial context.
- It will assist students to gain an appreciation of what statistical methods can achieve, as well as skills in analysing and interpreting business data and statistical analysis.
- To prepare the students on data science as an analytical and decision making tool, in a variety of business contexts, with a major emphasis on interpretation and application.

**Course outcome:** Students who successfully complete this unit will be able to:

- Identify and apply commonly used techniques for data collection and analysis.
- Apply fundamental concepts of probability and probability distributions to problems in business decision-making.
- Apply statistical inference methods to conduct and explain the results of hypothesis testing.
- Apply simple regression analysis to explain the relationship between variables to draw inferences about relationships.

## **Actuarial Statistics**

### **Course objectives:**

- To provide grounding in mathematical and statistical techniques that are of particular relevance to actuarial statistics.

**Course outcome:** On successful completion of this subject, a student will be able to:

- Describes the essential features of statistical distributions, Utility theory.
- Understand, interpret and discuss the theories on Premium Calculation.
- Describes Survival Distribution and Life Tables.
- Describe, interpret and discuss mathematical techniques used to model and value cash flows which are contingent on mortality and morbidity risks.

## **Survival Analysis and Biostatistics**

### **Course objectives:**

The course will focus on the basic concepts of survival (time-to-event) data analysis. The course objectives are to:

- Recognize when it is necessary to account for time in the analysis of yes/no outcomes
- Learn different types of censoring, and their characteristics.
- Study different survival distributions and their applications
- Study Competing Risk Theory, Stochastic Epidemic Models and Statistical Genetics

### **Course outcome:**

- Learn to appropriately summarize time-to-event data
- Understand different types of censoring, and learn to estimate and interpret survival characteristics
- To understand different survival distributions and their applications
- To understand various methods of Competing Risk Theory, Stochastic Epidemic Models and Statistical Genetics.

## **Skill Enhancement Elective Statistical Data Analysis Using R**

**Course objectives:** As the name suggests, this course on Statistical Data Analysis using R software for implementation and students are trained on several practical problems in this course to equip them to think independently and for analysis of statistical data. After finishing this course, one can write R codes for statistical methods and implement R codes for the various methods learnt in the B.Sc. Program.

**Course outcome:** A person successfully completing the Course will acquire practical knowledge of solving problems and proof techniques in several topics in Statistical Data Analysis Using R by writing R codes, visualization and running R packages are part of the Course.

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Sl. No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	14.Zoology BSCCBCSZOOYCM

**B.Sc., Zoology - 2016-17**

Sl. No	Sem	Title of the Paper
1	I	Animal diversity-I
2	II	Animal diversity -II
3	III	Animal diversity -III
4	IV	Biochemistry, physiology and Ethology
5	V	Cell & Molecular Biology
6		Genetics and Evolution
7	VI	Developmental Biology and Endocrinology
8		Environmental biology, Zoogeography and applied Biology

**I Semester**

**Animal Diversity - I**

**Course objectives:**

- Study starts with the concept of biodiversity and its importance as well as system of classification and nomenclature of animals
- Learning about invertebrates elaborates different group of animals from protozoa to Annelida with various examples according to the coelom
- Importance will be given to type study in each phylum along with the example in the theory paper
- In practical students will study the concept of invertebrates with the hands of experience by observing and mounting the protozoa and setae of the earthworm

**Course outcome:**

- After completing this course, the students will be able to know the basic concepts of animal taxonomy and zoological nomenclature, how to identify the species its significance students will be able to develop an understanding of the basic characters used for classification from the kingdom to species level.
- They have hands on experience of materials demonstrating the diversity of protists and non-chordates
- Students are able to analyze different animals from their habitat to their reproduction. It will be further enable the students to think and interpret individually and helps to undertake research in any aspect of animal taxonomy in future

## **II Semester Animal Diversity - II**

### **Course objectives:**

- Students will study unique characters of phylum Onychophora to Cyclostomata
- Students will learn the connecting link between the animals from different phyla
- In practicals each individual will undergo the field study to observe the insects
- Observation and recording of Arthropods in nature (Minimum ten species).
- Identification of insects according to the order by using the appropriate key
- Identification of pest in agricultural and household
- Identification of the different species of Mosquitoes as vectors

### **Course outcome:**

- 1. After completing this course, the students will be able to get the basic concepts of Onychophora to Cyclostomata & Protochordates that helps to evaluate the significance of museum specimens.
- Further, the students will also be able to develop an understanding of the evolution of vertebrates with integrating structure, function and development in brain, aortic arches, kidneys.
- It will help to undertake research in any aspect of invertebrates and protochordates especially in the field of entomology vertebrates in future
- Students are able to understand the various pest and its types and also causes
- Students are enable to understood the pathogens which are transmitted by the Mosquitoes and their mouth parts
- Students are able to understand the habit of the insects and their identification.

## **III Semester Animal Diversity - III**

### **Course objectives:**

- To understand what the general characters of vertebrates from fishes to mammals and their adaptations
- Students will learn the dentition of different categories of the animals
- To understand the various groups animals (Externals, Digestive system, Respiratory system, Nervous system, Urinogenital system).
- Students should be taken outside to watch the birds using some protocol

- Study of Osteology using different vertebrate system form Fishes to mammals

**Course outcome:**

- Student should be able to recognize life functions of Fishes to Mammals.
- To understand the ecological role of different groups of chordates.
- Students are able to assess the diversity of birds and their adaptations.
- Field trip for analyzing the bird movements and their habitats will help the students to in wild life research.
- Students are able to understand the structure of bones and their functions in vertebrates.

**IV Semester**  
**Biochemistry, physiology and Ethology**

**Course objectives:**

- To provide a glimpse of Aims and scopes of physiology and biochemistry to the students.
- To impart knowledge regarding structure and functions of nerve and muscle to the students.
- To develop detailed understanding of mechanism of digestion, respiration and excretion.
- To provide knowledge about reproductive system as well as endocrine glands and their mechanism of action.
- To give adequate information to the students regarding Metabolism of macromolecules such as carbohydrates, lipid and protein.
- To make the students gain knowledge about enzyme functions, regulation and their mechanism of action as well.
- In practicals prominence was given to the test for some of qualitative test to the biochemical's aspects and demonstrating experiments are done example Gel electrophoresis

**Course outcome:**

- Students are able to understand the Physiology of Digestion & Respiration.
- Students understood the Physiology of Circulation & nerve impulse and Reflex Action.
- Students gain the knowledge of Physiology of muscle contraction & Excretion
- Students learned about Physiology & Types of Endocrine glands.
- Structure, function, significance and Metabolism of Carbohydrates, Proteins and Lipid will be elaborately studied.
- Students will learn how to identify the blood groups and the Haemoglobin content in the blood samples
- Students will come out with technique of DNA extraction by gel electrophoresis

**V Semester**  
**Cell and Molecular biology**

**Course objectives:**

- Students examine the basic properties of cells and cell organelles, in addition to the properties of differentiated cell systems and tissues.
- The course aims to equip students with a basic knowledge of the structural and functional properties of cells.

- Students will understand how these cellular components are used to generate and utilize energy in cells.
- Students will understand the cellular components underlying mitotic cell division.

**Course outcome:**

- After completion of this course, students will be able to: Identify the macromolecules, their monomers, and their functions in cells.
- Students are able to describe the structures and functions of cell organelles.
- Students are able to discuss energy transfer, enzyme function and the pathways of cellular respiration.
- Students can differentiate prokaryotic binary fission, the eukaryotic cell cycle, mitosis and meiosis.
- Students are able to understand the DNA structure and replication, transcription, translation and gene expression.
- Students are able to know the modern biotechnological techniques and their importance in various field of science.

## **Genetics and Evolution**

**Course objectives:**

- Students will study the mendelian principles and classical genetical aspects and some part of cytology
- The aim of the course is to provide students with a deeper insight into the evolutionary processes.
- both selective and random - which can explain the genetic composition of populations, form, behavior and distribution of organisms.
- To teach students the basic methods of analyzing the evolutionary relationships between the
- organisms
- Study of organic evolution and adaptations
- Study of speciation
- The above points are observed in the practical class along with the hands of experience.

**Course outcome:**

- Solve problems in Mendelian genetics, including multiple alleles and X-linkage along with the Laws of Segregation and Independent Assortment
- Describe the structure and replication of the genetic material and basic aspects of the flow of genetic information from DNA to proteins.
- Apply knowledge about transcription, translation and the genetic code to demonstrate an understanding of the flow of genetic information from DNA to proteins students can describe some of the processes involved in the regulation of gene expression

- Explain fundamental genetic concepts. Describe the phases of mitosis and meiotic in detail and explain the connection between chromosomal behavior in meiosis.
- Apply the principles of Mendelian inheritance and their extensions (one- and two-locus traits with two or more alleles, gene interactions, sex linkage and linkage) by analyzing inheritance patterns from crosses
- Describe the origins and genetic consequences of mutations and chromosomal abnormalities
- Analyze allele and genotype frequencies within populations from the Hardy-Weinberg
- Analyze basic processes in population genetics, mutation, migration, natural selection, sexual selection and genetic drift and describe how they affect the genetic diversity within a species
- Discuss methods for detecting and analyzing variation at gene, genome and phenotypic levels within and between individuals, populations and species.
- Describe the relationship between molecular and phenotypic evolution.

## **VI Semester Developmental Biology and Endocrinology**

### **Course objectives:**

- The objectives of the course is to develop knowledge of early embryonic development in humans and the important role played by different hormones during various developmental stages under physiological and pathological conditions.
- Study of various aspects of reproduction and fertilization in higher animals
- In practical contraceptive devices for the family planning will be studied
- Study of the preparation of the permanent histological slides using the microtome technique
- Studies on demography was also taught and its consequences are discuss in the Practical paper

### **Course outcome:**

- Upon successful completion of this course, students should be able to understand the processes of spermatogenesis, oogenesis, fertilization etc.,
- They can also able to understanding of the hormonal control of reproduction in males and females with regulations.
- They critically assess relevant scientific literature in modern Human Reproductive biology with recent developed assisted reproductive technologies viz; Test tube baby, -ZIFT, GIFT, ICSI, IVF, ET. They can also able to understand detail account on Family planning in India.
- Students can understand the use of the contraceptive devices and what is family planning methods
- Students can prepare there own permanent histological slides which should be submitted during the exam by procuring the section by the microtomy.
- Students can understand the consequences of the population explosion and its impact in the society and environment

## **Environmental Biology, Zoogeography and Applied Biology**

### **Course objectives:**

- Creating the awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.



- Students will study how to assess the pollutants in water samples
- Students are able understand the local varieties of the edible fishes
- Zoogeography aims to explain the structure, function and history of the geo graphical ranges of animals. The absence or presence of a species in a given place has ecological as well as historical causes.
- The Applied Biology Programme is designed to equip the students with the practical uses
- of biological knowledge and to inculcate in the students an entrepreneurial and problem-solving ability.
- Field trip is to be conducted by the college to know the fauna and its habitat in the nature
- Study of the Food chain and the animals in the wild locality.

**Course outcome:**

- After completing this course, the students will be able to: 1. Acquire an in-depth knowledge on the diversity and relationships in animal world. Develop a holistic appreciation on the phylogeny and adaptations in animals.
- Enable the students to understand the evolution of universe and life. Understanding on the process and theories in evolutionary biology.
- Develop an interest in the debates and discussion taking place in the field of evolutionary biology by visiting the lake available in and around localities.
- The students will also be able to know the evolutionary and functional basis of animal ecology. Develop an understanding of how animals interact with each other and their natural environment. Studies engage in field-based research activities to understand well the theoretical aspects, taught besides learning techniques for gathering data in the field.
- Analyze a biological problem, derive testable hypotheses and then design experiments and put the tests into practice. When they visit to field to study the wild life
- Solve the environmental problems involving interaction of humans and natural systems at local or global level.
- The course is an introduction to wildlife management and gives an account of the tools used by wildlife managers. Topics covered are to equip students with adequate knowledge of various biodiversity monitoring methodologies, conservation and management issues of vertebrate pests, wildlife conflict and over abundant species, wildlife health and diseases.
- From the field trip for national park and bird sanctuary students can learn the subject behind the class room level. They can able to learn the concepts very clearly as much as possible by acquiring the skills
- Students are able to understand the rules and regulations in the national park which was regulated by the both State and Govt of India.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	AECC Language disciplines: Compulsory (One): 1(a)English, BSCCBCSENGYCM

## ENGLISH LANGUAGE- PROGRAMME SPECIFIC OBJECTIVES

- To enable the learner to communicate effectively and appropriately in real life situations;
- To impact the use of English effectively for various purposes across the curriculum;
- To develop interest in the appreciation of Literature;
- To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing.

### **B.Sc., (Language Course): Ability Enhancement Compulsory Course (AECC):**

#### **English 2016-17**

Sl. No	Sem	Course	Title of the Paper
1	I	AECC	English I
2	II	AECC	English II
3	III	AECC	English III
4	IV	AECC	English IV

## ENGLISH LANGUAGE- PROGRAMME SPECIFIC OBJECTIVES

- To enable the learner to communicate effectively and appropriately in real life situations;
- To impact the use of English effectively for various purposes across the curriculum;
- To develop interest in the appreciation of Literature;
- To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing.

### **I Semester: B.Sc/BBA/BCA**

#### **AECC: Title of the Course: English I**

#### **Course objectives:**

- To introduce basic grammar through ample practice exercises for effective language learning
- To teach to use vocabulary appropriately and grammatical structures correctly
- To adopt strategies for developing effective reading and listening skills while engaging students in using correct pronunciation
- To instil confidence and develop competence in students in order to communicate in grammatically correct English.

#### **Course outcome:**

- Students will be able to enrich their vocabulary and enhance their comprehension skills.
- They will acquire grammatical competence and communicative skill which in turn will improve their command over English
- Students will acquire greater fluency in English which is an important dimension of language learning.

## **II Semester: B.Sc/BBA/BCA**

### **AECC: Title of the Course: English II**

#### **Course objectives:**

- To introduce basic grammar through ample practice exercises for effective language learning
- To teach to use vocabulary appropriately and grammatical structures correctly
- To adopt strategies for developing effective reading and listening skills while engaging students in using correct pronunciation
- To instill confidence and develop competence in students in order to communicate in grammatically correct English.

#### **Course outcome:**

- Students will be able to enrich their vocabulary and enhance their comprehension skills.
- They will acquire grammatical competence and communicative skill which in turn will improve their command over English
- Students will acquire greater fluency in English which is an important dimension of language learning.

## **III Semester: B.Sc/BBA/BCA**

### **AECC: Title of the Course: English III**

#### **Course objectives:**

- Teaching explicitly the structures and grammatical features of spoken and written texts
- Providing students with guided practice in writing as they develop language skills for meaningful communication
- Set some language-focussed tasks to enable students to acquire critical thinking
- Creating scope in the classroom for meaningful and purposeful interaction through language

#### **Course outcome:**

- Students' engagement with various strategies of writing and revising like paragraph writing, correction of sentences, essay writing and use of language as a means of creative expression will make them confident communicators .
- Students, in acquiring the skill to use language to recreate experience, will be able to order their experiences into meaningful narratives and thus would be prepared for real-world uses of language.
- Since communicative competence is a prerequisite for success and advancement in many fields of employment in today's world, this course will immensely benefit the students in their future endeavours.

## **IV Semester: B.Sc/BBA/BCA**

### **AECC: Title of the Course: English IV**

#### **Course objectives:**

- Teaching explicitly the structures and grammatical features of spoken and written texts
- Providing students with guided practice in writing as they develop language skills for meaningful communication
- Set some language-focussed tasks to enable students to acquire critical thinking
- Creating scope in the classroom for meaningful and purposeful interaction through language

## Course outcome:

- Students' engagement with various strategies of writing like paragraph writing, précis writing, comprehension passages and use of language as a means of creative expression will make them confident communicators .
- Students, in acquiring the skill to use language to recreate experience, will be able to order their experiences into meaningful narratives and thus would be prepared for real-world uses of language.
- Since communicative competence is a prerequisite for success and advancement in many fields of employment in today's world, this course will immensely benefit the students in their future endeavours.

Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	Optional any one (Nine): 1(b)Kannada, BSCCBCSKANYCM

### B.Sc., (Language Course): Ability Enhancement Compulsory Course:

#### Kannada Language - 2016-17

Sl. No	Sem	Course	Title of the Paper
1	I	AECC	Kannada I
2	II	AECC	Kannada II
3	III	AECC	Kannada III
4	IV	AECC	Kannada IV

### Program Specific and course outcomes of Kannada Language

#### 1. ಜ್ಞಾನಾರ್ಜನೆಗಾಗಿ :

ಭಾಷೆ ಎಂದರೇನು, ಭಾಷೆಯ ಬಳಕೆ, ವ್ಯಾಕರಣ, ಭಾಷೆಯ ಮರುಹುಟ್ಟು, ಭಾಷಿಕ ಅಧ್ಯಯನದ ಮೂಲಕ ಮಾತೃಭಾಷೆಯ ಬಗೆಗಿನ ಜ್ಞಾನವನ್ನು ಪಡೆಯುತ್ತಾರೆ. ಪರಸ್ಪರ ಸಂವಹನಕ್ಕಾಗಿ ಬಳಸುವ ಭಾಷೆಯನ್ನು ಹೇಗೆ ಬಳಸಬೇಕು, ಪರಿಣಾಮಕಾರಿ ಸಂಭಾಷಣೆಗೆ ಮತ್ತು ಭಾವನಾತ್ಮಕವಾಗಿ, ಸ್ಪಷ್ಟವಾಗಿ, ನಿಖರವಾಗಿ ಸಂವಹನ ನಡೆಸಲು ಭಾಷೆಯ ಜ್ಞಾನ ಮತ್ತಷ್ಟು ಉದ್ದಿಪನಗೊಳ್ಳುತ್ತದೆ. ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳನ್ನು ಪಠ್ಯವಾಗಿ ಕಲಿಯುವ ಮೂಲಕ ಸಮಾಜಮುಖಿಯಾಗುತ್ತಾರೆ. ಪ್ರತಿಕಾಲಘಟ್ಟದ ಜನ-ಜೀವನ, ಮನೋಧೋರಣೆಯನ್ನು ಅರಿಯುವ ಮೂಲಕ ಪ್ರಸ್ತುತ ಸಮಾಜದ ಸಂದರ್ಭವನ್ನರಿತು ಜೀವನದ ಸೂಕ್ಷ್ಮ ಸಂವೇದನೆಗಳನ್ನು ನಿಭಾಯಿಸುವ ಜ್ಞಾನ ಪಡೆಯುತ್ತಾರೆ. ಸಾಹಿತ್ಯವು ಜೀವನದ ಕೈಗನ್ನಡಿ ಹಾಗಾಗಿ ವಿದ್ಯಾರ್ಥಿಯು ಸಾಹಿತ್ಯದ ಅಧ್ಯಯನದಿಂದ ಸಮಾಜಮುಖಿಯಾಗುತ್ತಾನೆ.

#### 2. ಕೌಶಲ್ಯ ಅಭಿವೃದ್ಧಿ:-

ಕನ್ನಡ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯದ ಅಧ್ಯಯನದಿಂದ ವಿದ್ಯಾರ್ಥಿಯು ಸರ್ವತೋಮುಖ ಅಭಿವೃದ್ಧಿಗೆ ತನ್ನನ್ನು ತಾನು ಅಣಿಗೊಳಿಸಿಕೊಳ್ಳುತ್ತಾನೆ. ಜರ್ಜಾಸ್ಪರ್ಧಿ, ಪ್ರಬಂಧ, ಭಾಷಣ, ಕವಿತೆ ವಾಚನ ಪಾಠ್ಯೋಕ್ತಿಗಳು ಯಶಸ್ವಿಯಾಗುತ್ತಾನೆ. ಭಾಷೆಯ ಮೇಲೆ ಹಿಡಿತವಿಲ್ಲದೆ ಅಥವಾ ಭಾಷೆಯ ಬಳಕೆ ತಿಳಿಯದೆ ಈ ಜಟಿಲವಿಷಯದಲ್ಲಿ ತೊಡಗುವುದು ಕಷ್ಟ ಸಾಧ್ಯ. ವಿದ್ಯಾರ್ಥಿಯು ಕೌಶಲ್ಯ ಅಭಿವೃದ್ಧಿಯೊಟ್ಟಿಗೆ ವ್ಯಕ್ತಿತ್ವ ವಿಕಸನಕ್ಕೂ ಕಾರಣವಾಗುತ್ತದೆ. ಬರವಣಿಗೆಯ ಮೂಲಕ ತನ್ನ ವಿಚಾರ ವ್ಯಕ್ತಪಡಿಸುವುದು, ಭಾವನೆಗಳನ್ನು ಉತ್ತಮವಾಗಿ ಅಭಿವ್ಯಕ್ತಿಸುವ ಮೂಲಕ ಉತ್ತಮ ಸಂದೇಶ ಸಂವಾಹಕರಾಗುತ್ತಾರೆ.

**3. ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಸಜ್ಜುಗೊಳಿಸುವುದು :**

ಇಂದಿನ ಸ್ಪರ್ಧಾತ್ಮಕ ಜಗತ್ತಿಗೆ ತೆರೆದುಕೊಳ್ಳುವ ಮೂಲಕ, ಪರೀಕ್ಷೆಗಳಲ್ಲಿ ಯಶಸ್ವಿಯಾಗಲು ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯದ ಅಧ್ಯಯನ ಅನಿವಾರ್ಯ ಮತ್ತು ಅತ್ಯಗತ್ಯವಾಗಿದೆ. ಬಹುತೇಕ ಸ್ಪರ್ಧಾತ್ಮಕ ಪರೀಕ್ಷೆಗಳಲ್ಲಿ ಕಡ್ಡಾಯ ಕನ್ನಡ ಪತ್ರಿಕೆಗಳಿದ್ದು, ಸಾಮಾನ್ಯ ಪತ್ರಿಕೆಯಷ್ಟೇ ಮಹತ್ವ ಪಡೆದಿರುತ್ತವೆ. ಪಠ್ಯಗಳಲ್ಲಿ ಭೋಧಿಸುವ ಕವಿಗಳ ಪರಿಚಯ, ಕವಿತೆಯ ಸಾಲುಗಳು, ನಾಟಕಗಳು, ಕಾದಂಬರಿಗಳು ಪಾತ್ರಗಳನ್ನು ಅಭ್ಯಸಿಸುವ ಮೂಲಕ ಕನ್ನಡದ ಬಗೆಗೆ ಮತ್ತು ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳ ಜ್ಞಾನವನ್ನು ಪಡೆಯುತ್ತಾರೆ. ಸುಲಭದಲ್ಲಿ ಕನ್ನಡ ಪತ್ರಿಕೆಯಲ್ಲಿ ಹೆಚ್ಚು ಅಂಕ ಪಡೆಯುವ ಮೂಲಕ ಉದ್ಯೋಗ ಪಡೆಯಬಹುದು.

**4. ಪ್ರಾಯೋಗಿಕ ಕೌಶಲ್ಯ:**

ತರಗತಿಯಲ್ಲಿ ಪ್ರಾಯೋಗಿಕ ತರಗತಿಗಳನ್ನು ನಡೆಸುವಾಗ ವಿದ್ಯಾರ್ಥಿಯೇ ಸ್ವಯಂಚರ್ಚೆ ಮಾಡಲು, ಅಭಿಪ್ರಾಯ ಮಂಡಿಸಲು ಅವಕಾಶ ನೀಡಲಾಗುವುದು. ಆ ಮೂಲಕ ಮೌಖಿಕ ಅಭಿವ್ಯಕ್ತಿ ಮತ್ತು ಬರವಣಿಗೆಯ ಕೌಶಲ್ಯವನ್ನು ಪ್ರಾಯೋಗಿಕ ತರಗತಿಗಳಲ್ಲಿ ಪಡೆಯಬಹುದು. ಭಾಷೆಯ ಉಚ್ಚಾರಣೆ, ವ್ಯಾಕರಣ, ವಿಷಯದ ಮೇಲೆ ಹಿಡಿತ ಸಾಧಿಸುವ ಜ್ಞಾನವನ್ನು ಹೊಂದಬಹುದು. ಪ್ರಬುದ್ಧತೆಯಿಂದ ಭಾಷೆಯ ಬಳಕೆ ಮತ್ತು ಬರೆಯುವ ಕೌಶಲ್ಯ ಹೊಂದುವ ಮೂಲಕ ಮಾಧ್ಯಮಗಳಲ್ಲಿ ಉದ್ಯೋಗವಕಾಶಹೊಂದಲು ಅನುಕೂಲವಾಗುತ್ತದೆ. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕುತೂಹಲ, ಅನ್ವೇಷಣೆ, ಚಿಂತನೆ, ಚರ್ಚೆ, ಆತ್ಮವಿಮರ್ಶೆ ಬೆಳೆಸುವ ಪಠ್ಯ ವಿಷಯವನ್ನು ಸಮಕಾಲೀನಗೊಳಿಸುವ, ಪ್ರಶ್ನಿಸುವ ಮನೋಭಾವ ಮೂಡಿದಾಗ ಓದು ಬರಹ, ಮಾತುಗಾರಿಕೆ ಮೊದಲಾದ ಕೌಶಲ್ಯವನ್ನು ಉದ್ದೇಶನಗೊಳಿಸಿಕೊಳ್ಳುವ ಮೂಲಕ ಮಾನಸಿಕ, ವ್ಯಕ್ತಿತ್ವ, ಬೌದ್ಧಿಕ ವಿಕಸನವಾಗುತ್ತದೆ.

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Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	Optional any one (Nine): 1(c)Hindi BSCCBCSHINYCM

**B.Sc., (Language Course): Ability Enhancement Compulsory Course:**

**Hindi Language - 2016-17**

Sl. No	Sem	Course	Title of the Paper
1	I	AECC	Hindi I : Hindi Gadya aur Grammar
2	II	AECC	Hindi II : Hindi Kahanies
3	III	AECC	Hindi III: Nataka Sahitya aur Praoyojana Mulak Hindi
4	IV	AECC	Hindi IV: Hindi Kavya aur Anuvaad

**I Semester:**

**Title of the paper: Hindi Gadya aur Grammar.**

In this paper, students have opportunity to learn Hindi Literature, Short Essays and Short Articles etc. and Classic Hindi Grammar.

**II Semester:**

**Title of the paper: Hindi Kahanies.**

In this paper, students have opportunities to learn Hindi short stories and Grammar.

### III Semester:

**Title of the paper: Nataka Sahitya aur Praoyojana mulak Hindi.**

In this paper, students have opportunities to learn Hindi Dramas and Official Language.

### IV Semester:

**Title of the paper: Hindi Kavya aur Anuvaad.**

In this paper, students have opportunities to learn hindi Poems and Translation. Hindi Literature and Understanding social awareness.

We have been creating, learning environment when students have opportunities to improve this language learning.

Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	Optional any one (Nine): 1(d) Sanskrit BSCCBCSSANYCM

Program specific Objectives and outcome

### ॥ संस्कृतभाषायाः महत्त्वम् ॥

संस्कृतभाषा नाम अत्यन्तप्राचीनभाषा इत्युच्यते । संस्कारवती भाषा संस्कृतभाषा । प्रत्येकं पदमपि व्याकरणसूत्रद्वारा निष्पाद्यते । इयं भाषा देववाणी इति कथ्यते । न केवलं देववाणी इति कारणेन अस्याः भाषायाः महत्त्वं वर्तते । किन्तु या भारतीया प्राचीनसाहित्यपरम्परा वर्तते सा सर्वापि संस्कृते निबद्धा विद्यते इति अस्याः भाषायाः महत्त्वम् । ऋग्वेदः, यजुर्वेदः, सामवेदः, अथर्ववेदः इति चत्वारः वेदाः, आयुर्वेदः, धनुर्वेदः, गान्धर्ववेदः, अथर्ववेदः [अर्थशास्त्रम्] इति चत्वारः उपवेदाः, शिक्षा, व्याकरणम्, छन्दः, निरुक्तम्, ज्यौतिषम्, कल्पः इति षडङ्गानि, मत्स्यपुराणम्, मार्कण्डेयपुराणम्, भविष्यपुराणम्, भविष्योत्तरपुराणम्, ब्रह्मपुराणम्, ब्रह्माण्डपुराणम्, ब्रह्मवैवर्तपुराणम्, वायुपुराणम्, वामनपुराणम्, वराहपुराणम्, विष्णुपुराणम्, अग्निपुराणम्, नारदपुराणम्, पद्मपुराणम्, लिङ्गपुराणम्, गरुडपुराणम्, कूर्मपुराणम्, स्कान्दपुराणम् इति अष्टादश पुराणानि, चार्वाकम्, बौद्धम्, आर्हतम्, रामानुजम्, पूर्णप्रज्ञम्, पाशुपतम्, शैवम्, प्रत्यभिज्ञा, रसेश्वरम्, औलूक्यम्, अक्षपादम्, पातञ्जलम् इति द्वादश दर्शनानि अथवा न्यायः, वैशेषिकम्, साङ्ख्यम्, योगः, कर्म, वेदान्तः इति षट् दर्शनानि, राजनीतिः, दण्डनीतिः, नाट्यशास्त्रम्, शिल्पशास्त्रम्, वास्तुशास्त्रम्, रामायणम्, महाभारतम्, काव्यशास्त्रम् [काव्यानि] - इत्येवं प्रकारेण संस्कृतम् अतीव समृद्धं वर्तते । अतः कदाचित् कस्यचित् आवश्यकता भवति चेत् संस्कृतमेव शरणीकरणीयम् । संस्कृतस्य अध्ययनेन विना एतेषाम् अध्ययनं कर्तुं न शक्यते इति संस्कृताध्ययनस्य महदिदं प्रयोजनम् । एतेषाम् अध्ययनेन विना प्राचीनभारतीयसाहित्यपरम्परा न ज्ञायते । अतः संस्कृतम् अवश्यं सर्वैरपि अध्येयम् ॥ न केवलम् अनेन विरम्यते । संस्कृतं संस्कृतेर्मूलम् । स्मरणशक्तिः [ज्ञापकशक्तिः], मनश्शान्तिः, उत्तमः संस्कारः, स्पष्टम् उच्चारणम् इति संस्कृताध्ययनस्य बहुमुख्यानि प्रयोजनानि वर्तन्ते । सर्वासां भारतीयभाषाणां मातृभाषा इति कारणेन, अन्यासां भाषाणाम् अध्ययनमपि सुलभं भवति । एवं रीत्या

संस्कृताध्ययनस्य बहूनि प्रयोजनानि वर्तन्ते । सर्वे संस्कृतम् अधीत्य अस्य संस्कृतस्य प्रयोजनं प्राप्नुवन्तु इति प्रार्थ्यते ॥

### **Program specific objectives and outcome**

Sanskrit is very ancient language in the world. It is Sanskrit because it has Samskaara or culture. Each word of Sanskrit can be derived with Grammatical Rule. This is a Divine Language. This is not a reason to give the importance for Sanskrit. But Sanskrit has everything. It means, Whole ancient Indian literature is kept in Sanskrit Language. Four Vedas named Rugveda, Yajurveda, Saamaveda and Atharvaveda, Four Upavedas named Aayurveda, Dhanurveda, Gaandharvaveda and Arthaveda, Six parts of Veda named Shikshaa, Vyaakarana, Chandas, Nirukta, Jyothishya and Kalpa, Eighteen Puraanas, Twelve Darshanas or Six important Darshanas, Political Science, Law and Punishment, Natya-Shastra means Dance, Drama, Music, Musical Instruments, Shilpa Shastra means any art or craft on wood or stone, Vaastu is Architecture, Ramayana, Mahabharatha and Poetry - these all are composed in Sanskrit. So, Sanskrit is very rich language by it's collection of ancient Indian literature. If anybody likes to know something in ancient Indian literature, he must have the knowledge about Sanskrit language. Translation gives only outlook. Necessity of Sanskrit is everywhere to have great depth or inner mind in related subject. Simply we can say that Yoga, Ayurveda the ancient medical theory, Natya the ancient theory of Music, Dance, Drama, Musical Instruments, all are explained in Sanskrit. So, everybody or every Indian have to study the divine language to enjoy the ancient science of India.

Another derivation can be told that Samskruthi is culture and Samskrutha is language. The language which has culture is called Sanskrit. So, culture and Sanskrit language, both are faces of a coin. Learning Sanskrit creates good culture and humanity in students. Other advantages of Sanskrit are Good pronunciation, Increase of memory power and Peace of mind. Sanskrit is mother tongue of all Indian languages. This is the reason that learning Sanskrit helps to study any Indian language easily. So, we are requesting all of you to learn Sanskrit to enjoy the great knowledge of ancient India.

### **B.Sc., (Language Course): Ability Enhancement Compulsory Course:**

#### **Sanskrit Language – 2016-17**

<b>Sl No</b>	<b>Sem</b>	<b>Course</b>	<b>Title of the Paper</b>
<b>1</b>	<b>I</b>	<b>AECC</b>	<b>Sanskrit I</b>
<b>2</b>	<b>II</b>	<b>AECC</b>	<b>Sanskrit II</b>
<b>3</b>	<b>III</b>	<b>AECC</b>	<b>Sanskrit I</b>
<b>4</b>	<b>IV</b>	<b>AECC</b>	<b>Sanskrit I</b>

## Course objectives and outcome:

॥ पाठ्यक्रमस्य प्रयोजनम् ॥

संस्कृतसाहित्ये गद्यम्, पद्यम्, नाटकम् चम्पूश्चेति चत्वारः प्रकाराः प्रमुखाः सन्ति । एषां परिचयेन संस्कृतवाङ्मयस्य परिचयो भवतीति महदिदं पाठ्यक्रमस्य प्रयोजनं वर्तते । अतः एते चत्वारः अपि प्रकाराः पाठ्यक्रमे नियोजिताः सन्ति । प्रौढशालायां पदवीपूर्वकक्ष्यासु च प्राथमिकं संस्कृतं पाठितं भवति । अतः पदवीकक्ष्यासु प्रौढग्रन्थानां परिचयः क्रियते ॥

\* प्रथमं चातुर्मासिकम् : बाणभट्टविरचितायाः कादम्बर्याः कथामुखम् । इदं गद्यमस्ति । अनेन प्रौढवाक्यानां रचनाविषये, सुदीर्घसमासविषये, शब्दालङ्कारविषये च ज्ञानं सिद्ध्यति ॥

\* द्वितीयं चातुर्मासिकम् : कालिदासविरचितस्य रघुवंशस्य प्रथमः सर्गः । अनेन श्लोकानां गायनम्, श्लोकानां रचना, श्लोकानाम् अन्वयः, छन्दः-वृत्तानि - इत्येतेषु विषयेषु ज्ञानं सम्पाद्यते ॥

\* तृतीयं चातुर्मासिकम् : श्रीहर्षविरचितं नागानन्दं नाटकम् । नाटके श्लोकाः, सम्भाषणवाक्यानि च भवन्ति । अनेन सम्भाषणकौशल्यं वर्धते ॥

\* चतुर्थं चातुर्मासिकम् : अत्र भोजराजविरचितस्य चम्पूरामायणस्य सुन्दरकाण्डम् वर्तते । अनेन भाषायां प्रौढता रमणीयता च विशेषेण सिद्ध्यतः । तस्मात् चम्पूकाव्यं पाठ्यक्रमे निबद्धं वर्तते ॥

\* सामान्यविषयाः : शब्दरूपाणि, क्रियापदानि, सन्धिः, समासः, अलङ्कारः - इति सर्वत्र उपयुक्ताः व्याकरणविषयाः सर्वासु कक्ष्यासु नियोजिताः सन्ति । अत्र प्रत्येकं विषयमधिकृत्य प्रयोजनं वक्तुं न शक्यते । किन्तु प्रत्येकं विषयेऽपि वैशिष्ट्यं वर्तते एव । यथा पर्वतो रमणीयः इत्यत्र रमणीयत्वं कुत्र वर्तते इति वक्तुं न शक्यते तथैव संस्कृतवाङ्मये प्रत्येकं प्रयोजनं वक्तुं न शक्यते । किन्तु प्रत्येकमपि पाठ्यभागः विशिष्टं प्रयोजनं सञ्जनयति इति शम् ॥

## Course objectives and outcomes

Prose, Poetry, Drama and Champoo are the most important varieties of Sanskrit Literature. It can be known the Sanskrit Literature easily if these varieties are known by the students. So, four varieties of Sanskrit Literature are kept in this syllabus. Basic level knowledge is given for the students with simple texts in High School and P.U. Level. Now higher level compositions are selected for Degree level classes.

## I Semester:

Beginning of the story "kathaamukham" from Kadambari of Bana Bhatta is selected for first semester. Composing the complex sentences, Composing the long compounds and Figures of Speech with rhythm are practiced here.



## II Semester:

First Canto from Raghu-Vamsham of Kalidasa is selected as text for second semester. Singing the verses, Composing the verses, Composing the sentences from verses and Metre of the verses are practiced here.

## III Semester:

A Drama Naganandam of Shreeharsha is selected for third semester. Drama has Verses and Conversations. So, studying a drama improves Communication Skills in Sanskrit language.

## IV Semester:

"Champoo" a kind of poetry which is mixed with prose and verses. But Champoo is Extraordinary text, it makes more fluency and beauty (attraction) in the language. So, Champoo is given for last semester (4th semester).

\* General (common) Subjects: Forms of the nouns and verbs, Sandhi (conjunction between words), Samasa (Compounds) and Figures of Speech are common in all semesters. It cannot be explained the advantage of each portion of Sanskrit, however the beauty of a hill cannot be pointed at a place. But each part of a hill makes the hill beautiful.

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Sl.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	<b>Optional any one (Nine):</b> <b>4(e) Malayalam, BSCCBCSTAMYCM</b> <b>5(f) Persian, BSCCBCSPERYCM</b> <b>6(g) Tamil, BSCCBCSARAYCM</b> <b>7(h) French, BSCCBCSFREYCM</b> <b>8(i) Arabic, BSCCBCSARAYCM</b> <b>9(j) Malayalam, BSCCBCSMALYCM</b>  <b>This is included as one of the four ability Enhancement compulsory courses</b>

**The objectives and outcomes of the above Modern Indian Languages:** The above language option is given to students of under graduate to choose the one which they wish to pursue with self study. Hence during the course of self-study, they will build up language skills which will help them as added advantage for their profession to speak local languages with better knowledge of the language.

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Sl. No	Program	Program Code	Ability Enhancement Compulsory Course
1	B.Sc.	BSCCBCSYCM	Ability enhancement disciplines (three): 1(k) Environmental Studies, BSCCBCSESYCM

### The objectives and outcomes of Environmental studies

#### Course objectives:

- To understand the multidisciplinary nature of natural resources their associated problems.
- To develop the concept of conservation of biodiversity and ecosystems for future generations.

#### Course outcome:

- Students will understand the uses and exploitation of various natural resources like forest, water, minerals food and energy, along with case studies to preserve and sustain our environment.
- It will enable them to understand the concept and types of ecosystems.
- Conservation of biodiversity, endangered, endemic species are studied at global, national and local levels.
- Help the students to understand the causes, effects and control measures of various environmental pollution also by taking into account the social issues associated with it.

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Sl. No	Program	Program Code	Ability Enhancement Compulsory Course
1	B.Sc	BSCCBCSYCM	<u>Ability enhancement disciplines</u> Indian Constitution , BSCCBCSINCYCM

#### Course objectives:

- To understand the fundamental rights and duties as being citizen of India
- To know the entire outline of our federal structure
- T develop the belongingness to our country and be patriotic

#### Course outcome:

- Students become aware of the fundamental rights and meantime become responsible towards the duties as being citizen of India
- The knowledge of federal structure after completion of the course helps them to know the depth of governing structure of our country which always supports justice to everyone equally.
- Our students become patriotic.

Sl. No	Program	Program Code	Ability Enhancement Compulsory Course
1	B.Sc.	BSCCBCSYCM	Ability enhancement disciplines (three): 1(I) Disaster Management, BSCCBCSDSMYCM

**Course learning outcomes:**

- Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment. Understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.
- Students will be able to test and evaluate water quality for drinking and agricultural use. They will also have knowledge about various natural disasters.

Sl. No	Program	Program Code	Skill Enhancement Course
1	B.Sc	BSCCBCSYCM	SEC1/3: Computer Application

**Course objectives:**

- To make the students digitally educated
- To make the students technology oriented

**Course outcome:**

- Students become equipped with digital knowledge which is the need of the hour.
- This equips the students of all courses in a digital technology driven direction and gives a common platform for all students of our college

Sl. No	Program	Program Code	Skill Enhancement Course
1	B.Sc	BSCCBCSYCM	SEC1/3: Computer Application

**Course objectives:**

- To make the students digitally educated
- To make the students technology oriented

**Course outcome:**

- Students become equipped with digital knowledge which is the need of the hour.
- This equips the students of all courses in a digital technology driven direction and gives a common platform for all students of our college



<b>Sl. No</b>	<b>Program</b>	<b>Program Code</b>	<b>No of Program specific discipline</b>
<b>2</b>	<b>B.C.A</b>	<b>BCAYCM</b>	<b>One - Computer applications</b>

**BCA Non-CBCS – 2016-17**

**I - Semester**

<b>Subject code</b>	<b>Title</b>	<b>Teaching Department</b>
1BCA1	Kannada / Other Language - I	Kannada/ Concerned Department
1BCA2	English I	English
1BCA3	Digital Fundamentals	CS/Electronics
1BCA4	Mathematics	Mathematics
1BCA5	Fundamentals of Information Technology	CS
1BCA6	Problem Solving & Programming in C	CS
1BCA7	Information Technology & Digital Electronics Lab	CS/Electronics
1BCA8	C Programming Lab	CS

**II - Semester**

<b>Subject code</b>	<b>Title</b>	<b>Teaching Department</b>
2BCA1	Kannada / Other Language - II	Kannada/ Concerned Department
2BCA2	English II	English
2BCA3	Data Structures and Algorithms	CS
2BCA4	Discrete Mathematics	Mathematics
2BCA5	Computer Organization	CS
2BCA6	Accounting & Financial Management	Commerce
2BCA7	Data Structures Lab	CS
2BCA8	Accountancy Lab	Commerce

**III Semester**

<b>Subject code</b>	<b>Title</b>	<b>Teaching Department</b>
3BCA1	Kannada / Other Language-III	Kannada/ Concerned Department
3BCA2	English Language	English
3BCA3	Operating Systems	CS
3BCA4	System Analysis & Design	CS
3BCA5	Microprocessors	CS
3BCA6	Object Oriented Programming with C++	CS
3BCA7	Microprocessor Lab	CS
3BCA8	Object Oriented Programming Lab	CS

## IV Semester

Subject code	Title	Teaching Department
4BCA1	Kannada / Other Languages-IV	Kannada/ Concerned Department
4BCA2	English IV	English
4BCA3	Numerical Analysis and Statistics	CS/Mathematics
4BCA4	Database Management Systems	CS
4BCA5	Computer Networks	CS
4BCA6	Dot Net Programming	CS
4BCA7	Numerical Analysis and Statistics Lab	CS
4BCA8	Database & Visual Basic Lab	CS

## Semester - V

Subject code	Title	Teaching Dept.
5BCA1	Constitution of India *	Concerned Dept.
5BCA2	Environmental Studies *	Concerned Dept.
5BCA3	Software Engineering	CS
5BCA4	Java & Web Designing	CS
5BCA5	Elective – I	CS
5BCA6	Elective – II	CS
5BCA7	Web Designing Lab	CS
5BCA8	Elective Lab	CS

## Semester-VI

Subject code	Title	Teaching
BCA1	Project Work	CS

## I Semester

### Analog and Digital Electronics

#### Course objectives:

- The concept of various components.
- The concepts that underpin the disciplines of analog and digital electronic logic circuits.
- Various Number system and Boolean algebra.
- Design and implementation of combinational circuits.
- Design and implementation of sequential circuits

**Course outcome:** Students will be able to:

- Understand the concepts of various components to design stable analog circuits.
- Represent numbers and perform arithmetic operations.
- Minimize the Boolean expression using Boolean algebra and design it using logic gates.
- Analyze and design combinational circuit
- Design and develop sequential circuits.

### **Mathematics**

**Course objectives:** Students will try to learn:

- The concepts of Set theory and Relation.
- The concepts of Functions and define the recursive functions.
- The concept of Laplace transforms.
- The concept of Inverse Laplace transforms.
- The concept of permutations and combinations.
- The concept of variable and also identify the mapping

**Course outcome:** Students will be able to:

- Apply the Set theory and Relation concepts.
- Apply the Functions and define the recursive functions.
- Apply Laplace transform to different applications
- Apply Inverse Laplace transform to different applications.
- Identify the permutations and combinations.
- Define variable and also identify the mapping.

### **Fundamental of Information Technology**

**Course objectives:** Students will try to learn:

- IT in a simple language to all undergraduate students, regardless of their specialization.
- It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry.
- Skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc.

**Course outcome:** Students will be able to:

- Understand basic concepts and terminology of information technology.
- Have a basic understanding of personal computers and their operations.
- Be able to identify issues related to information security.

### **Information Technology Lab**

**Course objectives:** Students will try to learn:

- To expose to the field of computers and their basic applications such as word-processing, spreadsheet and presentations.

**Course outcome:** Students will be able to:

- Understand the basic organization, working and applications of personal computers.
- Apply the different tools and utilities of the operating system.
- Create, edit, spread-sheet and present documents using the relevant application software.
- Analyze the data using spread sheet.

## Problem Solving and Programming in C

**Course objectives:** Students will try to learn:

- To make the student learn a programming language.
- To develop logics, this will help them to create programs, applications in C.
- To learn problem solving techniques.
- Also learn the basic programming constructs they can easily switch over to any other language in future.

**Course outcome:** Students will be able to:

- Analyze a given problem and develop an algorithm to solve the problem
- Improve upon a solution to a problem
- Use the 'C' language constructs in the right way
- Design, develop and test programs written in 'C'
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Understand the dynamics of memory by the use of pointers and Structures.

### C Programming Lab

**Course objectives:** Students will try to learn

- A programming language.
- Problem solving techniques.
- How to write programs in C and to solve the problems.

**Course outcome:** Students will be able to:

- Demonstrate use of data types, simple operators (expressions)
- Demonstrate decision making statements (if and if-else, nested structures)
- Demonstrate decision making statements (switch case)
- Demonstrate use of simple loops
- Demonstrate use of nested loops
- Demonstrate menu driven programs and use of standard library functions.
- Demonstrate writing c programs in modular way (use of user defined functions)
- Demonstrate recursive functions.
- Demonstrate use of arrays (1-d arrays ) and functions
- Demonstrate use of multidimensional array (2-d arrays) and functions
- Demonstrate use of pointers
- Demonstrate concept of strings (strings and pointers)
- Demonstrate array of strings.
- Demonstrate structures (using array and functions)
- Demonstrate nested structures

## II Semester

### Data Structures & Algorithms

**Course objectives:** Students will try to learn:

- Understand and remember algorithms and its analysis procedure.
- Introduce the concept of data structures through ADT including List, Stack, Queues.
- To design and implement various data structure algorithms.
- To introduce various techniques for representation of the data in the real world.
- To develop application using data structure algorithms.
- Compute the complexity of various algorithms.

**Course outcome:** Students will be able to:

- Select appropriate data structures as applied to specified problem definition.
- Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
- Students will be able to implement Linear and Non-Linear data structures.
- Implement appropriate sorting/searching technique for given problem.
- Design advance data structure using Non-Linear data structure.

### Data Structures Lab

**Course objectives:** Students will try to learn:

- Understand and remember algorithms and its analysis procedure.
- Introduce the concept of data structures through ADT including List, Stack, Queues .
- To design and implement various data structure algorithms.
- To introduce various techniques for representation of the data in the real world.
- To develop application using data structure algorithms.

**Course outcome:** Students will be able to:

- Select appropriate data structures as applied to specified problem definition.
- Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
- Students will be able to implement Linear and Non-Linear data structures.
- Implement appropriate sorting/searching technique for given problem.
- Design advance data structure using Non-Linear data structure.

### Discrete Mathematics

**Course objectives:** Students will try to learn:

- Concepts of mathematical logic for analyzing propositions and proving theorems.
- Use sets for solving applied problems, and use the properties of set operations algebraically.
- Work with relations and investigate their properties.
- Investigate functions as relations and their properties.
- Introduce basic concepts of graphs, digraphs and trees.

**Course outcome:** Students will be able to:

- Analyze logical propositions via truth tables.



- Prove mathematical theorems using mathematical induction.
- Understand sets and perform operations and algebra on sets.
- Determine properties of relations identify equivalence and partial order relations, sketch relations.
- Identify functions and determine their properties.
- Define graphs, digraphs and trees, and identify their main properties.
- Evaluate combinations and permutations on sets.

## **Computer Organization**

**Course objectives:** Students will try to learn:

- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.
- To identify the elements of modern instructions sets and their impact on processor design.
- To explain the function of each element of a memory hierarchy.
- To identify and compare different methods for computer I/O.

**Course outcome:** Students will be able to:

- Understand the theory and architecture of central processing unit.
- Analyze some of the design issues in terms of speed, technology, cost, performance.
- Design a simple CPU with applying the theory concepts.
- Use appropriate tools to design verify and test the CPU architecture.
- Learn the concepts of parallel processing, pipelining and inter-processor communication.
- Understand the architecture and functionality of central processing unit.
- Exemplify in a better way the I/O and memory organization.
- Define different number systems, binary addition and subtraction, 2's complement
- Representation and operations with this representation.

## **Accounting and Financial Management**

**Course objectives:** Students will try to learn:

- An overview of the process in financial management of the firm
- The concept of accounting and financial management.
- The accounting standards, book keeping and preparation of journal, ledger and trial balance and other accounting related statements.
- Improving students' understanding of the time value of money concept and the role of a financial manager in the current competitive business scenario.
- Will learn accounting through software.

**Course outcome:** Students will be able to:

- Understand basic concepts of Accounting.
- Record the transactions in bank reconciliation statement and record transactions through one journal.
- Understand the meaning of depreciation and need for charging depreciation, preparing the final accounts and company's financial statement as per the company's act.
- Knowledge regarding how to create ledgers, journals and balance sheet.

## Accounting and Financial Management Lab

**Course objectives:** Students will try to learn:

- The concept of accounting and financial management.
- The accounting standards, book keeping and preparation of journal, ledger and trial balance and other accounting related statements.
- Will learn accounting through software.

**Course outcome:** Students will be able to:

- Understand basic concepts of Accounting.
- Knowledge regarding how to create ledgers, journals and balance sheet using Tally.
- Do Accounting through software Tally.

### III Semester

#### Operating Systems

**Course objectives:** Students will try to learn:

- To understand the main components of an OS & their functions.
- To study the process management and scheduling.
- To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
- To understand the concepts and implementation Memory management policies and virtual memory.
- To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
- To study the need for special purpose operating system with the advent of new emerging technologies.

**Course outcome:** Students will be able to:

- Describe the important computer system resources and the role of operating system in their management policies and algorithms.
- Understand the process management policies and scheduling of processes by CPU
- Evaluate the requirement for process synchronization and coordination handled by operating system
- Describe and analyze the memory management and its allocation policies.
- Identify use and evaluate the storage management policies with respect to different storage management technologies.
- Identify the need to create the special purpose operating system.

#### System Analysis and Design

**Course objectives:** Students will try to learn:

- What systems are and how they are developed.
- To Identify and describe the phases of the systems development life cycle.
- Follow the analysis portion of the Systems Development Life Cycle in a disciplined manner.
- Develop and evaluate system requirements.

**Course outcome:** On successful completion of the course students will be able to:

- A firm basis for understanding the life cycle of a systems development project;
- An understanding of the analysis and development techniques required as a team member of a medium-scale information systems development project;
- An understanding of the ways in which an analyst's interaction with system sponsors and users play a part in information systems development;
- Experience in developing information systems models;
- Experience in developing systems project documentation;
- An understanding of the object-oriented methods models as covered by the Unified Modeling Language.

## **Microprocessor**

**Course objectives:** Students will try to learn:

- Learn about the architecture and programming of the microprocessor 8085 and 8086.
- Know the basic concepts of Motherboard and function of 8085 processor.

**Course outcome** On successful completion of the course students will be able to:

- To illustrate the architecture of 8085 and 8086 microprocessors.
- To explain the programming and interfacing techniques of 8085 microprocessor.
- To analyze the basic concepts and programming of 8085
- To define the architecture of advanced microprocessors and microcontrollers.

## **Microprocessor Programming Lab**

**Course objectives:** Students will try to learn:

- They come to know how to write program in Assembly level language and know how to Implement the Programs in 8085 kit.
- Know the basic concepts 8085 program.
- Get hands on experience with Assembly Language Programming

**Course outcome:** Students will be able to:

- Apply the fundamentals of assembly level programming of microprocessors.
- Build a program on a microprocessor using arithmetic & logical instruction set of 8085.
- Develop the assembly level programming using 8085 Branching instruction set.
- Write programs based on Instruction set of 8085.

## **Object Oriented Programming with C++**

**Course objectives:** Students will try to learn:

- To develop programming skills , using object oriented programming concepts,
- learn the concept of class and object using C++
- develop classes for simple applications

**Course outcome:** On successful completion of the course students will be able to:

- Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.
- Able to make use of objects and classes for developing programs.
- Able to use various object oriented concepts to solve different problems.

## Object Oriented Programming with C++ Lab

**Course objectives:** Students will try to learn:

- Develop solutions for a range of problems using objects and classes.
- Programs to demonstrate the implementation of constructors, destructors and operator overloading.
- Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.
- Understand generic programming, templates, file handling.

**Course outcome:** On successful completion of the course students will be able to:

- Programs using Control Structures
- Programs using Functions
- Programs using Arrays
- Programs using Inline Functions
- Programs using Classes
- Programs using Constructors and Destructors
- Programs using Friend Functions
- Programs using Operator Overloading
- Programs using Inheritance
- Programs using Virtual Functions
- Programs using Strings

## IV Semester Numerical Analysis and Statistics

**Course objectives:** Students will try to learn:

- To develop the mathematical skills of the students in the areas of numerical methods.
- To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems, interpolation
- To lay foundation of computational mathematics for post-graduate courses specialized studies and research.

**Course outcome:** On successful completion of the course students will be able to:

- Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.
- Apply various interpolation methods and finite difference concepts
- Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
- Work numerically on the ordinary differential equations using different methods through the theory of finite differences.

## Numerical Analysis and Statistics Lab

**Course objectives:** Students will try to learn:

- To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.

- To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering this requires computing of numerical results using certain raw data.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
- To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, and solution of matrix problems.
- To facilitate numerical computing

**Course outcome:** On successful completion of the course students will be able to:

- Apply Numerical analysis which has enormous application in the field of Science and some fields of Engineering.
- Familiar with finite precision computation.
- Familiar with numerical solutions of nonlinear equations in a single variable.
- Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
- Familiar with calculation and interpretation of errors in numerical method.

## **Database Management Systems**

**Course objectives:** Students will try to learn:

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and usage of Relational Algebra.
- To introduce the concepts of basic SQL as a universal Database language.
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.

**Course outcome:** Students will be able to:

- Explain the features of database management systems and Relational database.
- Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
- Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
- Retrieve any type of information from a data base by formulating complex queries in SQL.
- Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
- Build indexing mechanisms for efficient retrieval of information from a database.

## **Database Management Systems and Visual Basic Lab**

**Course objectives:** Students will try to learn:

- Formal foundation in database concepts, technology and practice to the participants to groom them into well-informed database application developers
- to give a good formal foundation on the relational model of data
- to present SQL and procedural interfaces to SQL comprehensively
- to give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

- to motivate the participants to relate all these to one or more commercial product environments as they relate to the developer tasks
- to present the concepts and techniques relating to query processing

**Course outcome:** On successful completion of the course students will be able to:

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDI commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

## **Computer Networks**

**Course objectives:** Students will try to learn:

- Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- Acquire knowledge of Application layer and Presentation layer paradigms and protocols.
- Study Session layer design issues, Transport layer services, and protocols.
- Gain core knowledge of Network layer routing protocols and IP addressing.
- Study data link layer concepts, design issues, and protocols.
- Read the fundamentals and basics of Physical layer, and will apply them in real time applications.

**Course outcome:** Students will be able to:

- Describe the functions of each layer in OSI and TCP/IP model.
- Explain the functions of Application layer and Presentation layer paradigms and Protocols.
- Describe the Session layer design issues and Transport layer services.
- Classify the routing protocols and analyze how to assign the IP addresses for the given network.
- Describe the functions of data link layer and explain the protocols.
- Explain the types of transmission media with real time applications

## **Dot Net Programming**

**Course objectives:** Students will try to learn:

- Microsoft framework architecture
- Development of console application
- Building windows application
- OOPs using C#.NET
- Learn data access mechanism provided .net
- Create and consume libraries
- Create a web application using .net
- Developing the website & application
- Application security

- Dot Net IDE Component Framework.
- Programming concepts in .Net Framework.

**Course outcome:** Students will able to:

- Create user interactive web pages using ASP.Net.
- Create simple data binding applications using ADO.Net connectivity.
- Performing Database operations for Windows Form and web applications.

## V Semester Software Engineering

**Course objectives:** Students will try to learn:

- Knowledge of basic SW engineering methods and practices, and their appropriate application.
- Describe software engineering layered technology and Process frame work.
- A general understanding of software process models such as the waterfall and evolutionary models.
- Understanding of software requirements and the SRS documents.
- Understanding of the role of project management including planning, scheduling, risk management, etc.
- Describe data models, object models, context models and behavioural models.
- Understanding of different software architectural styles.
- Understanding of software testing approaches such as unit testing and integration testing.
- Describe software measurement and software risks.
- Understanding on quality control and how to ensure good quality software.

**Course outcome:** Students will able to:

- Select and implement different software development process models.
- Extract and analyze software requirements specifications for different projects.
- Develop some basic level of software architecture/design.
- Apply standard coding practices.
- Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
- Identify and implement of the software metrics.
- Apply different testing and debugging techniques and analyzing their effectiveness

## Java Programming and Web Designing

**Course objectives:** Students will try to learn:

- To understand how to design, implement, test, debug, and document programs that use
- Basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
- To understand the importance of Classes & objects along with constructors, Arrays and Vectors.
- Discuss the principles of inheritance, interface and packages and demonstrate though problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
- To understand importance of Multi-threading & different exception handling mechanisms.
- To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events.

**Course outcome:** Students will be able to:

- Implement Object Oriented programming concept using basic syntaxes of control
- Structures, strings and function for developing skills of logic building activity.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- Demonstrates how to achieve reusability using inheritance, interfaces and packages and
- Describes faster application development can be achieved.
- Demonstrate understanding and use of different exception handling mechanisms and
- Concept of multithreading for robust faster and efficient application development.
- Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events.

## **Web Designing Lab**

**Course objectives:** Students will try to learn:

- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.

**Course outcome:** Students will able to:

- Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Write Java application programs using OOP principles and proper program structuring
- Demonstrate the concepts of polymorphism and inheritance
- Write Java programs to implement error handling techniques using exception handling.

## **Data Mining and Data Warehousing**

**Course objectives:** Students will try to learn:

- To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage.
- To enable students to effectively identify sources of data and process it for data mining
- To make students well versed in all data mining algorithms, methods of evaluation.
- To impart knowledge of tools used for data mining

**Course outcome:** Students will able to:

- Know the fundamentals of data mining
- Pre-process the data
- Organize and prepare the data needed for data mining using pre pre-processing techniques
- Understand frequent pattern mining
- Perform exploratory analysis of the data to be used for mining.
- Implement the appropriate data mining methods like classification, clustering or Frequent
- Classify the dataset using supervised learning methods 5. Cluster the dataset using unsupervised learning methods



# Software Testing and Quality Assurance

**Course objectives:** Students will try to learn:

- Basic software debugging methods.
- White box testing methods and techniques.
- Black Box testing methods and techniques.
- Designing test plans.
- Different testing tools (familiar with open source tools)
- Quality Assurance models.

**Course outcome:** Students will able to:

- Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.
- Implement various test processes for quality improvement
- Design test planning.
- Manage the test process
- Apply the software testing techniques in commercial environment
- Use practical knowledge of a variety of ways to test software and an understanding of some of the tradeoffs between testing techniques.

## VI Semester

### PROJECT

**Course objectives:** Students will try to learn:

- To offer students a glimpse into real world problems and challenges that need IT based solutions
- To enable students to create very precise specifications of the IT solution to be designed.
- To introduce students to the vast array of literature available of the various research challenges in the field of IT
- To create awareness among the students of the characteristics of several domain areas where IT can be effectively used.
- To enable students to use all concepts of IT in creating a solution for a problem
- To improve the team building, communication and management skills of the students.

**Course outcome:** Students will be able to:

- Discover potential research areas in the field of IT
- Conduct a survey of several available literature in the preferred field of study
- Compare and contrast the several existing solutions for research challenge
- Demonstrate an ability to work in teams and manage the conduct of the research study.
- Formulate and propose a plan for creating a solution for the research plan identified
- To report and present the findings of the study conducted in the preferred domain

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3	B.B.A	BBACBCSYCM	<b>One - Business Administration</b> <b>BBACBCSMANYCM</b>  <b>Electives :</b>  <b>2. Marketing Management</b>  <b>3. Human Resource Management</b>  <b>4. Financial management</b>
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**PROGRAM SPECIFIC OBJECTIVES AND OUTCOME**

**Elective: Marketing Management: Program specific objectives:**

- To help students to understand the concepts of marketing and its 4 P's. How the 4 P's: product, price, place and promotion decisions affect the success of any business
- To help students to understand the working of rural marketing institutions and to familiarize with the special problems related to sales in rural markets, consumer behavior and consumer satisfaction in rural region
- The purpose of this program is to expose the students different issues concerned with Advertising and Sales
- Provides understanding the management of retail business and supply chain. Provides an insight into customer relationship management and effective retail space management
- Students learn the tools and techniques necessary to effectively manage the sales function of an organization

**Elective: Marketing Management: Program specific outcomes:**

- Student learns the nature, scope and importance of marketing.
- It helps to understand basic concepts of marketing.
- It develops the basic and essential skills of students related to marketing.
- It improves the ability of the students and creates employability opportunities in marketing which are essential for industries.
- Students get insights into all functional areas of retailing.
- The students also get an insight on consumer behavior and social responsibility of marketing towards business.
- Students will able to Categorize issues in rural markets and Analyze marketing environment, consumer behavior, distribution channels, marketing strategies, etc

- Students will be able to describe different types of advertisement, discuss the ethics in advertisement
- Students will be able to implement the key issues in supply chain management effectively.

**Elective: Human Resource Management: Program specific objectives:**

- The objectives of this course is to acquaint the students with the basics of Human Resource management, its scope and functions
- To understand theoretical foundations of key areas of HRD, importance of HRD, its scope and how it helps in improving the Quality of Work Life of employees in an organization.
- They also get an insight into what if training, development, career development, employee empowerment and related concepts.
- The course helps in understanding performance management techniques, various motivation theories and importance of job evaluation in assessing the relative worth of the job.
- The course helps to give insight with regard to wage and salary administration, various incentive plans, benefits and services, discipline and Industrial relations for a strong & effective workforce through right policies & practices
- Students are exposed to Recruitment and Selection Process through Practice work.
- Students get to understand important legal provisions governing the industrial

**Elective: Human Resource Management: Program specific outcomes:**

- Students apply motivational theories in their life.
- Students understand the employee contributions and participations in solving any industrial disputes.
- Students will be able to understand the importance of human resources and their effective management in organizations.
- They get an insight into what are human resource planning, job analysis and design, recruitment sources and selection methods, different tests used in selection and the process of interview.
- Enables students to develop integrated view on role of HRD in modern business.
- They develop insight into various HRD programs, to help keep employees empowered.
- They understand the importance of Workers participation in Management, in the form of works committees, Joint Management Councils, worker directors, Co-partnership.
- The students would be able to understand how employees can be managed effectively using motivation techniques.
- They would be able to design jobs and carryout job evaluations

- Helps in Designing and Executing effective Incentive programs and employee management techniques. Students will be able to analyze core and legal issues, policies and practices surrounding employee relations, and the strength of trade union movement in India.

**Elective: Financial management: Program Specific Objectives:**

- To acquaint the students with the fundamental aspects of financial management in the business.
- To acquaint the students with the fundamental aspects and the importance of Working Capital Management in business.
- To expose the students with an overview of banks and other financial services companies.
- To acquaint the students with the basics of security Analysis and portfolio management
- Students got knowledge about the interpretation and analysis of financial statements effectively
- Students able to understand long-term and short term financing
- To make Students read and studied about dividend policies
- Students are acquainted with current financial practices
- Students are well acquainted with Financial Markets

**Elective: Financial management: Program Specific Outcomes:**

- Empowers the students with knowledge of financial planning, procurement, investment and distribution of finance in companies.
- Students will learn about the capital structures which is most appropriate for the company and they will be able to calculate cost of various sources of capital.
- They also get an insight into meaning, importance of Capital Budgeting and also learn its techniques.
- Students will be able to determine working capital requirement, optimum inventory level. Enables them to prepare cash budget and estimate the various kinds of leverages.
- Students will be able to evaluate credit policies of the company.
- Students learn about financial services in India as Indian Financial System, Financial Markets, Banking and Insurance Sector in India and Recent Trends in Accounting and Finance.
- Students are acquainted with current financial practices and also acquainted with Financial Markets knowledge.
- Students will be able to; explore different avenues of investment, equipped with the knowledge of security analysis, apply the concept if portfolio management for better investment.
- Students will have the knowledge of analysing market efficiency

**BBA-2016-17**

<b>Sl. No.</b>	<b>Code</b>	<b>Title of the Paper</b>
<b>I Semester</b>		
1.	1.01	Functional Language – I Communicative English
2.	1.02	Functional Language – II – Kannada or other languages.
		Core Papers
3.	1.03	Financial Accounting – I
4.	1.04	Business Organization and Environment
5.	1.05	Banking Theory and Practice
6.	1.06	Indian Constitution
<b>II Semester</b>		
7.	2.01	Functional Language – I Business Communication
8.	2.02	Functional Language – II – Kannada or other languages.
		Core Papers
9.	2.03	Financial Accounting – II
10.	2.04	Business Management
11.	2.05	Cost Accounting – I
12.	2.06	Environmental Studies.

Sl. No.	Code	Title of the Paper
<b>III Semester</b>		
13.	3.01	Functional Language – I Business Communication
14.	3.02	Functional Language – II – Kannada or other languages.
		Core Papers
15.	3.03	Human Resource Management
16.	3.04	Corporate Accounting-I
17.	3.05	Cost Accounting – II
18.	3.06	Computer Fundamentals and applications
<b>IV Semester</b>		
19.	4.01	Functional Language – I Business Communication
20.	4.02	Functional Language – II – Kannada or other languages.
		Core Papers
21.	4.03	Business Legislation
22.	4.04	Corporate Accounting-II
23.	4.05	Business Statistics
24.	4.06	Managerial Economics

<b>V Semester</b>		
25.	5.01	Financial Management – I
26.	5.02	Management Accounting
27.	5.03	Office Administration and Mgt.
28.	5.04	Quantitative Technique
29.	5.05	Taxation – I
30.	5.06	Elective – I-HRM
	5.06	Elective – I-FM
	5.06	Elective – I-MM
<b>VI Semester</b>		
31.	6.01	Financial Management – II
32.	6.02	Principles and Practice of Auditing
33.	6.03	Marketing Management
34.	6.04	Taxation – II
35.	6.05	Elective – II-HRM
	6.05	Elective – II-FM
	6.05	Elective –II-MM
36.	6.06	Entrepreneurship Development

### **I Semester**

### **Communicative English**

**Course objectives:** To acquaint the students with English Grammar and Composition and to make them learn Correspondence. Also help them learn proper pronunciation of English words.

**Course outcome:** Students proficiency level will be enhanced by adopting advance communicative learning, they will be able to prepare for corporate environment and maintain public relation in a more efficient manner.

### **Financial Accounting I**

**Course objectives:** To provide fundamental accounting knowledge and familiarize basic accounting concepts.

**Course outcome:** Show proficiency in basic accounting concepts, conventions and understanding the accounting process. Understand the process and preparation of financial statements for Sole Proprietorship and Company.

## **Business Organization and Environment**

**Course objectives:** To provide knowledge of the environment in which businesses operates. Provides insights into aspects related to economic operations and financial framework.

**Course outcome:** Students will be able to understand present dynamic world of business by analyzing the strength, weaknesses, opportunities and threats in the light of changing environment

## **Banking Theory and Practices**

**Course objectives:** The Objectives of this course is to provide a brief idea and framework of Banking law and practices

**Course outcome:** Students will be able to understand functions of banking. Describe policy reforms in banking industry. Understand the modern conventions of banking sector.

### **II Semester**

## **Business Communication I**

**Course objectives:** To acquaint the students with Business Correspondence and to make them learn Business Write up.

**Course outcome:** Initiate the students about corporate correspondence letters, drafting purchase and sales order procedures and they will be able to learn about appointment letters and offers.

## **Financial Accounting II**

**Course objectives:** To impart knowledge of accounting systems adopted in different Business Organizations, profit and nonprofit organizations. To enable the students to prepare different kinds of financial statements.

**Course outcome:** Empowers students to understand and prepare Royalty, Hire purchase and partnership accounts. It introduces students to various purchasing systems in accounting

## **Business Management**

**Course objectives:** Course familiarizes the students with the basic Principles and practices of management

**Course outcome:** Students will get familiar with the basic concepts and principles of management, develop leadership skills, learn about business in the light of the environment, learn tools and techniques used in managing organizations and management practices

## **Cost Accounting I**

**Course objectives:** The course exposes the students to the Cost Accounting systems adopted in different Manufacturing Organizations. Develop an insight into advanced cost accounting methods and procedures.

**Course outcome:** To enable students to conceptualize various methods and techniques of cost accounting and its application. Students will be able to use methods of time keeping and book keeping and will define the terms of variance analysis



### III Semester

## Business Communication II

**Course objectives:** To acquaint the students with Business Correspondence and to make them learn Business Write up.

**Course outcome:** Students will be able to develop and deliver effective presentations and interpersonal communication

## Human Resource Management

**Course objectives:** To enable the students to understand the dynamics of HRM function in Corporate Enterprises.

**Course outcome:** Contribute to the development implementation and evaluation of employee recruitment selection and retention plans and process. It enables to development of human relationship, inter and intrapersonal relationship among students.

## Corporate Accounting I

**Course objectives:** To provide advanced accounting knowledge and familiarize students in corporate accounting practices.

**Course outcome:** Students will be able to account for various adjustments related to share capital. It enables to prepare and understand final accounts of joint stock companies and understand accounting system in corporate sector. Students will be able to understand and prepare accounts for liquidation

## Cost Accounting II

**Course objectives:** The course gives an insight into advanced cost accounting methods and procedures.

**Course outcome** Helps in decision making process and to analyse the cost financial statements in the industrial prospective

### IV Semester

## Business Communication III

**Course objectives:** To acquaint the students with Business Correspondence and to make them learn Business Write up.

**Course outcome:** Students will be able to learn effective business writing research approaches and information collection.

## Business Legislation

**Course objectives:** Objectives: The objectives of this course is to provide as brief idea about legislations of business; Contract Act, Negotiable Instruments Act and Competition Act, Contract of Indemnity and Guarantee, Bailment and Pledge, and Contract of Agency and how it is used in managing various business operations.

**Course outcome:** Students will understand the legal aspects while entering into a contract, the meaning and importance of Negotiable Instruments and the legal aspects relating to it and also understand the importance of Competition Act, Contract of Indemnity and Guarantee, Bailment and Pledge, and Contract of Agency and how it can be used in businesses.

## **Corporate Accounting II**

**Course objectives:** To provide advanced accounting knowledge and familiarize Students in corporate accounting practices

**Course outcome:** Students will be able to explain and prepare accounts for the amalgamation and external reconstruction. Students enable to understand and prepare accounts for liquidation

## **Business Statistics**

**Course objectives:** To acquaint the students with the fundamental aspects of Statistics and its significance in business.

**Course outcome:** Enables students to describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis. Students learn to discuss critically the uses and limitations of statistical analysis. Solve a range of problems using the techniques covered. Conduct basic statistical analysis of data.

## **Managerial Economics**

**Course objectives:** The purpose of this course is to familiarize the students with the concepts of Economics applicable to Business.

**Course outcome:** Students will learn how consumers make decision, how firms analyze market demand, how firms analyze their internal costs, how firms interact in different market structures and make price, output decision.

## **V Semester**

### **Financial Management – I**

**Course objectives:** To acquaint the students with the fundamental aspects of financial management in the business.

**Course outcome:** Empowers the students with knowledge of financial planning, procurement, investment and distribution of finance in companies. Students will learn about the capital structures which is most appropriate for the company and they will be able to calculate cost of various sources of capital. They also get an insight into meaning, importance of Capital Budgeting and also learn its techniques.

### **Management Accounting**

**Course objectives:** This course provides the students an understanding of the application of accounting techniques for management decision making.

**Course outcome:** Students will have knowledge of components of costs that constitute business analysis. Students will be able develop an attitude to focus on financial statement users, their information needs, and how financial statement analysis addresses those needs. Students will acquire the basic knowledge required for application of tools for decision making.

### **Office Administration and Management**

**Course objectives:** This course enables the students to know about the office administration and management which is the part of information management.

**Course outcome:** Describe the changing work environment and the skills needed by the administrative assistant to function in such an environment.

## **Quantitative Technique**

**Course objectives:** This course enables the students to gain basic understanding of quantitative techniques and its applicability to business.

**Course outcome:** They will develop knowledge to apply basic financial mathematical techniques and Develop problem solving skills. Students enable to demonstrate their competence and confidence in using descriptive statistics and statistical process control.

### **Taxation – I**

**Course objectives:** This course enables the students to know the basics of Income Tax and its Implications.

**Course outcome:** Students will be able to define the procedure of direct tax assessment, file IT return on individual basis, compute total income and define tax complicacies, differentiate between direct and indirect tax assessment and they will understand the various deductions to be made from gross total income..

### **Elective 1-MM- Marketing Research**

**Course objectives:** To introduce students to the research methods in business marketing and also provides experience in designing questionnaire and statistical analysis.

**Course outcome:** Enables students to understand the role of business research in decision making. Learn different kinds of research design, primary scales of measurement, sampling techniques and methods for analysis of data. Students will be able to carry out a simple sample survey, analyze the results and present the findings

### **Elective 1- HRM- Principles and Practice of Human Resource Management**

**Course objectives:** The objectives of this course is to acquaint the students with the basics of Human Resource management, its scope and functions

**Course outcome:** Students will be able to understand the importance of human resources and their effective management in organizations. They get an insight into what is human resource planning, job analysis and design, recruitment sources and selection methods, different tests used in selection and the process of interview

### **Elective 1- FM- INDIAN CAPITAL MARKET**

**Course objectives:** This course aims at acquainting the students with the working of financial markets in India.

**Course outcome:** Students learn about financial services in India as Indian Financial System, Financial Markets, Banking and Insurance Sector in India and Recent Trends in Accounting and Finance, Students are acquainted with current financial practices and also acquainted with Financial Markets knowledge.

## **VI Semester**

### **Financial Management – II**

**Course objectives:** To acquaint the students with the fundamental aspects and the importance of Working Capital Management in business.

**Course outcome:** Students will be able to determine working capital requirement, optimum inventory level. Enables them to prepare cash budget and estimate the various kinds of leverages. Students will be able to evaluate credit policies of the company.

### **Principles and Practice of Auditing**

**Course objectives:** This course provides the students an understanding of the application of Verification techniques for finding the integrity of accounting transactions

**Course outcome:** helps to understand the auditing environment in the corporate entities and students will understand roles and responsibilities of auditor

### **Marketing Management**

**Course objectives:** The objectives of this course is to help students to understand the concepts of marketing and its 4 P's. How the 4 P's: product, price, place and promotion decisions affect the success of any business

**Course outcome:** On successful completion of the course, students will be able to: have an in depth understanding of the marketing concepts, and how strategies with regard to the 4 P's have to be effectively designed and managed. The students also get an insight on consumer behavior and social responsibility of marketing towards business.

### **Taxation – II**

**Course objectives:** The course provides basic ideas about Tax law concerning Business organizations.

**Course outcome:** Enables students to define the procedure of direct tax assessment. They will understand the concept of recovery and refund of tax. Students will define tax complications and structure and aware about IT authorities and their powers and appeal & revision, tax penalties, offences and prosecutions.

### **Elective II- HRM- Industrial Relations**

**Course objectives:** The course helps to give insight with regard to wage and salary administration, various incentive plans, benefits and services, discipline and Industrial relations for a strong & effective workforce through right policies & practices

**Course outcome:** Helps in Designing and Executing effective Incentive programs and employee management techniques. Students will be able to analyze core and legal issues, policies and practices surrounding employee relations, and the strength of trade union movement in India

### **Elective II- MM-Advertisement and Sales Management**

**Course objectives:** The purpose of this course is of expose the students different issues concerned with Advertising and Sales.

**Course outcome:** Students will be able to describe different types of advertisement, discuss the ethics in advertisement, identify and make decisions regarding the most feasible advertising appeal and media mix, describe different types of sales persons and explain the steps involved in sales force management.

### **Elective II- FM-Security Analysis and Portfolio Management**

**Course objectives:** The objectives of this course is to acquaint the students with the basics of security Analysis and portfolio management

**Course outcome:** Students will be able to; explore different avenues of investment, equipped with the knowledge of security analysis, apply the concept if portfolio management for better investment and students will have the knowledge of analysing market efficiency Analysis and portfolio management

### **Entrepreneurship Development**

**Course objectives:** This course will enable students to develop an understanding of entrepreneurship and small business management. The course would give an insight about the importance of small business for economic development, the support available to small business from Government. Develops entrepreneurial skill and motivates them to become entrepreneurs

**Course outcome:** The students should be able to develop an understanding about entrepreneurship and small business and appreciate their role in an economy, particularly in the FSM economy. Develop and demonstrate competence in basic business and marketing planning and in identifying opportunities and challenges of small business entrepreneurs.

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