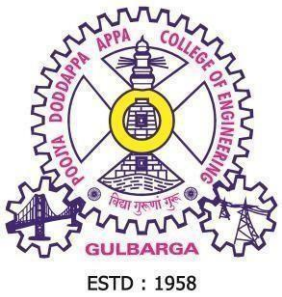
CURRICULUM
FOR THE ACADEMIC YEAR 2023-2024

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.E. (Computer Science & Engineering)

III SEMESTER (22 SERIES)



POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING

(An autonomous college under VTU)

KALABURAGI

About the Institution: The Hyderabad Karnataka Education (HKE) society founded by Late Shri. Mahadevappa Rampure, a great visionary and educationist. The HKE Society runs 46 educational institutions. Poojya Doddappa Appa College of Engineering, Gulbarga is the first institution established by the society in 1958. The college is celebrating its golden jubilee year, setting new standards in the field of education and achieving greater heights. The college was started with 50% central assistance and 50% state assistance, and a desire to impart quality technical education to this part of Karnataka State. The initial intake was 120 with degree offered in three branches of engineering viz, Civil, Mechanical and Electrical Engineering. Now, it houses 11 undergraduate courses, 10 post Graduate courses and 12 Research centers, established in Civil Engg., Electronics & Communication Engg, Industrial & Production Engg, Mechanical Engg, Electrical Engg., Ceramic Cement Tech., Information Science & Engg., Instrumentation Technology, Automobile Engg., Computer Sc. and Engg., Mathematics and Chemistry All the courses are affiliated to Visveswaraya Technological University, Belgaum. At present the total intake at UG level is 980 and PG level 193.

The college receives grant in aid funds from state government. A number of projects have been approved by MHRD /AICTE, Govt. of India for modernization of laboratories. KSCST, Govt. of Karnataka is providing financial assistance regularly for the student's projects.

The National Board of Accreditation, New Delhi, accredited the College in the year 2005- 08 for 09 UG Courses out of which 08 courses are accredited for three years and 01 course is accredited for five years. And second time accredited for Six Course in the year 2009-2012

Our college is one among the 14 colleges selected under TEQIP, sponsored by World Bank. It has received a grant of Rs 10.454 Crores under this scheme for its development. The institution is selected for TEQIP phase II in year 2011 for four years. Institution is receiving a grant of Rs. 12.50 Crores under TEQIP Phase -II scheme for its development and selected for TEQIP-III as mentoring Institute for BIET Jhansi(UP).

Recognizing the excellent facilities, faculty, progressive outlook, high academic standards and record performance, the VTU Belgaum reposed abundant confidence in the capabilities of the College and the College was conferred Autonomous Status from the academic year 2007-08, to update its own programme and curriculum, to devise and conduct examinations, and to evaluate student's performance based on a system of continuous assessment. The academic programmers are designed and updated by a Board of Studies at the department level and Academic Council at the college level. These statutory bodies are constituted as per the guidelines of the VTU Belgaum. A separate examination section headed by a Controller of Examinations conducts the examinations.

At present the college has acquired the Academic autonomous status for both PG and UG courses from the academic year 2007-08 and it is one among the six colleges in the state of Karnataka to have autonomous status for both UG and PG courses.

One of the unique features of our college is, it is the first college in Karnataka State to start the Electronics and Communication Engineering branch way back in the year 1967, to join NIT Surathkal and IISc, Bangalore. Also, it is the only college in the state and one among the three colleges across the country, offering a course in Ceramic and Cement Technology. This is the outcome of understanding by faculty and management about the basic need of this region, keeping in view of the available raw material and existing Cement Industries.

Bharatiya Vidya Bhavan National Award for an Engineering College having Best Overall Performance for the year 2017 by ISTE (Indian Society for Technical Education). In the year 2000, the college was awarded as Best College of the year by KSCST, Bangalore in the state levelstudents projects exhibition.

The college campus is spread over 71 acres of land on either side of Mumbai-Chennai railway track and has a sprawling complex with gardens and greenery all around.

About the department: The Computer Science and Engineering department was started in the year 1984 with an intake of 40 students for UG. The department has seen phenomenal growth and now the department has increased UG intake to 180 students and offering two Post Graduation programmes: PG (Computer Science and Engineering with an intake of 25students) and PG (Computer Network and Engineering with an intake of 09 students). The department is offering research program under its recognized research center. Computer Science and Design course was started from 2021 with an intake of 60 students. The department is having state- of-the-art computing facilities with high speed internet facilities and laboratories. The department library provides useful resources like books and journals. The department has well qualified and experienced teaching faculty. The department has been conducting several faculty development programs and student training programs.

Vision of the Institution

To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

Mission of the Institution

- To provide a high quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.
- To explore, create and develop innovations in engineering and science through research and development activities.
- To provide beneficial service to the national and multinational industries and communities through educational, technical, and professional activities

Vision of the Department

To become a premier department in Computer education, research and to prepare highly competent IT professionals to serve industry and society at local and global levels.

Mission of the Department

- To impart high quality professional education to become a leader in Computer Science and Engineering.
- To achieve excellence in Research for contributing to the development of the society.
- To inculcate professional and ethical behaviour to serve the industry.

Program Educational Objectives (PEO):

PEO1:	To prepare graduates with core competencies in mathematical and engineering fundamentals to solve and analyze computer science and engineering problems
PEO2:	To adapt to evolving technologies and tools for serving the society
PEO3:	To perform as team leader, effective communicator and socially responsible computer professional in multidisciplinary fields following ethical values
PEO4:	To encourage students to pursue higher studies, engage in research and to become entrepreneurs

Program Outcomes:

01. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

02. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

03. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

04. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

05. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

06. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

07. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

08. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

09. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one„s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO1:	Acquire competency in hardware and software working principles to analyze andsolve computing problems.
PSO2:	Design quality software to develop scientific and business applications followingSoftware Engineering practices.
PSO3:	Apply cutting edge technologies using modern tools to find novel solutions ethicallyto existing problems.

Poojya Doddappa Appa Engineering College, Kalaburagi (An Autonomous Institution)

Department of Computer Science & Engineering

SCHEME OF TEACHING FOR III SEMESTER (CSE)–22 SERIES for Academic 2023-2024 (Approved)

Sl. No	Course	Course Code	Course Title	Teaching Hours/Week				Examination				Credits
				Theory Lecture(L)	Tutorial(T)	Practical	Self-Study (S)	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	BSC	22MATS31	Engineering Mathematics-III for Computer Science Engineering Stream	3	0	0	0	3	50	50	100	3
2	IPCC	22CS32	Analog and Digital Electronics	3	0	2	0	3	50	50	100	4
3	IPCC	22CS33	Object Oriented Programming with JAVA	3	0	2	0	3	50	50	100	4
4	PCC	22CS34	Data Structures	3	0	0	0	3	50	50	100	3
5	PCCL	22CSL35	Data Structures Lab	0	0	2	0	3	50	50	100	1
6	ESC	22CS36A	Operating System	3	0	0	0	3	50	50	100	3
7	UHV	22UHV37	Social Connect and Responsibility	0	0	2	0	2	50	50	100	1
8	AEC	22CSAE381	Mastering Microsoft Office	0	0	2	0	2	50	50	100	1
9	NCMC	22NS39	National Service Scheme(NSS)	0	0	2	0	0	50	0	50	0
10		22PE39	Physical Education(PE)Sports &Athletics									
11		22YO39	Yoga									
			Total	**15**	**0**	**12**	**0**	**22**	**450**	**400**	**850**	**20**

BSC: Basic Science Course, **IPCC**: Integrated Professional Core Course, **PCC**: Professional Core Course, **ESC**: Engineering Science Course, **UHV**: Universal Human Values, **AEC** : Ability Enhancement Course, **NCMC**: Non-Credit Mandatory Course.

Course Title: Engineering Mathematics-III for Computer Science Engineering Stream		
Subject Code : 22MATS31	Credits :03	CIE: 50
Number of Lecture Hours/Week (L:T:P)	**3:0:0 Hrs**	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03

Prerequisites: Basic knowledge of Mathematics

Course Learning Objectives: To enable the students to obtain the knowledge of Engineering Mathematics in the following topics

1. Probability distribution of discrete and continuous random variables
2. Joint probability distributions and discrete and continuous random variables
3. Analyse the sample data using Large sample test, t-distribution and chi- distribution

MODULES	**Teaching Hours**
Module - I **Probability distributions:** Random variable (Discrete and continuous) probability density function, cumulative density function. Binomial distribution, Poisson distributions, Normal distribution and problems.	**09 Hrs**
Module - II **Joint probability distributions:** Concept of joint probability distribution, discrete and continuous random variables independent random variables .problems on expectation and variance	**08 Hrs**
Module – III **Sampling theory -I** Sampling, sampling distribution, standard error, null and alternative hypothesis, Type-I and Type-II errors, Confidence limits. Test of significance for Large sample: Test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations	**09 Hrs**
Module – IV Test of significance Small samples student's t-distribution: Test for single mean, difference of means, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes and problems.	**08 Hrs**
Module – V **Optimization techniques**: Linear Programming: Mathematical formulation of linear Programming problem (LPP), Types of solutions, Graphical Method, basic feasible solution, canonical and standard forms and simplex method.	**08 Hrs**

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module**.**

Text books:

1 Higher Engineering Mathematics by B.S.Grewal, Khanna publishers; 40th Edition.2007

2 Engineering Mathematics by N. P. Bali and Manish Goyal. Laxmi publications, latest edition

Reference books:

1. Advanced Engineering Mathematics by E. Kreyszig, John Willey & sons 8th Edn.
2. A short course in differential equations – Rainvile E.D.9th Edition.
3. Advanced Engineering Mathematics by R. K. Jain & S.R.K Iyengar; Narosa publishing House.
4. Introductory methods of numerical analysis by S. S. Sastry
5. Statistical Methods Authored By Gupta S.P. Publisher: Sultan Chand & Sons. Publishing Year 2021
6. Fundamentals of Mathematical Statistics Authored By Gupta S.C.& Kapoor V.K. Publisher: Sultan Chand & Sons. Publishing Year: 2020

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22MATS31	CO1	Solve problems using theoretical probability distributions
	CO2	Apply the concepts of joint probability, to find covariance, correlation, independent variables
	CO3	Analyze the sample data using Large sample tests
	CO4	Analyze the sample data using t-distribution and chi- distribution
	CO5	Apply optimization techniques and LPP for real life problems

Course Title: ANALOG AND DIGITAL ELECTRONICS		
Subject Code :22CS32	**Credits :04**	**CIE: 50**
Number of Lecture Hours/Week (L:T:P)	**3 : 0 : 2**	**SEE: 50**
Total Number of Lecture Hours	**42Hrs**	**SEE Hours: 03**

Prerequisites: Knowledge of Basic Electronics and Boolean algebra.

Course Objectives:

- Recall and Recognize characteristics of PDs, optocouplers, BJT.
- Demonstrate and analyze operational amplifier circuits and their applications
- Describe and analyze combinational logic circuits, simplifications of algebraic equations using Karnaugh maps and Quine McClaskey techniques
- Design decoders, encoders and substractors, Binary comparators latches and flip flops.
- Design registers and counters, A/D and D/A converter.

MODULES	**Teaching Hours**
Module - I Photo diodes , Light emitting diodes, Optocouplers, BJT Biasing: Fixed Bias , Collector to Base Bias, Voltage Divider Bias, Operational Amplifiers, Application circuits: Multivibrators using 555 IC, Peak detector, Schmitt trigger, Active filters, Non linear Amplifier, Relaxation Oscillator, Current to voltage, voltage to Current converter, Regulated power supply parameters, Adjustable voltage Regulator.	**10 Hrs**
Module - II The Basic Gates: Review of Basic Logic gates, Positive and Negative Logic. Combinational Logic Circuits: Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications, Don't- care Conditions, Product-of-sums Method, Product-of-sums simplifications, Simplification by Quine-McClusky Method, Hazards and Hazard covers.	**08 Hrs**
Module – III Data-Processing Circuits: Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD to Decimal Decoders, Seven Segment Decoders, Encoders, Exclusive-OR Gates, Parity Generators and Checkers, Magnitude Comparator, Programmable Array Logic, Programmable Logic Arrays, Arithmetic Building Blocks: Half-adder, Full adder, Adder & Subtractor, arithmetic logic unit. Flip- Flops: RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS FLIP- FLOP, Edge-triggered D FLIP-FLOP,T FLIP-FLOP, Edge-triggered JKFLIP-FLOP.	**08 Hrs**
Module – IV Flip- Flops: FLIP-FLOP Timing, JK Master-slave FLIP-FLOP, Switch Contact Bounce Circuits, Various Representation of FLIP-FLOPs. Registers: Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In - Serial Out, Parallel In - Parallel Out, Universal Shift Register, Applications of Shift Registers. Counters: Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus.	**08 Hrs**
Module – V Counters: Decade Counters, Presettable Counters, Counter Design as a Synthesis problem, A Digital Clock. D/A Conversion and A/D Conversion: D/A Converters Variable, Resistor Networks, Binary Ladders, , D/A Accuracy and Resolution, A/D Converter-Simultaneous Conversion, A/D Converter-Counter Method, A/D Accuracy and Resolution.	**08 Hrs**

List of Programs

1. Design and construct a Schmitt trigger using OP-Amp for given UTP and LTP values and demonstrate its working.
2. Design and implement an Astable multivibrator circuit using 555 timer for a given frequency and duty cycle.
3. Design and implement Half adder, Full Adder, Half Subtractor, Full Subtractor using basic gates.
4. Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.
5. Design and implement code converter I)Binary to Gray (II) Gray to Binary Code using basic gates.
6. Design and verify the Truth Table of 3-bit Parity Generator and 4-bit Parity Checker using basic Logic Gates with an even parity bit.
7. Realize a D,T,JK Flip-Flop using NAND gates and verify its truth table.
8. Design and implement a mod-n (n<8) synchronous up counter using JK Flip Flop ICs and Demonstrate its working
9. Design and implement an Asynchronous counter using decade counter IC to count from 0 to n(n<=9) and demonstrate on seven segment display(using IC 7447).
10. Design SISO and PISO shift register.
11. Generate a Ramp output waveform using DAC0800 (Inputs are given to DAC through IC74393 dual 4-bit binary counter).

Question paper pattern:

The question paper will have ten questions.

There will be 2 questions from each module, covering all the topics from a module.

The students will have to answer 5 full questions, selecting one full question from each module**.**

Text Books:

1. Anil K Maini, Varsha Agarwal, "Electronic Devices and Circuits", Wiley, 2012.
2. Donald P Leach, Albert Paul Malvino&GoutamSaha, "Digital Principles andApplications", 8th Edition, Tata McGraw Hill, 2015

Reference Books:

1. R D Sudhaker Samuel, "Illustrative Approach to Logic Design", Sanguine-Pearson, 2010.
2. M Morris Man, "Digital Logic and Computer Design", 10th Edition, Pearson, 2008.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CS32	CO1	To understand the principle of operation of different analog circuits.
	CO2	Analyze combinational circuits.
	CO3	Acquire the knowledge of Flip Flop operations and application of shift registers.
	CO4	Design and analyze synchronous and asynchronous counters.
	CO5	Understand the working and applications of A/D, D/A converters.

Course Title: OBJECT ORIENTED PROGRAMMING WITH JAVA		
Subject Code : 22CS33	**Credit : 04**	**CIE: 50**
Number of Lecture Hours/Week (L:T:P)	**3: 0:2**	**SEE: 50**
Total Number of Lecture/Lab Hours	**42 Hrs**	**SEE Hours: 03**
Prerequisites: Concepts of C- Programming		
Course Objectives: Learn the Java Programming to develop applications, creating GUI with applets		

MODULES	**Teaching Hours**
Module I **Object-Oriented Programming Paradigm**– New programming paradigm, OOPs a new paradigm, Evolution of programming Paradigms, Structured Versus Object-Oriented Development, Objects, Classes, Multiple views of same objects, Encapsulation and data abstraction, Inheritance, Delegation- Object composition, Polymorphism. **Introducing Data Types and Operators:** Data types**,** Java Primitive Types , Literals, A Closer Look at Variables, The Scope and Lifetime of Variables, Operators, Arithmetic Operators, Relational and Logical Operators, Short- Circuit Logical Operators, The Assignment Operator, Shorthand Assignments, Type Conversion in Assignments, Using a Cast, Operator Precedence, Expressions. **String Handling-** String Fundamentals, The String Constructors, Three String-Related Language Features, The Length() Method, Obtaining the Characters within a String, String Comparison, Using indexOf() and last IndexOf(), Changing the Case of Characters Within a String.	**09 Hrs**
Module II **More Data Types and Operators** – Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Using the Length Member, The For-Each Style for Loop, Strings, The Bitwise Operators. **Introducing Classes, Objects, and Methods**-Class Fundamentals, Object creation, Reference Variables and Assignment, Methods, Returning from a Method, Returning a value, Using Parameters, Constructors, Parameterized Constructors, The new Operator Revisited, Garbage Collection and Finalizes, The this Keyword. **A Closer Look at Methods and Classes -** Controlling Access to Class Members, Pass Objects to Methods, Arguments passing, Returning Objects, Method Overloading, Overloading Constructors, Recursion, Understanding Static, Introducing Nested and Inner Classes, Varargs	**09 Hrs**

Module III **Inheritance- :** Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Superclass constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, When are Constructors Executed, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Using Abstract Classes, Using final, The Object Class. **Interfaces:** Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces, Final Thoughts on Interfaces. **Packages: Packages:** Package Fundamentals, Packages and Member Access , Importing Packages, Static Import.	**08 Hrs**
Module IV **Exception Handling :**The Exception Hierarchy, Exception Handling Fundamentals, The Consequences of an Uncaught Exception, Exceptions Enable you to handle errors gracefully, using Multiple catch clauses, Catching subclass Exceptions, try blocks can be nested, Throwing an Exception, A Closer look at Throwable, using finally, using throws, Java's Built-in Exception, New Exception features added by JDK 7, Creating Exception Subclasses. **Multithreaded Programming:** Multithreading fundamentals, The Thread Class and Runnable Interface, Creating Thread, Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, using Synchronization Methods, The Synchronized Statement, Thread Communication using notify (), wait() and notify All(), suspending, Resuming and stopping Threads.	**08 Hrs**
Module V **Applets:** Applet basics, A complete Applet Skeleton, Applet Initialization and Termination, A key Aspect of an Applet Architecture, Requesting Repainting, using the status window, Passing parameters to Applets. **Event Handling**- Two Event Handling Mechanisms. **The Delegation Event Model-Events:** Event Sources, Event Listeners. **Event Classes:** The ActionEvent Class, The AdjustmentEvent Class, The Component EventClass, The ContainerEventClass, The FocusEvent Class, The Input Event Class, The Item Event Class, The KeyEvent Class, The MouseEvent Class, The Mouse Wheel Event Class, The Text Event Class, The WindowEvent Class. Using the Delegation Event Model- Handling Mouse Events, Handling Keyboard Events, Adapter Classes, Inner Classes, Anonymous Inner Classes.	**08 Hrs**
Question paper pattern: The question paper will have ten questions. There will be 2 questions from each module, covering all the topics from a module. The students will have to answer 5 full questions, selecting one full question from each module**.**	
Text Books: 1. Mastering **C++,** K R Venugopal, Rajkumar, T Ravishankar , 2012 Tata McGraw hill education private limited 2. Java Fundamentals: A comprehensive Introduction by Herbert Schildt, Dale Skrien. Tata McGraw Hill Edition 2013.	

Reference Books:

1. Herbert Schildt , The Complete Reference, JAVA 7th/9th Edition, Tata McGraw Hill, 2013.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.

Lab Programs

1. Write a Java Program to demonstrate the creation of class for student information.

2. Write a program in Java for String handling which performs the following:

i) Checks the capacity of String Buffer objects.

ii)Reverses the contents of a string given on console and converts the resultant string in upper case.

iii) Reads a string from console and appends it to the resultant string of ii.

3 a. Write a JAVA Program to demonstrate Constructor Overloading and Method Overloading.

b. Write a JAVA Program to implement Inner class and demonstrate its Access Protections.

4. a. Write and execute a JAVA Program to demonstrate Inheritance.(single leveland multilevel)

b. Write and execute a JAVA program to demonstrate method overriding.

5. Write a JAVA Program to demonstrate multiple inheritance using interfaces to calculate the area of a rectangle and triangle.

6. Write a JAVA program to create and import packages in JAVA.

7. Write a JAVA program which has

i. A Class called Account that creates account with 500Rs minimum balance, a deposit() method to deposit amount, a withdraw() method to withdraw amount and also throws Less Balance Exception if an account holder tries to withdraw money which makes the balance become less than 500Rs. amount (__Rs) is not valid.

ii. A Class which creates 2 accounts, both account deposit money and one account tries to withdraw more money which generates a Less Balance Exception take appropriate action for the same.

ii. A Class which creates 2 accounts, both account deposit money and one account tries to withdraw more money which generates a Less Balance Exception take appropriate action for the same.

8. Write a Java program to implement multithreading in JAVA which demonstrate built in methods available for thread.

9. Write a JAVA program using Synchronized Threads, which demonstrates Producer Consumer concept.

10. Write a JAVA applet program to create a basic Applet having buttons, text area GUI controls to add & subtract two numbers. Use appropriate event listeners.

Course Code	CO #	Course Outcome (CO)
	CO1	Understand the concepts of Object Oriented Programming and apply the concepts of programming and implement programs using Java Constructs.

22CS33	**CO2**	Create classes and demonstrate object oriented programming concepts.
	CO3	Demonstrate inheritance, interfaces and Packages .
	CO4	Illustrate multithreading code for concurrency and run-time errors using exception handling mechanism.
	CO5	Develop GUI application program using Applet , event handling for design web application.

Course Title: DATA STRUCTURES		
Subject Code : 22CS34	**Credits :03**	**CIE: 50**
Number of Lecture Hours/Week (L:T:P)	**3:0:0**	**SEE: 50**
Total Number of Lecture Hours	**42 Hrs**	**SEE Hours: 03**

Prerequisites: C language fundamentals and programming skill, Basic knowledge of algorithm development, Knowledge of linear and Non-linear data types

Course Objectives:

- To study the behavior of data structures such as stacks, queues, trees, hash techniques, search trees and their representations.
- To choose the appropriate data structure for a specified application.
- To analyze various searching and sorting algorithms.

MODULES	**Teaching Hours**
Module – I **Structures and Unions:** Structure definition, giving value to members, Structure initialization, Comparison of structure variables , Arrays of structures, Arrays within structures, Structure within structures, Structure and functions, Unions, Size of structures, Bit-fields. **Pointers:** Understanding pointers, and the address of operator, Declaring and initializing pointer, Accessing a variable through it's pointer, Pointer and arrays, Pointer and character strings, Pointer and functions, Pointer and Structures. **Dynamic memory allocation:** Meaning of dynamic memory allocation, MALLOC, CALLOC, Free and REALLOC functions, Pointer revisited. **File management:** Definition and opening a file, closing a file, I/O operations on files, Error handling during file operation, Radom access to files, Command line arguments	**08 Hrs**
Module – II **Definition and Representing Stack in C:** Primitive operation, Example. Implementing the pop() operation, Testing for exceptional conditions, Implementing the push() operation, Example: Infix, Postfix and Prefix, Basic definitions and Examples, Evaluating a postfix expression, Program to evaluate postfix expression , Converting an expression from infix to postfix, Program to convert expression from infix to postfix. **Recursive definition and processes:** Factorial function, Multiplication of natural numbers, Fibonacci sequence, Binary search, Properties of recursive definition or algorithm Recursion in C: Factorial of a number Generation of Fibonacci numbers, Binary searching, Towers of Hanoi problem.	**08 Hrs**
Module – III **The queue and it's sequential representation:** C implementation of queues, Insert operation, Priority queues, Array implementation of priority Linked lists: Inserting and removing nodes from a list. Linked implementation of stacks, Get node and Free node operations, Linked list implementation of queues, Linked list as a data structure, Example of list operations, Header nodes. Array implementation of list, Linked implementation of lists. Limitations of array implementation, Allocating and freeing dynamic variables, Linked list using dynamic variable, Queues as lists in C, Example of list operations in C, Non- integer and non-homogeneous lists.	**08 Hrs**
Module – IV **Other list structures:** Circular lists, Stack as circular list, Queues as a circular list, Primitive operations on circular list, doubly linked list.	

Binary trees: Operations on binary trees and applications of binary trees Binary tree representation: Node representation of binary tree, Internal and external nodes, Implicit array representation of binary trees, Choosing a binary tree representation, Binary tree traversals in C, Threaded Binarytrees. **Trees and their applications:** C representation of trees, Tree traversals, General expression as trees, Evaluating an expression tree, Constructing a tree.	**09 Hrs**
Module – V **Sorting & Searching:** Binary tree sort, Simple insertion sort, Address calculation sort, Radix sort. Sequential searching, Searching an ordered table, Indexed sequential search, Interpolation search. **Tree searching:** Inserting into a binary search tree, Deleting from a binary search tree. **Hashing:** Resolving hash clashed by open addressing, Choosing a hash function.	**09 Hrs**

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module**.**

Text book :

1. E. Balgurusamy, "*Programming in ANSI C*", 7 th Edition, Tata McGraw-Hill Publication, 2017.
2. Yedidyah Langsam, Moshe J. Augenstein and Aaron M. Tannenbaum, "*Data Structures Using C and C++"*, 2nd Edition, Prentice-Hall of India publication, 2005.

Reference Books:

1. Debasis Samanta, "Classic Data Structures", 2nd Edition, PHI, 2009.
2. Richard F. Gilberg and Behrouz A. Forouzan:, "Data Structures A Pseudocode Approachwith C", Cengage Learning, 2005.
3. Robert Kruse & Bruce Leung, "Data Structures & ProgramDesign in C", Pearson Education, 2007.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2007.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CS34	**CO1**	Apply the fundamental knowledge of pointers, dynamic memory allocation and recursion for designing data structures.
	CO2	Demonstrate the usage of stack, queue data structure for design of applications.
	CO3	Illustrate basic operations on linked lists and construct various data structures using linked lists.
	CO4	Design Binary trees and binary search trees using tree data structure.
	CO5	Compare, analyze and implement different sorting and searching Techniques.

Course Title: DATA STRUCTURES LAB		
Subject Code : 22CSL35	**Credits :01**	**CIE: 50**
Number of Lecture Hours/Week (L:T:P)	**0:0:2**	**SEE: 50**
Total Number of Lecture Hours		**SEE Hours: 03**

Prerequisite: C Language : Functions and Pointers

Course Objectives:

1. To study the working of data structures such as stacks, queues, trees, hash techniques, search trees.
2. Apply the appropriate data structure for a specified application.
3. To learn various searching and sorting algorithms.

List of Programs

1. Design, Develop and Implement a menu driven Program in C for the following Array operations
   a. Creating an Array of N Integer Elements
   b. Display of Array Elements with Suitable Headings
   c. Inserting an Element (ELEM) at a given valid Position (POS)
   d. Deleting an Element at a given valid Position(POS)
   e. Exit.

   Support the program with functions for each of the above operation.

2. Design, Develop and Implement a program in C for the following operations on Strings
   a. Read a Main String (STR), a Pattern String (PAT) and a Replace String (REP).
   b. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in STR with REP if PAT exists in STR. Repost suitable messages in case PAT does not exist in STR.

   Support the program with functions for each of the above operations without using built-in functions.

3. Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX)
   a. Push an Element on to Stack
   b. Pop an Element from Stack
   c. Display the status of Stack
   d. Demonstrate Overflow and Underflow situations on Stack
   e. Exit

   Support the program with appropriate functions for each of the above operations.

4. Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, %(Remainder), ^ (Power) and alphanumeric operands.

5. Design, Develop and Implement a Program in C for the following Stack Application. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^.

6. Design, Develop and Implement a menu driven Program in C for the following operations on QUEUE of Characters (Array Implementation of Queue with maximum size MAX)
   a. Insert an Element on to QUEUE

b. Delete an Element from QUEUE
c. Demonstrate Overflow and Underflow situations on QUEUE
d. Display the status of QUEUE
e. Exit

Support the program with appropriate functions for each of the above operations

7. Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of integer values

   a. Create a SLL of N integers by using front insertion.
   b. Display the status of SLL and count the number of nodes in it
   c. Perform Insertion and Deletion at End of SLL
   d. Perform Insertion and Deletion at Front of SLL

8. Design, Develop and Implement Program in C to Reverse a Singly Linked List (SSL) of a given integer.
9. Design, Develop and Implement a menu driven Program in C for the following operations on Priority Queue.
   a. Create a Priority queue by using Insert function.
   b. Insertion data and Priority values as Input.
   c. Perform Deletion operation.
   d. Display the elements of Priority queue.

10. Design, Develop and Implement a Program in C for the following operations on Binary Search Tree(BST) of Integers
    a. Create a BST of N integers: 6,9,5,2,8,15,24,14,7,8,5,2.
    b. Traverse the BST in Inorder
    c. Traverse the BST in Preorder
    d. Traverse the BST in Postorder

11.Given a File of N employee records with a set K of Keys(4- digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash Table(HT) of m memory locations with L as the set of memory addresses (2- digit) of locations in HT. Let the keys in K and Addresses in L are Integers. Design and develop a Program in C that uses Hash function H: K ®L as H(K)=K mod m (remainder method), and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CSL35	CO1	Demonstrate the concepts of arrays and strings.
	CO2	Design and develop various data structure using pointers ,dynamic memory allocation and recursion

	CO3	Demonstrate basic operation on Linked list using suitable data structures.
	CO4	Illustrate the implementation of different sorting and searching techniques.
	CO5	Construct Binary trees and binary search trees and demonstrate the concepts of hashing technique.

Course Title: OPERATING SYSTEM		
Subject Code:22CS36A	**Credit:3**	**CIE:5 0**
Number of Lecture Hours/Week (L:T:P)	**3 : 0: 0**	**SEE:5 0**
Total Number of Lecture Hours	**42**	**SEE Hours: 03**
Prerequisites: Nil		

Course Objectives:

- Learn services provided by the operating system and design of operating system
- Gain knowledge on how processes are synchronized and scheduled how different resources are managed.
- Understand structure and organization of file system and approaches to memory management.

MODULES	**Teaching Hours**
Module– I **Introduction:** Operating Systems, Computer-System Organization, Computer-System Architecture, Operating-System Operations, Process Management, Memory Management, Storage Management, Security and Protection, Kernel Data Structures, Computing Environments. **Operating-System Structures:** Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating- System Design and Implementation, Operating System Structure. **Case Studies:** Architecture of UNIX, The Kernel of Unix; The Kernel of Solaris; Architecture of Windows.	**08 Hrs**
Module-II **Process Management**: Process Concept, Process Scheduling, Operations **Multithreaded Programming:** Overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues	**08 Hrs**
Module– III **Process Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multi-Processor Scheduling, Real-Time CPU Scheduling **Process Synchronization:** The Critical-Section Problem, Petersons Solution, Synchronization hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.	**09 Hrs**
Module– IV **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. **Memory Management:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.	**08 Hrs**

Module– V	
Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory mapped files, Allocating Kernel Memory **File System: File-System Interface:** File Concept, Access Methods, Directory and disk Structure, File system Mounting, File Sharing, and Protection.	**09 Hrs**

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module**.**

Textbook:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, 9th Edition, Wiley-India,2018.

Reference Books:

1. D.M Dhamdhere, Operating systems-A concept based Approach, 3rd Edition, TataMcGraw-Hill, 2017.
2. P. C. P. Bhatt: Operating Systems, 5th Editi0on, PHI,2019.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome (CO)
22CS36A	**CO1**	Describe the functions of operating systems and its structure
	CO2	Illustrate process concepts and management models.
	CO3	Apply Scheduling algorithms and different concurrency control techniques to provide co- ordination among processes.
	CO4	Apply deadlock detection and prevention algorithms, and illustrate the concept of paging, segmentation and swapping policies for memory management.
	CO5	Demonstrate Virtual memory management and describe file system interface.

Course Title: **SOCIAL CONNECT & RESPONSIBILITY**		
Subject Code: **22UHV37**	Credit : **1**	CIE: 50
Number of Lecture Hours/Week (L:T:P:S)	**0:0:2 Hrs**	SEE : 50
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning	

Course objectives: The course will enable the students to:

1. Provide a formal platform for students to communicate and connect to the surrounding.
2. create a responsible connection with the society.
3. Understand the community in general in which they work.
4. Identify the needs and problems of the community and involve them in problem –solving.
5. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

General Instructions - Pedagogy :

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
2. State the need for activities and its present relevance in the society and Provide real-life examples.
3. Support and guide the students for self-planned activities.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
5. Encourage the students for group work to improve their creative and analytical skills.

Modules

Module-I

Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of BE / B.Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature - – Objectives, Visit, case study, report, outcomes.

Module-II

Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms - – Objectives, Visit, case study, report, outcomes.

Module-III

Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus Objectives, Visit, case study, report, outcomes.

Module-IV

Water conservation: Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photo blog presenting the current practices – Objectives, Visit, case study, report, outcomes.

Module-V

Food walk: City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes.

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

CO1: Communicate and connect to the surrounding. CO2: Create a responsible connection with the society.

CO3: Involve in the community in general in which they work.

CO4: Notice the needs and problems of the community and involve them in problem –solving.

CO5: Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.

CO6: Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

Activities:

Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

PEDAGOGY:

The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?

COURSE TOPICS:

The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversional will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.

Duration :

A total of 40 - 50 hrs engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic ,and poetry) Faculty mentors has to design the evaluation system as per VTU guidelines of scheme & syllabus.

Guideline for Assessment Process:

Continuous Internal Evaluation (CIE):

After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period. The report should be signed by the mentor. The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50. Planning and scheduling the social connect Information/Data collected during the social connect Analysis of the information/data and report writing Considering all above points allotting the marks as mentioned below

Excellent : 80 to 100

Good : 60 to 79

Satisfactory : 40 to 59Unsatisfactory and fail : <39

Pedagogy – Guidelines:

It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl No	Topic	Group size	Location	Activity execution	Reporting	Evaluation of the Topic
1.	**Plantation and adoption of a tree:**	May be individual or team	Farmers land/ parks / Villages / roadside/ community area / College campus etc…..	Site selection /proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
2.	**Heritage walk and crafts corner:**	May be individual or team	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers/ campus etc…..	Site selection /proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty

3.	**Organic farming and waste management :**	May be individual or team	Farmers land / parks /Villages visits / roadside/ community area / College campus etc…..	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
4.	**Water conservation : & conservation techniques**	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers / campus etc…..	site selection / proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and Syllabus by Faculty
5.	**Food walk: Practices in society**	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers/ campus etc…..	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty

Plan of Action (Execution of Activities)

Sl. NO	Practice Session Description
1	**Lecture session in field to start activities**
2	**Students Presentation on Ideas**
3	**Commencement of activity and its progress**
4	**Execution of Activity**
5	**Execution of Activity**
6	**Execution of Activity**
7	**Execution of Activity**
8	**Case study based Assessment, Individual performance**
9	**Sector/ Team wise study and its consolidation**
10	**Video based seminar for 10 minutes by each student At the end of semester with Report.**

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assign activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted asper the instructions and scheme.

Course Title: MASTERING MICROSOFT OFFICE		
Subject Code : **22CSAE381**	Credit : 1	CIE: 50
Number of Practical Hours/Week/batch (L:T:P)	**0:0:2**	SEE: 50
Total Number of Practical Hours	**12**	SEE Hours: 03
Pre-requisites: Basic computer knowledge.		

Course objectives:

- Understand the use of MS-Office tools.
- Develop skills in analyzing the usability office tools.

Programs

MS-Word -

1. Create Word document illustrating Text – Formatting, Moving, copying and pasting text, Styles – Lists – Bulleted and numbered lists, Nested lists, Formatting lists. Table Manipulations.
2. Create Word document illustrating -Graphics – Adding clip Art, add an image from a file, editing graphics, Page formatting - Header and footers, page numbers, Protect the Document, Mail Merge, Macros – Creating & Saving web pages, Hyperlinks.

MS-Excel-

3. Modifying a Worksheet – Moving through cells, adding worksheets, rows and columns, Resizing rows and columns, selecting cells, Moving and copying cells, freezing panes - Macros – recording and running.
4. . Linking worksheets - Sorting and Filling, Alternating text and numbers with Auto fill, Auto filling functions. Graphics – Adding clip art, add an image from a file, Charts – Using chart Wizard, Copy a chart to Microsoft Word.

MS-Power Point -

5. Create a Presentation from a template- Working with Slides – Insert a new slide, applying a design template, changing slide layouts – Resizing a text box, Text box properties, delete a text box.
6. Video and Audio effects, Color Schemes & Backgrounds Adding clip art, adding an image from a file, Save as a web page.

MS-Access -

7. Create Access database wizard, pages and projects. Creating Tables – Create a Table in design view. Datasheet Records – Adding, Editing, deleting records
8. Implement Adding and deleting columns Resizing rows and columns, finding data in a table & replacing, Print a datasheet. Queries - MS-Access.

Microsoft Outlook

9. Create Microsoft Outlook, Outlook Today
10. Illustrate Different Views In Outlook, Outlook Data Files

Course outcomes: **On completion of the course, the student will have the ability to:**		
Course Code	**CO #**	**Course Outcome (CO)**
22CSAE381	**CO1**	Know the basics of computers and prepare documents, spreadsheets, make small presentations with audio, video and graphs and would be acquainted with internet.
	CO2	Create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker
	CO3	Attain the knowledge about spreadsheet with formula, macros spell checker etc.
	CO4	Demonstrate the ability to apply application software in an office environment.
	CO5	Use Google Suite for office data management tasks

Course Title : NATIONAL SERVICE SCHEME (NSS)		
Subject Code : 22NS39	Credits :00	CIE: 50
Number of Lecture Hours/Week(L:T:P)	0:0:2 Hrs	SEE: 00
Total Number of Lecture Hours	28	SEE Hours: 00

Prerequisites:

1. Students should have a service oriented mind set and social concern.
2. Students should have dedication to work at any remote place, anytime with available resources and proper time management for the other works.

Students should be ready to sacrifice some of the time and wishes to achieve service oriented targets on time

Course Objectives:

1. Understand the community in which they work
2. Identify the needs and problems of the community and involve them in problem-solving
3. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems
4. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony

Modules

1. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
2. Waste management– Public, Private and Govt organization, 5 R's.
3. Setting of the information imparting club for women leading to contribution in social and economic issues.
4. Water conservation techniques – Role of different stakeholders– Implementation.
5. Preparing an actionable business proposal for enhancing the village income and approach for implementation.
6. Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.
7. Developing Sustainable Water management system for rural areas and implementation approaches.
8. Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath,Make in India, Mudra scheme, Skill development programs etc.

9. Spreading public awareness under rural outreach programs.(minimum5 programs).
10. Social connect and responsibilities.
11. Plantation and adoption of plants. Know your plants.
12. Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).
13. Govt. school Rejuvenation and helping them to achieve good infrastructur

ONE NSS – CAMP @ College /University /State or Central Govt Level / NGO's / General Social Camps:

Students have to take up anyone activity on the above said topics and have to prepare content for awareness and technical contents for implementation of the projects and have to present strategies for Implementation of the same. Compulsorily students have to attend one camp.

CIE will be evaluated based on their presentation, approach and implementation strategies.

ASSESSMENT AND EVALUATION PATTERN		
WEIGHTAGE	**50%**	**50%**
	CIE	SEE
Presentation 1-Selectionoftopic-(phase 1)	**10**	*****
EXPERIENTIAL LEARNING Presentation 2(phase2)	**10**	*****
Case Study-based Teaching-Learning	**10**	• Implementation strategies of the project with report duly signed by the Dept's Coordinator, HoD & Principal. • At last It should be evaluated by the NSS Coordinator. • Finally consolidated report should be sent to the University.
Sector wise study & consolidation	**10**	
Video based seminar (4-5 minutes per student)	**10**	
TOTAL MARKSFORTHE COURSE	**50 MARKS**	**50 MARKS**

Suggested Learning Resource:

1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22NS39	**CO1**	Understand the importance of his / her responsibilities towards society.
	CO2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
	CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
	CO4	Implement government or self-driven projects effectively in the field.

Course Title : PHYSICAL EDUCATION AND SPORTS		
Subject Code : 22PE39	Credits :00	CIE: 50
Number of Lecture Hours/Week(L:T:P)	0:0:2 Hrs	SEE: 00
Total Number of Lecture Hours	28	SEE Hours: 00

SEMESTER	**COURSE**
III	Fitness Components Kabaddi/ Kho Kho
IV	Athletics Volleyball Throw ball / Chess
V	Athletics Football/Hockey
VI	Athletics Cricket/Base ball
VII	Athletics Netball/Basketball
VIII	Individual Games Handball/ Badminton

Notes:

- One Hour of Lecture is equal to 1 Credit
- One Hour of Tutorial is equal to 1 Credit (Except Languages)
- Two Hours of Practical is equal to 1 Credit
- SEE : Semester End Examination
- CIE : Continuous Internal Examination
- L+T+P : Lecture + Tutorial + Practical

SEMESTER	**COURSE TITLE**	**CONTENT**	**NO. HOURS**
III	**Fitness Component** Speed Strength Endurance Agility Flexibility	Meaning and Importance, Fit India Movement, Definition of fitness, Components of fitness, Benefits of fitness, Types of fitness and Fitness tips. **Practical Components: Speed, Strength, Endurance, Flexibility, and Agility** **KABADDI** **A. Fundamental skills** 1. Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line. 2. Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques. 2-3-2 System Chain Formation 3. Additional skills in raiding: Escaping from	Total 32 Hrs 2 Hrs/Week

		various holds, techniques of escaping from chain formation, offense and defense. 4.Game practice with application of Rules and Regulations. **B. Rules and their interpretations and duties of the officials.**	
	Kho kho	**A. Fundamental skills** 1. Skills in Chasing: Sit on the box (Parallel & Bullet method), Get up from the box (Proximal & Distal method), Give Kho (Simple, Early, Late &Judgment), Pole Dive, Tapping, Hammering, Rectification of foul. 2. Skills in running: Chain Play, Ring play and Double and Single chain & Ring mixed play figure of 8-3 by 6. 3. Game practice with application of Rules and Regulations. **B. Rules and their interpretations and duties of the officials.**	
SEMESTER	**COURSE TITLE**	**CONTENT**	**NO. HOURS**
IV	**Athletics** **Track** Sprints **Jumps-** Long Jump **Throws-** Shot Put	**Track Events** 1.1. Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block. 1.2. Minimum Optimum and Maximum, Acceleration with proper running techniques. 1.3. Finishing technique: Run Through, Forward Lunging and Shoulder Shrug. **Long Jump:** Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing **Shot put:** Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique	Total 32 Hrs 2 Hrs/Week
	Volley Ball	**A. Fundamental skills** 1. Service: Under arm service, Side arm service, Tennis service, Floating service. 2. Pass: Under arm pass, Over head pass. 3. Spiking and Blocking. 4. Game practice with application of Rules and Regulations **B. Rules and their interpretation and duties of officials.**	
	Throw Ball	**A. Fundamental skills:** Only Tennis Service, Air Service, two hand catching, one hand overhead return, side arm return. **Rules and their interpretations and duties of officials**	

SEMESTER	**COURSE TITLE**	**CONTENT**	**NO. HOURS**
V	**Athletics Track1** 10 &400 Mtrs Hurdles **Jumps-** High Jump **Throws-** Discuss Throw	**110 Mtrs and 400Mtrs:** Hurdling Technique :Lead leg Technique, Trail leg Technique ,Side Hurdling, Over the Hurdles Crouch start (its variations) use of Starting Block. Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing. **High jump:** Approach Run, Take-off, Bar Clearance (Straddle) and Landing. Discus **Throw:** Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).	Total 32 Hrs 2 Hrs/Week
	Foot Ball	**A. Fundamental Skills** 1. Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick. 2. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot. 3. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot. 4. Heading: In standing, running and jumping condition. 5. Throw-in: Standing throw-in and Running throw-in. 6. Feinting: With the lower limb and upper part of the body. 7. Tackling: Simple Tackling, Slide Tackling. 8. Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting. 9. Game practice with application of Rules and Regulations. **B. Rules and their interpretation and duties of officials.**	
	Hockey	**A. Fundamental Skills** 1.Passing: Short pass, Long pass , push pass, Scooping hit 2.Trapping. 3.Dribbling and Dozing. 4.Penalty stroke practice. 5.Penalty corner practice. 6.Tackling: Simple Tackling, Slide Tackling. 7.Goal Keeping, Ball clearance-kicking, and deflecting. 8.Game practice with application of Rules and Regulations. **B. Rules and their interpretation and duties of officials.**	
SEMESTER	**COURSE TITLE**	**CONTENT**	**NO. HOURS**
VI	**CRICKET**	**A. Fundamental Skills** 1. Batting - Forward Defense Stroke,	

		Backward Defense Stroke, Off Drive, On Drive, Straight Drive, Cover Drive, Square Cut. 2. Bowling -Out-swing, In-swing, Off Break, Leg Break and Googly. 3. Fielding: Catching - The High Catch, The Skim Catch, The Close Catch and throwing at the stumps from different angles. Long Barrier and Throw, Short Throw, Long Throw,Throwing on the Turn. 4. Wicket Keeping **B. Rules and their interpretation and duties of officials**	Total 32 Hrs 2 Hrs/Week
	BASEBALL	**A. Fundamental Skills** Player Stances – walking, extending walking, L tance, cat stance Grip – standard grip, choke grip Batting – swing and bunt. Pitching Baseball : slider, fast pitch, curve ball, drop ball, rise ball, change up, knuckle ball, screw ball, **Rules and their interpretation and duties of officials.**	
	Athletics Combined Events Heptathlon & Decathlon **Jumps-** Pole Vault **Throws** -Hammer Throw	Combined Events: Heptathlon all the 7 events Decathlon: All 10 Events **Pole Vault:** Approach Run, Planting the Pole, Take-off, Bar Clearance and Landing. **Hammer Throw:** Holding the Hammer, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).	
SEMESTER	**COURSE TITLE**	**CONTENT**	**NO. HOURS**
VII	Basket ball	**A. Fundamental Skills** 1. Passing: Two hand Chest Pass, Two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass. 2. Receiving: Two hand receiving, One hand receiving, Receiving in stationary position, Receiving while Jumping and Receiving while Running. 3. Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble. 4. Shooting: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw. 5. Rebounding: Defensive rebound and Offensive rebound. 6. Individual Defence: Guarding the player with the ball and without the ball, Pivoting. 7. Game practice with application of Rules and Regulations. **B. Rules and their interpretation and duties of officials**	Total 32 Hrs 2 Hrs/Week
	Netball	**A. Fundamental skills**	

		1. Catching: one handed, two handed, with feet grounded and in flight. 2. Throwing (Different passes and their uses): One hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce). 3. Footwork: Landing on one foot, landing on two feet, Pivot, Running pass. 4. Shooting: One hand, forward step shot, and backward step shot. 5. Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed. 6. Defending: Marking the player, blocking, inside the circle, outside the circle. Defending the circle edge against the passing. 7. Intercepting: Pass and shot. 8. Game practice with application of Rules and Regulations. **B. Rules and their interpretation and duties of officials**	
SEMESTER	**COURSE TITLE**	**CONTENT**	**NO. HOURS**
VIII	**Individual games** Shuttle Badminton	**A. Fundamental skills** 1. Basic Knowledge: Various parts of the Racket and Grip. 2. Service: Short service, Long service, Long high service. 3. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash. 4. Game practice with application of Rules and Regulations. **B. Rules and their interpretations and duties of the officials.**	Total 32 Hrs 2 Hrs/Week
		A. Fundamental skills 1. Basic Knowledge: Various parts of the Racket and Grip (Shake Hand & Pen Hold Grip). 2. Stance: Alternate & Parallel. 3. Push and Service: Backhand & Forehand. 4. Chop: Backhand & Forehand. 5. Receive: Push and Chop with both Backhand & Forehand. 6. Game practice with application of Rules and Regulations. **B. Rules and their interpretations and duties of the officials**	
	Table Tennis	**A. Fundamental Skills** 1. Catching, Throwing and Ball control, 2. Goal Throws: Jump shot, Center shot, Dive shot, Reverse shot. 3. Dribbling: High and low. 4. Attack and counter attack, simple counter attack, counter attack from two wings and center.	

		5. Blocking, Goal Keeping and Defensive skills. 6. Game practice with application of Rules and Regulations. **B. Rules and their interpretation and duties of officials**	
	Handball	**A. Fundamental skills** 1. Basic Knowledge: Basic Skills 2. Service: Short service, Long service, Long high service. 3. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash. 4. Game practice with application of Rules and **Regulations. B. Rules and their interpretation and duties of officials**	

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1. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
3. Petipus, et al. Athlete's Guide to Career Planning, Human Kinetics.
4. Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi.
5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
7. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
8. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
10. Dubey, H. C. Basketball, Discovery Publishing House, New Delhi.
11. Rachana Jain, Teach Yourself Basketball, Sports Publication.
12. Jack Nagle, Power Pattern Offences for Winning asketball, Parker Publishing Co., New York.
13. Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
14. Sally Kus, Coaching Volleyball Successfully, Human Kinetics.
15. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani. 16 Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
16. Test and Measurement (by Cleark and Cleark)
17. Evaluation in Physical Education (by Dr. Devendraya Kausal)
18. Methods of Physical Education (by Haridrash & Prof. Tirumalay Swamy)
19. Athletics (by Hardayal Singh)
20. Efficienting and Coaching (by Dr. Anand Nadigri)
21. Modern and Ancient History of Physical Education (by Dr. D. M. Jyothi)
22. Organization and Administration (by K. G. Nadigir or Vastrad)

Course Title : YOGA AND MEDITATION		
Subject Code : 22YO39	Credits :00	CIE: 50
Number of Lecture Hours/Week(L:T:P)	**0:0:2 Hrs**	SEE: 00
Total Number of Lecture Hours	28	SEE Hours: 00

SEMESTER	**CONTENTS**
III	1) Introduction of Yoga, Aim and Objectives of yoga, Prayer 2) Brief introduction of yogic practices for common man 3) Rules and regulations 4) Misconceptions of yoga 5) Suryanamaskara 6) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line
IV	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhati 5) Pranayama
V	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhati 5) Pranayama

VI	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhati 5) Pranayama
VII	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhati 5) Pranayama
VIII	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhati 5) Pranayama 6) Shat Kriyas

Notes:

· One Hour of Lecture is equal to 1 Credit
· One Hour of Tutorial is equal to 1 Credit (Except Languages)
· Two Hours of Practical is equal to 1 Credit
· SEE : Semester End Examination
· CIE : Continuous Internal Examination
· L+T+P : Lecture + Tutorial + Practical

Guidelines

Semester	Course Title	Content	No. of Hours
3rd Semester	Introduction of Yoga, Aim and Objectives of yoga, Prayer	Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, importance of prayer	Total 32 hrs 2 hrs / week
	Brief introduction of yogic practices for common man	Yogic practices for common man to promote positive health	
	Rules and regulations	Rules to be followed during yogic practices by practitioner	
	Misconceptions of yoga	Yoga its misconceptions, Difference between yogic and non yogic practices	
	Suryanamaskara	Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar 12 count, 2 rounds	
	Different types of Asanas e. Sitting 1. Padmasana 2. Vajrasana f. Standing 1. Vrikshana 2. Trikonasana g. Prone line 1. Bhujangasana 2. Shalabhasana h. Supine line 1. Utthita dvipadasana 2. Ardha halasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana	
4th Semester	Patanjali's Ashtanga Yoga 1. Yama 2. Niyama	Patanjali's Ashtanga Yoga its need and importance. Yama :Ahimsa, satya, asteya, brahmacarya, aparigraha Niyama : shoucha, santosh, tapa, svaadhyaya, Eshvara pranidhan	Total 32 hrs 2 hrs / week
	Suryanamaskara	Suryanamaskar 12 count 4 rounds	
	Different types of Asanas e. Sitting 1. Sukhasana 2. Paschimottanasana f. Standing 1. Ardhakati Chakrasana 2. Parshva Chakrasana g. Prone line 1. Dhanurasana h. Supine line 1. Halasana 2. Karna Peedasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Meaning, importance and benefits of Kapalabhati. 40 strokes/min 3 rounds	
	Pranayama – 1. Suryanuloma –Viloma 2. Chandranuloma-Viloma 3. Suryabhedana 4. Chandra Bhedana 5. Nadishodhana	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

5th Semester	Ashtanga Yoga 3. Asana 4. Pranayama	Patanjali's Ashtanga Yoga its need and importance.	Total 32 hrs 2 hrs / week
	Suryanamaskara	Suryanamaskar 12 count 6 rounds	
	Different types of Asanas a. Sitting 1. Ardha Ushtrasana 2. Vakrasana b. Standing 1. Urdhva Hastothanasana 2. Hastapadasana c. Prone line 1. Padangushtha Dhanurasana d. Supine line 1. Sarvangasana 2. Chakraasana	Asana, Need, importance of Asana. Different types. Asana its meaning by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Revision of practice 50 strokes/min 3 rounds	
	Pranayama – 1. Surya Bhedana 2. Ujjayi	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	
6th Semester	Ashtanga Yoga 5. Pratyahara 6. Dharana	Patanjali's Ashtanga Yoga its need and importance.	Total 32 hrs 2 hrs / week
	Suryanamaskara	Revision of practice 12 count 8 rounds	
	Different types of Asanas a. Sitting 1. Aakarna Dhanurasana 2. Yogamudra in Padmasana b. Standing 1. Parivritta Trikonasana 2. Utkatasana c. Prone line 1. Poorna Bhujangasana / Rajakapotasana d. Supine line 1. Navasana/Noukasana 2. Pavanamuktasana	Asana, Need, importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Revision of practice 60 strokes/min 3 rounds	
	Pranayama – 1. Sheetali 2. Sheektari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	
7th Semester	Ashtanga Yoga 1. Dhyana (Meditation) 2. Samadhi	Patanjali's Ashtanga Yoga its need and importance.	Total 32 hrs 2 hrs / week
	Suryanamaskara	Revision of practice 12 count 10 rounds	
	Different types of Asanas a. Sitting 1. Vibhakta Paschimottanasana 2. Yogamudra in Vajrasana b. Standing 1. Parshvakonasana 2. Ekapadbaddhapadmottanasana c. Prone line balancing 1. Mayurasana d. Supine line 1. Sarvangasana 2. Setubandhasana 3. Shavasanaa (Relaxation poisture)	Asana, Need, importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Revision of practice 80 strokes/min 3 rounds	

	Pranayama – 1. Bhastrika 2. Bhramari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

8th Semester	Suryanamaskara	Revision of practice 12 count 12 rounds	Total 32 hrs 2 hrs / week
	Different types of Asanas a. Sitting 1. Bakasana 2. Hanumanasana 3. Ekapada Rajakapotasana b. Standing 1. Vatayanasana 2. Garudasana 3. Natarajasana c. Balancing 1. Sheershasana d. Supine line 1. Setubandha Sarvangasana 2. Shavasanaa (Relaxation poisture)	Asana, Need, importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Revision of practice 100 strokes / min, 3 rounds	
	Pranayama – 1. Nadishodhana 2. Ujjai 3. Bhramari	Revision of practices	
	Shat Kriyas 1. Jalaneti & sutraneti 2. Nouli (only for men) 3. Sheetkarma Kapalabhati	Meaning, Need, importance of Shatkriya. Different types. Meaning by name, technique, precautionary measures and benefits of each Kriya	