SYLLABUS

(With effect from 2022 -23)

ಪಠ್ಯಕ್ರಮ

(ಶೈಕ್ಷಣಿಕ ವರ್ಷ 2022-23)

Bachelor Degree
In
Information Science & Engineering

III & IV Semester

Out Come Based Education
With
Choice Based Credit System

[National Education Policy Scheme]

P.E.S. College of Engineering, Mandya - 571 401, Karnataka
[An Autonomous Institution affiliated to VTU, Belagavi,
Grant – in – Aid Institution (Government of Karnataka),
Accredited by NBA (All UG Programs), NAAC and Approved by AICTE, New Delhi]

ಪಿ.ಇ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ
ಮಂಡ್ಯ–571 401, ಕರ್ನಾಟಕ
(ವಿ.ಟಿ.ಯು, ಬೆಳಗಾವಿ ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ)
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VISION

"PESCE shall be a leading institution imparting quality Engineering and Management education developing creative and socially responsible professionals."

MISSION

- *Provide state of the art infrastructure, motivate the faculty to be proficient in their field of specialization and adopt best teaching-learning practices.*
- *Impart engineering and managerial skills through competent and committed faculty using outcome based educational curriculum.*
- *Inculcate professional ethics, leadership qualities and entrepreneurial skills to meet the societal needs.*
- *Promote research, product development and industry-institution interaction.*

QUALITY POLICY

Highly committed in providing quality, concurrent technical education and continuously striving to meet expectations of stake holders.

CORE VALUES

***P**rofessionalism*
***E**mpathy*
***S**ynergy*
***C**ommitment*
***E**thics*

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

About the Department

The Department of Information science and Engineering takes pride in producing quality engineers over the past 18 years. The credit for all the flowery results goes to the highly motivating staff, from whom all students draw inspiration. The Department was started in the year 2000. The present intake of the undergraduate program is 60. The department has well equipped classrooms, computer laboratories with high-end systems, department library. We are proud to produce the first PhD student in our college. Faculty members of the department are involved in research activities in different fields such as Medical Image Processing, Pattern Recognition, and Data Mining etc. The department is using Outcome-based education (OBE), which is a recurring education reform model, and it is affiliated to Visvesvaraya Technological University (VTU). The department has achieved good Placement, conducted International Conferences and other sponsored short-term courses, workshops, National seminars and symposia. The laboratory facilities and the Internet access are available to the staff and students of the Information Science and Engineering

Vision

"The department strives to equip our graduates with Knowledge and Skills to contribute significantly to Information Science & Engineering and enhance quality research for the benefit of society".

Mission

M1: To provide students with state of art facilities and tools of Information Science & Engineering to become productive, global citizens and life-long learners.
M2: To prepare students for careers in IT industry, Higher education and Research.
M3: To inculcate leadership qualities among students to make them competent Information Science & Engineering professionals or entrepreneurs.

1.2. State the Program Educational Objectives (PEOs)

Graduates of the program will be able to

PEO1: Establish a productive Information Science & Engineering career in industry, government or academia.
PEO2: Interact with their peers in other disciplines by exhibiting professionalism and team work to contribute to the economic growth of the country.
PEO3: Promote the development of solutions to the problems in Information Science using hardware and software integration.
PEO4: Pursue higher studies in Engineering, Management or Research.

A. List of Program Outcomes (POs)

Engineering Graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. 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.

PO3. 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.

PO4. 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.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. 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.

PO7. 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.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. 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.

PO11. 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.

PO12. 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.

B. List of Program Specific Outcomes (PSOs)

Information Science & Engineering Graduates will have

PSO1- The Knowledge to excel in IT profession by utilizing mathematical concepts, programming paradigms and software development practices for successful career.

PSO2- The ability to continuously learn and develop solutions in IT world by applying the emerging technologies in multidisciplinary environment

Bachelor of Engineering (III –Semester)										
Sl. No.	**Course Code**	**Course Title**	**Teaching Department**	**Hrs / Week**			**Credits**	**Examination Marks**		
				L	**T**	**P**		**CIE**	**SEE**	**Total**
1	P21MA301	Transform and Numerical Analysis	MA	2	2	-	3	50	50	100
2	P21IS302	Data Structures	IS	3	-	-	3	50	50	100
3	P21IS303	Computer Organization	IS	3	-	-	3	50	50	100
4	P21IS304	Digital Logic Design	IS	3	-	2	4	50	50	100
5	P21IS305	Object Oriented Programming With Java	IS	3	-	2	4	50	50	100
6	P21ISL306	Data Structures Laboratory	IS	-	-	2	1	50	50	100
7	P21KSK307	Samskrutika Kannada /	HSMC	-	2	-	1	50	50	100
	P21KBK307	Balake Kannada								
	OR									
	P21CIP307	Constitution of India and Professional Ethics	HSMC	-	2	-	1	50	50	100
8	P21HSMC308	Employability Enhancement Skills - III	HSMC	-	2	-	1	50	50	100
9.	P21AEC309	Innovation and Design Thinking	XX	-	2	-	1	50	50	100
Total							**21**			

10	P21MDIP301	Basic Engineering Mathematics - I	MA	2	2	-	0	100	-	100
11	P21HDIP308	Employability Enhancement Skills - I	HSMC	-	2	-	0	100	-	100

Bachelor of Engineering (IV –Semester)										
Sl. No.	**Course Code**	**Course Title**	**Teaching Department**	**Hrs / Week**			**Credits**	**Examination Marks**		
				L	**T**	**P**		**CIE**	**SEE**	**Total**
1	P21MA401	Applied Mathematical Methods	MA	2	2	-	3	50	50	100
2	P21IS402	Theory of Computation	IS	3	-	-	3	50	50	100
3	P21IS403	Design and Analysis of Algorithms	IS	3	-	-	3	50	50	100
4	P21IS404	Database Management System	IS	3	-	2	4	50	50	100
5	P21IS405	Operating systems	IS	3	-	2	4	50	50	100
6	P21ISL406	Design and Analysis of Algorithms Laboratory	IS	-	-	2	1	50	50	100
7	P21KSK407	Samskrutika Kannada /	HSMC	-	2	-	1	50	50	100
	P21KBK407	Balake Kannada								
	OR									
	P21CIP407	Constitution of India and Professional Ethics	HSMC	-	2	-	1	50	50	100
8	P21HSMC408	Employability Enhancement Skills - IV	HSMC	-	2	-	1	50	50	100
9.	P21INT409	Internship – I	XX	-	-	-	1	-	100	100
Total							**21**			

10	P21MDIP401	Basic Engineering Mathematics - II	MA	2	2	-	0	100	-	100
11	P21HDIP408	Employability Enhancement Skills – II	HSMC	-	2	-	0	100	-	100

TRANSFORM AND NUMERICAL ANALYSIS
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – III

Course Code:	**P21MA301**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives:

- Adequate exposure to basics of engineering mathematics so as to enable them to visualize the applications to engineering problems
- Analyze periodic phenomena using concept of Fourier series, series solution of Engineering problems
- Understand Fourier transforms of functions and use it to solve initial value, boundary value problems.
- Apply Z-Transform technique to Solve difference equations and Numerical Technique to estimate interpolation, Extrapolation and area - (All formulae without proof)-problems only
- Use mathematical IT tools to analyze and visualize the above concepts.

UNIT – I	**8 Hours**

Fourier Series: Introduction, periodic function, even and odd functions, properties. Special waveforms - square wave, half wave rectifier, saw-tooth wave and triangular wave. Dirichlet's conditions, Euler's formula for Fourier series (no proof). F urier series for functions of period 2L (all particular cases) – problems, Half Range Fourier series- Construction of Half range cosine and sine series and problems Practical harmonic analysis- Illustrative examples from engineering field.

Self-study component:	Derive Euler's formula, Fourier series in complex form.

UNIT – II	**8 Hours**

Partial differential equations (PDE's):
Formation of PDE's. Solution of non-homogeneous PDE by direct integration. Solutions of homogeneous PDE involving derivative with respect to one independent variable only, Method of separation of variables(first and second order equations).

Applications of PDE's: Various Possible solution of PDE's
Classification of second order PDE, various possible solutions for One- dimensional wave and heat equations, by the method of separation of variables. Solution of all these equations with specified boundary conditions (Boundary value problems). Illustrative examples from engineering field.

Self-study component:	Charpit's Method -simple problem. Various possible solutions of Two dimensional Laplace equation.

UNIT – III	8 Hours
Finite Differences and Interpolation: Forward and backward differences, Interpolation, Newton-Gregory forward and backward interpolation formulae, Lagrange's interpolation formula and Newton's divided difference interpolation formula (All formulae without proof)-problems only. **Numerical Differentiation**: Derivatives using Newton-Gregory forward and backward interpolation formulae, Applications to Maxima and Minima of a tabulated function. **Numerical Integration:** Newton-Cotes quadrature formula, Simpson's 1/3rd rule and Simpson's $3/8^{th}$ rule. Weddle's rule (All rules without proof)-	
Self-study component:	Inverse Lagrange's Interpolation formula, Central differences.
UNIT – IV	**8 Hours**
Fourier Transforms: Infinite Fourier transforms. Properties- linearity, scaling, shifting and modulation (no proof), Fourier sine and cosine transforms. Inverse Fourier Transforms, Inverse Fourier cosine and sine transforms. Problems. Convolution theorem and Parseval's Identity (noproof)-problems.	
Self-study component:	Finite Fourier transform, Fourier transform of derivatives of functions
UNIT – V	**8 Hours**
Z - Transforms: Definition. Z-transforms of basic sequences and standard functions. Properties-linearity, scaling, Damping rule, first and second shifting, multiplication by *n*, initial and final value theorem (statement only)-problems. Inverse Z- transforms- problems. **Difference Equations:** Definition. Formation of Difference equations, Linear & simultaneous linear difference equations with constant coefficients-problems, Solutions of difference equations using Z- transforms.	
Self-study component:	Convolution theorem and problems, Application to deflection of a loaded string.

Course Outcomes: On completion of the course, student should be able to:

CO1	**Analyze** engineering problems using the fundamental concepts in Fourier series, Fourier Transforms and Basics ideas of PDE's.
CO2	**Explain** various methods to find the Fourier constants, solution of PDE's, Estimation of interpolationand find the area, solution of difference equations.
CO3	**Apply** the acquired knowledge to construct the Half- range Fourier series, Finding Fourier transformsand Inverse Laplace transforms for some standard functions.
CO4	**Evaluate** Z-transform of various functions, solutions of differential equations with initial and boundaryconditions.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International PublishingHouse Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2010.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-085-computational-science-and-engineering-i-fall-2008/resources/lecture-28- fourier-series-part-1/
4. https://www.thefouriertransform.com/
5. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**										
CO2	**2**	**3**										
CO3	**3**	**2**										
CO4	**2**	**3**										
Strength of correlation: Low-1, Medium- 2, High-3												

DATA STRUCTURES
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER - III

Course Code:	**P21IS302**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3:0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives:

- To become familiar with the concept of pointers and its usage in data structure.
- To study and understand the representation and implementation of linear & non-linear data structures.
- To identify the appropriate data structure while solving real-time applications.

UNIT – I	**8 Hours**

Pointers: Review of pointers, Pointers and arrays, Arrays of pointers.
Structures: Arrays of Structures, Structures and Functions- Passing Individual Members, Passing the Entire Structure, Passing Structures through Pointers, Self-referential Structures.
Introduction: Basic Terminology-Elementary Data Structure Organization, Classification of Data Structures, Operations on Data Structures, Abstract Data Type.
Dynamic memory Allocation

Self-study component:	Examples of Abstract Data Type Static v/s Dynamic memory allocation Pointers and Two-dimensional Arrays

UNIT – II	**8 Hours**

Linked Lists: Introduction, Operations on lists, Singly linked lists, Circular linked lists, Doubly linked lists, Applications of linked lists - Polynomial Representation, Evaluation of polynomials

Self-study component:	Doubly circular linked lists, Header linked list

UNIT – III	**8 Hours**

Stacks: Introduction to Stacks, Operations on a Stack (Using Arrays & Linked list), Applications of Stacks: Implementing Parentheses Checker, Conversion of Expression: infix to postfix, Postfix to Prefix, Evaluation of Expressions: prefix expression, postfix expression.

Self-study component:	Multiple stacks Conversion of Expressions: infix to prefix, Prefix to postfix, prefix to infix, Postfix to infix

UNIT – IV	**8 Hours**

Recursion: Introduction, Factorial of a number, Fibonacci series, Tower of Hanoi, GCD of two numbers.
Queues: Introduction to Queues, Operations on Queue (Using Arrays & Linked list).
Types of Queues: Circular queue, DeQues , Priority Queue, Multiple Queues

Self-study component:	Types of recursion with examples (Linear Search, Binary Search) Applications of Queues: Josephus Problem

UNIT – V	**8 Hours**

Trees: Introduction, Basic Terminology, Types of Trees, Traversing a Binary Tree, Applications of Trees, Binary Search Trees, Operations on Binary Search Trees, Threaded Binary Trees.

Self-study component:	Huffman tree, Expression Trees.

COs	**Course Outcomes** with ***Action verb*** for the Course topics
CO1	**Apply** the concepts of pointers in data structures.
CO2	**Analyze** and represent various data structures and its operations.
CO3	**Design** algorithms using different data structures like List, Stack, Queue and Trees.
CO4	**Develop** programs with suitable data structure based on the requirements of the real-time applications.

Text Book(s):

1. ReemaThareja, "Data Structures using C", 2nd Edition,2018, Oxford University Press

Reference Book(s):

1. Aaron M Tenenbaum, Yedidyah Langsam and Moshe J Augenstein, "Data Structures using C", 2014, low price edition ,Pearson education,.
2. Seymour Lipschutz ,"Data Structures with C (Schaum's Outline Series)" , July 2017, McGraw Hill Education

Web and Video link(s):

- Data Structures and algorithms offered by NPTEL: https://nptel.ac.in/courses/106102064/

E-Books/Resources: **https://www.academia.edu/28758384/**

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Apply** the concepts of pointers in data structures.	3											
CO2	**Analyze** and represent various data structures and its operations.	2	3										
CO3	**Design** algorithms using different data structures like List, Stack, Queue and Trees.	2	3	3									
CO4	**Develop** programs with suitable data structure based on the requirements of the real-time applications.	1	1	2									1

COMPUTER ORGANIZATION [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – III			
Course Code:	**P21IS303**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3:0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives:

- Conceptualize the basics of Organizational issues of a digital computer and compare the performance of machine instruction.
- Expose different ways of communication with I/O Devices.
- Notice how to perform computer arithmetic operation.
- Understand working of Processing unit using different bus structures.
- Illustrate different Types of memory devices with their principles.

UNIT – I	**8 Hours**

BASIC STRUCTURE OF COMPUTERS: Basic operational Concepts, Performance.
INSTRUCTION SET ARCHITECTURE: Memory Location and Addresses, Memory Operations, Instruction and Instruction Sequencing, Addressing Modes, Assembly Language.

Self-study component:	Functional Units of Computer, Number Representation and Arithmetic Operations, Character representation.

UNIT – II	**8 Hours**

INSTRUCTION SET ARCHITECTURE (Continued): Subroutines, Additional instructions.
BASIC INPUT/OUTPUT: Accessing I/O Devices- I/O Device Interface, Program Controlled I/O, Interrupts-Enabling and Disabling Interrupts, Handling Multiple Devices, Exceptions.
INPUT/OUTPUT ORGANIZATION: Bus Structure, Bus Operation -Synchronous Bus, Asynchronous Bus, Arbitration.

Self-study component:	Stacks, Interface Circuits.

UNIT – III	**8 Hours**

MEMORY SYSTEM: Basic Concepts, Semiconductor RAM Memories, Memory Hierarchy, and Cache Memories – Mapping Functions.

Self-study component:	Read Only Memories, Direct Memory Access

UNIT – IV	**8 Hours**

BASIC PROCESSING UNIT: Some Fundamental Concepts, Instruction Execution, Hardware Components, Instruction Fetch and Execution Steps, Control Signals, Hardwired Control

Self-study component:	CISC Style Processors.

UNIT – V	8 Hours
ARITHMETIC: Multiplication of Signed Numbers, Fast Multiplication-Bit Pair Recoding of Multipliers, Carry-Save Addition of Summands, Integer Division, Introduction to Floating point Numbers and Operations.	
Self-study component:	Design of Fast Adders, Multiplication of Unsigned numbers.

Course Outcomes: On completion of this course, students are able to:

COs	**Course Outcomes** with ***Action verbs*** for the Course topics.
CO1	**Understand** the operation and organization of a digital computer system.
CO2	**Apply** the knowledge of assembly language / algorithmic techniques to solve the given problem.
CO3	**Analyze** the given assembly language code snippet.
CO4	**Design** memory modules.

Text Book(s):

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization and Embedded Systems, 6th Edition, Tata McGraw Hill.

Reference Book(s):

1. Computer Organization & Architecture, William Stallings, 9th Edition, PHI, 2013.
2. Computer Systems Design and Architecture, Vincent P. Heuring& Harry F. Jordan, 2nd Ed. Pearson Education, 2004.

Web and Video link(s):

1. https://nptel.ac.in/courses/106/103/106103068/
2. https://nptel.ac.in/content/storage2/courses/106103068/pdf/coa.pdf
3. https://nptel.ac.in/courses/106/105/106105163/
4. https://nptel.ac.in/courses/106/106/106106092/
5. https://nptel.ac.in/courses/106/106/106106166/
6. http://www.nptelvideos.in/2012/11/computer-organization.html

CO-PO mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Understand** the operation and organization of a digital computer system.	2											
CO2	**Apply** the knowledge of assembly language / algorithmic techniques to solve the given problem.	2	2	1									
CO3	**Analyze** the given assembly language code snippet.	2	2	1									
CO4	**Design** memory modules.	2	2	2									

DIGITAL LOGIC DESIGN

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – III

Course Code:	**P21IS304**	**Credits:**	**04**
Teaching Hours/Week (L:T:P):	**3:0:2**	**CIE Marks:**	**50**
Total Theory Teaching Hours: **Total Laboratory Hours:**	**40** **24**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students to:

- Understand Boolean laws and minimization techniques and fundamental gates
- Design of combinational logic circuits using minimum number of gates, Decoders and Multiplexers
- Understand the Sequential logic components and Design of sequential circuits
- Understand and use high-level hardware description languages (VHDL) to design combinational / sequential circuits
- Conduct and Simulate practical experiments of combinational and sequential circuit

UNIT – I **8 Hours**

Boolean Algebra : Introduction, Logic gates , Boolean Laws, Duality, Boolean expression in standard SOP and POS , Realization using basic gates and universal gates.

Minimization Of Switching Functions: Introduction, K-Map: Two-variable, Three-variable and ,Four-variable K-map, Don't care combinations**,** Map entered variable(VEM), Limitation of K-map, Code converters: Binary to gray **,** BCD to Excess 3 **,** Quine-Mc-Clusky method- 3 variable

Self-study component:	Quine-Mc-Clusky method- 4,5 variable
Practical Topics: **(6 Hours)**	Verify the truth table for different logic gates using IC's (For practice only) 1. A committee of three individuals decides issues for an organization. Each individual votes either yes or no for each proposal that arises. A proposal is passed if it receives at least two yes votes. Design a circuit using minimum number of NAND gates only that determines whether a proposal passes. 2. Design Logic circuit to convert 3 bit binary to gray code using basic gates.

UNIT – II **8 Hours**

Combinational Logic Design: Introduction to combinational circuits, Adders, Subtractors, ripple carry adder, Look ahead carry adder, Comparators:1-bit and 2bit magnitude comparator, Encoders: octal to Binary and Decimal to BCD encoder, Priority encoders, Decoders: 2 to 4, 3 to 8 line decoder, Multiplexers: 2:1,4:1, 8:1,16:1 , Design combinational circuits using Decoders and Multiplexers

Self-study component:	7 Segment Decoder, Demultiplexer
Practical Topics: **(6 Hours)**	1. Design Full adder using suitable Decoder 2. A lawn sprinkling system is controlled automatically by certain combinations of the following variables. Season(S=1,if summer; 0, otherwise) Moisture content of soil(M=1,if high;0 if low) Outside temperature(T=1, if high;0 if low) Outside humidity(H=1,if high;0 if low) The sprinkler is turned on under any of the following circumstances: i. The moisture content is low in winter. ii. The temperature is high and the moisture content is low in summer. iii. The temperature is high and the humidity is high in summer. iv. The temperature is low and the moisture content is low in summer. v. The temperature is high and the humidity is low. Implement using suitable multiplexer.(use 8x1 mux)

UNIT – III	**8 Hours**

Flip flops :Introduction, Classification of sequential circuits: Asynchronous and Synchronous, NAND and NOR latches and flip flops: Excitation tables, State diagram and Characteristic equation of SR, JK, Race around condition, Master slave JK flip flops, , Excitation tables, State diagram and Characteristic equation of D and T flip flops, Conversion of SR to JK, JK to D, T to D Flip flops

Self-study component:	Conversion of JK to SR, D to JK and D to T Flip flops
Practical Topics: **(4 Hours)**	Verify the truth table of JK and D Flip Flops (For practice only) 1. Implement Master slave D Flip Flop using only NAND Gates 2. Design and demonstrate the conversion of JK flip flop to T Flip Flop

UNIT – IV	**8 Hours**

Shift Registers and Counters :Introduction, Data Transmission In Shift Registers, Serial In Serial Out Shift Register, Serial In Parallel Out Shift Register, Parallel In Serial Out Shift Register, Parallel In Parallel Out Shift Register, **Design of** shift registers using JK and D flip Flop's, Application Of Shift Registers: Ring Counter , Johnson Counter Up/Down Synchronous and Asynchronous Introduction, Design counters using JK and T Flip flip

Self-study component:	Effects of propagation delay in ripple counters, Sequence detector design
Practical Topics: **(4 Hours)**	1. Design and demonstrate 3-bit serial in serial out shift register using D Flip Flop's 2. Design and demonstrate 2-bit synchronous counter for the given sequence using JK Flip Flop.

UNIT – V	8 Hours
Introduction to VHDL :Hardware description languages, VHDL description of combinational circuits, VHDL models for multiplexers, VHDL modules, Sequential statements and VHDL processes, Modeling Flip-flops using VHDL Processes, VHDL Modeling registers and counters using VHDL processes	
Self-study component:	Compilation, simulation and synthesis of VHDL code, Simple synthesis examples.
Practical Topics: **(4 Hours)**	Write the VHDL code for basic gates and verify its working (For practice only) 1. Write the VHDL code for 8:1 Mux .Simulate and verify it's working. 2. Write the VHDL code for JK and D flip-flop. Simulate and verify it's working. 3. Write the VHDL code for 3- bit synchronous down counter. Simulate and verify it's working.
NOTE	**Practical Topics** will be changed every academic year

Course Outcomes: On completion of this course, students are able to:

COs	Course Outcomes with *Action verbs* for the Course topics.
CO1	**Understand** the operation and organization of a digital computer system.
CO2	**Analyze** Combinational and Sequential circuits
CO3	**Design** Combinational /Sequential logic circuit for the given problem
CO4	**Develop** VHDL code for Combinational / Sequential logic circuit
CO5	**Conduct** and Simulate practical experiments for demonstrating the working of Combinational and Sequential circuit both with component realization and VHDL code

Text Book(s):

1. A. Anand Kumar, Fundamentals of Digital Circuits,4th Edition, PHI Learning, ISBN: 9788120352681,Nov- 2016
2. Charles H.Roth, Jr., Lizy Kurian John, Digital Systems Design using VHDL,2nd Edition, CENGAGE Learning,2012

Reference Book(s):

1. M.Morris Mano, Michael D.Ciletti, Digital Design with an introduction to the verilog HDL, VHDL and systemverilog,6th edition, Pearson Publication,2020
2. Donald P Leach, Albert Paul Malvino, Goutam Saha, Digital Principles and applications,8th edition, McGraw-Hill Education,2017

Web and Video link(s):

1. https://nesoacademy.org/ec/05-digital-electronics

E-Books/Resources:

1. https://dvikan.no/ntnu-studentserver/kompendier/digital-systems-design.pdf
2. https://drive.google.com/file/d/1lw9LhePHIhwBljiWSXrmEJgXj5RE05j4/view?usp=sharing

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Apply** Boolean Algebra / K Map and knowledge of fundamental gates in minimizing Logic function	3											
CO2	**Analyze** Combinational and Sequential circuits	1	3	1									
CO3	**Design** combinational /sequential logic circuit for the given problem	1	2	3									
CO4	**Implement** Combinational/ Sequential logic circuit **using VHDL code**	1	1	2									
CO5	**Conduct** and Simulate practical experiments for demonstrating the working of combinational and sequential circuit both with component realization and VHDL code	1	1	2	1	2				2			

OBJECT ORIENTED PROGRAMMING WITH JAVA [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – III**			
Course Code:	**P21IS305**	**Credits:**	**4**
Teaching Hours/Week (L:T:P):	**3:0:2**	**CIE Marks:**	**50**
Total Theory Teaching Hours: **Total Laboratory Hours:**	**40** **24**	**SEE Marks:**	**50**

Course Learning Objectives: The students will be able to

- Understand fundamentals of Object Oriented Concepts.
- Explore the features of Object-oriented Programming in Java for defining classes, methods and invoking methods.
- Write program in Java to solve specified problems.

UNIT – I	**8 Hours**

Object Oriented Concepts : Fundamentals of Object Oriented programming - Object oriented paradigm, basics concepts of object oriented programming, benefits of object oriented programming, applications of object oriented programming.

JAVA Basics: JVM architecture. The scope and life time of variables, control statements, type conversion and casting, simple java programs.

Self-study component:	Data types and operators
Practical Topics:	1. Write a program to find the sum of the series 1 + 1/ (2*2) + 1/(3*3) + 1/(4*4) + ….. + 1/(n*n). 2. Write a Java program for printing Pascals's Triangle (5 rows) using nested loops. 3. Write a program that accepts three numbers from the user and prints "increasing" if the numbers are in increasing order, "decreasing" if the numbers are in decreasing order, and "Neither increasing or decreasing order" otherwise.

UNIT – II	**8 Hours**

Classes, Objects and Methods: Class Fundamentals, How objects are created, Reference variables, methods, Returning from a method returning, Returning a value, Constructors, Parameterized constructors, this keyword.

Java access modifiers, Passing objects to methods, How augment are passed, Returning Objects, Method overloading, Overloading constructors, Static- variables, methods and blocks, Nested and Inner class, Variable length arguments basics.

Self-study component:	Arrays
Practical Topics:	1. Create a Java class called Complex with the following details and variables within it as (i) Real (ii) Imaginary. Develop a Java program to perform addition and subtraction of two complex numbers by using the method add() and subtract( )

	respectively by passing object as parameter and display result using method display(). Initialize the real and imaginary values of the complex number using parameterized constructor. 2. A class called MyTime, which models a time instance with private instance variables: hour: between 0 to 23, minute: between 0 to 59, constructor shall invoke the setTime() method to set the instance variable (setTime(int hour, int minute): It shall check if the given hour and minute are valid before setting the instance variables). Define methods - getHour(), getMinute(),nextMinute( )Update this instance to the next minute and return this instance. Take note that the nextMinute() of 23:59 is 00:00 nextHour() is similar to the above. Write the code for the MyTime class. Also write a test program (called TestMyTime) to test all the methods defined in the MyTime class.
UNIT – III	**8 Hours**
Inheritance: Inheritance basics**,** Member access and inheritance, Constructors and Inheritance, Using super to call super class constructor, Using super to access super class members, Creating a multilevel hierarchy, Execution of constructors, Super class reference and Subclass objects, Method overriding, Abstract class.	
Self-study component:	Using final
Practical Topics:	1. Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. Create a class Account that stores customer name, account number and type of account. From this derive the classes Curr-acct and Sav-acct to make them more specific to their requirements. The savings account provides compound interest and withdrawal facilities. The current account does not provide interest. Current account holders should also maintain a minimum balance (Rs 5000) and if the balance falls below this level, a service charge (Rs 100) is imposed. Include the necessary methods in order to achieve the following tasks: □ Accept deposit from customer and update the balance. □ Display the balance. □ Compute and deposit interest □ Permit withdrawal and update the balance □ Check for the minimum balance(only for Current account), impose penalty if necessary and update the balance. 2. Design a base class Circle with member variables (radius of type double and color of type character), methods (getRadius(), getArea()) and constructors (Circle(radius), Circle(radius, color)). Derive subclass called Cylinder from the super class Circle with

	member variable (height) of type double, public methods (getHeight(), getVolume(), getArea()) and constructors(Cylinder(height),Cylinder(height,radius),Cylinder(height, radius, color)). Create the two instances of cylinder and print similar cylinders if the area, volume and color of cylinders are same. Demonstrate the code reuse and polymorphism properties of Object oriented programming by inheriting the constructors and methods of the base class. Derive subclass called Cylinder from the superclass Circle with member variable (height) of type double, public methods (getHeight(), getVolume(), getArea()) and its constructors(Cylinder(height, radius), Cylinder(height, radius,color)). Create the two instances of cylinder and print similar cylinders if the area, volume and color of cylinders are same. Demonstrate the code reuse and polymorphism properties of Object oriented programming by inheriting the constructors and methods of the base class.

UNIT – IV	**8 Hours**

Interface: Interface fundamentals, Creating an interface, Implementing an interface, Using interface references

Packages: Fundamentals of packages, Packages and member access, Importing packages.

Multithreaded Programming: The Java thread model, Creating a thread, Creating multiple threads, Using isalive() and Join( ), Thread priorities.

Self-study component:	Constants in Interfaces, Nested Interfaces
Practical Topics:	1. Create two classes called HDFCAccount and StateBankAccount. that implements all the methods defined in interface Account.Declare the methods getBalance, deposit and withdraw in Account interface. HDFCAccount uses member variables deposits and withdrawals for maintaining the balance, where as State BankAccount uses only balance to maintain the balance. In the `main` method create objects of `HDFCAccount` and `StateBankAccount`, but assigned them to the reference of the interface `Account`. Also write an method to print balance in main which prints the balance amount. 2. Create a package CIE which has two classes- Student and Internals. The class Student has members like usn, name, sem. The class internals has an array that stores the internal marks scored in six courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array thatstores the SEE marks scored in six courses of the current semester of the student. Import the two packages in a

	file that declares the final marks of N students in all six courses. 3. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number

UNIT – V	**8 Hours**

Exception handling: Fundamentals, Exception hierarchy, uncaught exceptions, using try and catch, multiple catch clauses, throw, finally, Java's built-in exceptions.
Generics: generic fundamentals, bounded types, generic methods, generic constructors, generic class hierarchies.

Self-study component:	Generic interfaces, throws
Practical Topics:	1. Write a java program to handle the following exceptions based on choice made by the user by writing suitable try and catch block. i) ArithmeticException ii) ArrayIndexOutOfBoundsException iii) NumberFormatException iv) StringIndexOutOfBoundException v) NullPointerException 2. Define a class Sort with generic method by name Arrange(T[]) and Display(T[]). Write a program to sort array elements of different data types.

Course Outcomes: On completion of this course, students are able to:

COs	Course Outcomes with *Action verbs* for the Course topics.
CO1	**Understand** and explore the fundamental concepts of object oriented programming language.
CO2	**Apply** the syntax and semantics of java for solving a given problem.
CO4	**Analyze** the given Java code snippet to identify the bugs and correct the code.
CO3	**Conduct** experiments using IDE to demonstrate the features of Java programming language.

Text Book(s):

1. Herbert Schildt and Dale Skrien, "Java Fundamentals – A comprehensive Introduction", McGraw Hill, 1st Edition, 2013.
2. Programming with Java A Primer E. BalaGuruSwamy 5th Edition McGraw Hill Education 2014

Reference Book(s):

1. The Complete Reference - Java , Herbert Schildt , 11th Edition , 2019, McGraw Hill Education

Publications.Core Java
2. Core Java – Vol 1, Cay S Horstmann, Gary Cornell 11th Edition Prentice Hall. 2018.

E-Books/Resources:

1. Java Programming Wikibooks Contributors Seventh Edition wikibooks.org 2016 URL:https://upload.wikimedia.org/wikipedia/commons/e/e7/Java_Programming.pdf
2. Java Programming,WikibooksContributors, Seventh Edition, wikibooks.org 2016,URL https://upload.wikimedia.org/wikipedia/commons/e/e7/Java_Programming.pdf

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Understand** and explore the fundamental concepts of object oriented programming language.	2											
CO2	**Apply** the syntax and semantics of java for solving a given problem.	2	2	2									
CO3	**Analyze** the given Java code snippet to identify the bugs and write correct code.	2	2	1									
CO4	**Conduct** experiments using IDE to demonstrate the features of Java programming language**.**	2	2	2		2				1			1

DATA STRUCTURES LABORATORY [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – III**			
Course Code:	**P21ISL306**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:0:2**	**CIE Marks:**	**50**
Total Number of Lab Hours:	**24**	**SEE Marks:**	**50**

Note: All programs are to be implemented using C Language

1.	Create a structure **DISTANCE** with data members ***kms*** and ***meters*** of type integer. Implement a program to perform addition and subtraction on two distances by passing pointer to a structure to function.
2.	Implement SLL which performs the following operations. 1. Create SLL of 'n' integers(insert front/rear) 2. Delete the specified integer from the list with appropriate message. 3. Display the contents of the list.
3.	Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Library Data with the fields: BOOK_ID, BOOK_TITLE, AUTHOR, EDITION 1. Create an ordered DLL of N books. 2. Count the number of nodes in the DLL. 3. Delete a node at the specified position. 4. Display the contents of DLL.
4.	Implement a program to add two polynomials.
5.	Implement a menu driven Program for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) 1. Push an Element on to Stack (Handle the situation of overflow) 2. Pop an Element from Stack (Handle the situation of underflow) 3. Display the status of Stack Support the program with appropriate functions for each of the above operations
6.	Implement a Program to convert infix to postfix expression.
7.	Implement the following using recursion: 1. Tower_of_Hanoi 2. GCD of two numbers 3. Largest of 'n' numbers
8.	Implement a menu driven Program for the following operations on QUEUES of Strings using Linked list 1. Insert an Element into Queue 2. Delete an Element from Queue 3. Display the status of Queue
9.	Implement a program to perform the operations on priority queue.

10.	Implement a menu driven Program for the following operations on Binary Search Tree (BST) of Integers 1. Create a BST of N Integers 2. Traverse the BST in Inorder, Preorder and Postorder

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Design** algorithms using different data structures like List, Stack, Queue and Trees.	2	2	2									
CO2	**Develop** programs with suitable data structure based on the requirements of the real-time applicatios.	2	2	2									1

EMPLOYABILITY ENHANCEMENT SKILLS (EES) - III
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – III

Course Code:	**P21HSMC308**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable students to:

- Build Personal Branding, team binding.
- Present the data using presentation skills in a better manner.
- Understand the importance of stress management, Entrepreneurship & Business skills.
- Usage of various voices in a sentence and critical reasoning.
- Explain the basic concepts in boat and stream, geometry and trigonometry problems.
- Calculations involving Permutations and combinations, probability and logarithms.
- Explain concepts behind logical reasoning modules of analytic, syllogisms, venn diagrams and puzzles.

UNIT – I	**8 Hours**

Soft Skills: Personal Branding, Synergy between Teams (Online and Offline), Interview skills, Stress Management, Entrepreneurship & Business skills.

Verbal Ability: Active voice and passive voice, critical reasoning.

Self-Study: Corporate ethics and Mannerism

UNIT – II	**10 Hours**

Quantitative Aptitude: Boats and streams, Geometry & Trigonometry, Permutations and combinations, Probability & Logarithms.

Self-Study: Pipes and cisterns

UNIT – III	**10 Hours**

Logical Reasoning: Analytical reasoning, Syllogisms, clocks and calendars, Venn diagram, puzzles.

Self-Study: Binary logic

Course Outcomes: On completion of this course, students are able to:	
CO – 1:	Exhibit amplified level of confidence to express themselves in English
CO – 2:	Develop the presentation skills, entrepreneurial skills by managing stress at various levels.
CO – 3:	Solve the problems based on Boats and streams, Geometry & Trigonometry, Permutations and combinations, Probability & Logarithms.
CO – 4:	Solve logical reasoning problems based on Analytical reasoning, Syllogisms, clocks and calendars, cases and Venn diagram, puzzles.

Text Book(s):

1. Word Power Made Easy New Revised and Expanded Edition, First Edition, Norman Lewis, Goyal Publisher.
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):

1. NPTEL Course: Soft skills by By Prof. Binod Mishra, IIT Roorkee

https://onlinecourses.nptel.ac.in/noc21_hs76/preview

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - III]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	2	3	2	2
CO-3	2	-	-	-	-	-	-	-	-	-	-	-
CO-4	2	-	-	-	-	-	-	-	-	-	-	-

INNOVATION AND DESIGN THINKING

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – III

Course Code	**P21AEC309**	**Credits**	**01**
Teaching Hours/Week (L: T:P: S)	**0:2:0**	**CIE Weightage**	**50%**
Total Hours of Pedagogy	**25**	**SEE Weightage**	**50%**
Exam Hour	**01**	**Total Marks**	**100**

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Course objectives:

- To explain the concept of design thinking for product and service development
- To explain the fundamental concept of design thinking
- To discuss the methods of implementing design thinking in the real world.

Module-1

Understanding Design Thinking

Definition of design - Design Vs Engineering Design– Difference between Design and Engineering Design– The General Design process Model – Design to Design thinking - Time line of Design thinking.

Module-2

Features of Design Thinking

Venn diagram of design thinking– Design thinking resources – Design thinking process Models – Design thinking methodologies

Module-3

Models to Do Design Thinking

Different kinds of thinking – 5 Stage d.School Process - 5 stages of Stanford – Empathize – Define- Ideate – Prototype – Test – Iterate - Applications of Design Thinking.

Module-4

Design thinking for Engineering - Concept models for comparing design thinking and engineering systems thinking - The Distinctive Concept Model - The Comparative Concept Model - The Inclusive Concept Model - The Integrative Concept Model.

Module-5

Design Thinking Tools and Methods - Purposeful Use of Tools and Alignment with Process - What Is: Visualization - What Is: Journey Mapping - What Is: Value Chain Analysis - What Is: Mind Mapping - What If: Brainstorming - What If: Concept Development - What Wows: Assumption Testing - What Wows: Rapid Prototyping - What Works: Customer Co-Creation - What Works: Learning Launch.

Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Understanding Design Thinking process	L2
CO2	Appreciate various design process procedure	L2
CO3	Generate and develop design ideas through different Technique.	L2
CO4	Identify the significance of reverse Engineering to Understand products	L3
CO5	Practice the methods, processes, and tools of Design Thinking	L2

Suggested Learning Resources:

Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengagelearning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage",Harvard Business Press , 2009.

References:

1. Jake knapp, John keratsky and Braden kowitz "Sprint how to solve big problems and test new ideas in just five days"
2. Tim Brown "Change by design"
3. Steve Krug "Don't make me think; Revisited"
4. Roger martin "The design of Business"
5. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, SecondEdition, 2011.
6. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Businessor Design School", John Wiley & Sons 2013.
7. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011

BASIC ENGINEERING MATHEMATICS - I [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – III (Lateral Entry: Common to all branches)**			
Course Code:	**P21MDIP301**	**Credits:**	**00**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**-**

Course Learning Objectives: The mandatory learning course **P21MADIP301**viz., **Basic Engineering Mathematics-I** aims to provide basic concepts of complex trigonometry, vector algebra, differential & integral calculus, vector differentiation and various methods of solving first order differential equations**.**

UNIT – I	**8 Hours**

Complex Trigonometry: Complex Numbers: Definitions & properties. Modulus and amplitude of a complex number, Argand's diagram, De- Moivre's theorem (without proof).

Vector Algebra: Scalar and vectors. Vectors addition and subtraction. Multiplication of vectors (Dot and Cross products). Scalar and vector triple products-simple problems.

Self-study component:	De-Moivre's theorem (without proof). Roots of complex number - Simple problems.

UNIT – II	**8 Hours**

Differential Calculus: Polar curves –angle between the radius vector and the tangent pedal equation- Problems. Taylor's series and Maclaurin's seriesexpansions- Illustrative examples.

Partial Differentiation: Elementary problems. Euler's theorem for homogeneous functions of two variables. Total derivatives-differentiation of composite and implicit function.

Self-study component:	Review of successive differentiation. Formulae for n^{th} derivatives of standard functions- Liebnitz's theorem (without proof). Application to Jacobians, errors & approximations.

UNIT – III	**8 Hours**

Integral Calculus: reduction formulae for $sin^n x$, $cos^n x$, *and* $sin^m x cos^m x$ and evaluation of these with standard limits-Examples. Applications of integration to area, length of a given curve, volume and surface area of solids of revolution.

Self-study component:	Differentiation under integral sign (Integrals with constants limits)-Simple problems.

UNIT – IV	**8 Hours**

Vector Differentiation: Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence, Curl and Laplacian (Definitions only).

Self-study component:	Solenoidal and irrotational vector fields-Problems.

UNIT – V	8 Hours

Ordinary differential equations (ODE's): Introduction-solutions of first order and first degree differential equations: homogeneous, exact, lineardifferential equations of order one and equations reducible to above types.

Self-study component:	Applications of first order and first degree ODE's - Orthogonal trajectories of Cartesian and polar curves. Newton's law of cooling, R-L circuits- Simple illustrative examples from engineering field.

Course Outcomes: After the successful completion of the course, the students are able to

CO1	**Explain** the fundamental concepts –in complex numbers and vector algebra to analyze the problemsarising in related area of engineering field.
CO2	**Identify** – partial derivatives to calculate rate of change of multivariate functions.
CO3	**Apply** - the acquired knowledge of integration and differentiation to evaluate double and triple integrals to compute length surface area and volume of solids of revolution and indentify velocity, acceleration of a particle moving in a space.
CO4	**Find** analytical solutions by solving first order ODE's which arising in different branches of engineering.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition), Khanna Publishers, New Delhi.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill publications, New Delhi, 11thReprint, 2010.

REFERENCE BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics (Latest Edition), Wiley Publishers, New Delhi.
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International PublishingHouse Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	2										
CO3	2	3										
CO4	2											
CO5	3											

Strength of correlation: Low-1, Medium- 2, High-3

EMPLOYABILITY ENHANCEMENT SKILLS (EES) - I

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER - III

Course Code:	**P21HDIP308**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**-**

Course Learning Objectives: This course will enable students to:

- Get introduced to some of the concepts of soft skills and enhance communication skills
- Recognize common mistakes done by an individual in the course of his / her communication
- Write effective emails
- Identify their strengths, weakness, opportunities and threats
- Understand the basic rules of sentence structures
- Understand the correct usage of parts of speech, tenses and articles
- Explain divisibility roles, properties of various types of numbers
- Explain application of percentage in our daily life
- Describe the concepts of profit, loss, discounts
- Explain concepts behind logical reasoning modules of arrangements and blood relations

UNIT – I	**10 Hours**

Soft Skills: LSRW, Listening, communication skills (verbal and non-verbal skills), public speaking, Email writing, SWOT Analysis

Self-Study: Motivation and Time Management

UNIT – II	**10 Hours**

Verbal Ability: Parts of Speech - Prepositions, Adjectives and Adverbs ; Tenses, Articles, Idioms and Phrasal verbs, Subject verb agreement, Synonyms and Antonyms

Self-Study: Para jumbles and one word substitution

UNIT – III	**8 Hours**

Quantitative Aptitude: Number system, Percentage, Profit & Loss

Logical Reasoning: Blood Relations and Arrangements

Self-Study: Speed Maths

Course Outcomes: On completion of this course, students are able to:	
CO – 1:	Exhibit amplified level of confidence to express themselves in English
CO – 2:	Understand the correct usage of tenses and articles
CO – 3:	Increase the number of words in his/her day to day
CO – 4:	Solve logical reasoning problems based on blood relations and arrangements
CO - 5:	Solve the problems based on number system, percentage and profit & loss

Text Book(s):

1. Word Power Made Easy New Revised and Expanded Edition, First Edition, Norman Lewis, Goyal Publisher.
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):

1. Improve Your English Communication Skills Specialization https://www.coursera.org/specializations/improve-english

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - I]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	-	2	-	2
CO-3	-	-	-	-	-	-	-	-	-	2	-	2
CO-4	2	-	-	-	-	-	-	-	-	-	-	-
CO-5	2	-	-	-	-	-	-	-	-	-	-	-

APPLIED MATHEMATICAL METHODS
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – IV (Common to EC, EE, CS, IS)

Course Code:	**21MA401B**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives:

- Adequate exposure to basics of engineering mathematics so as to enable them to visualize the applications to engineering problems.
- Analyze the concept of complex variables in terms real variables
- Understand the concept of statistical methods to fit curves of samples and correlation and regression analysis
- To have a insight into numerical techniques to find solution of equations having no analytic solutions
- Provide insight into develop probability distribution of discrete and continuous random variables Testing hypothesis of sample distribution

UNIT – I	**8 Hours**

Calculus of complex functions: Introduction to functions of complex variables. Definitions of limit, continuity and differentiability, Analytic functions: Cauchy- Riemann equations in Cartesian and polar forms (no proof) and consequences. Applications to flow problems. Constructionof analytic functions: Milne-Thomson method-Problems.

Conformal transformations: Introduction. Discussion of transformations $w = z^2$, $w = \frac{1}{z}$, $w = z+1/z$, $(z \neq 0)$. Bilinear transformations- Problems.

Self-study component:	Derivation of Cauchy- Riemann equation in Cartesian and polar forms, transformations of reflection, translation and Inversion.

UNIT – II	**8 Hours**

Complex integration: complex line integrals. Cauchy theorem, Cauchy integral formula. Taylor's and Laurent's series (Statements only) and illustrative examples. Singularities, poles and residues. (Statement only). Examples.

Curve Fitting: Curve fitting by the method of least squares, fitting the curves of the forms $y = ax + b$, $y = ae^{bx}$, $ax^2 + bx + c$

Statistical Methods: Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation- problems, Regression analysis, lines of regression, problems.

Self-study component:	Contour integration Type-I & Type-II..

UNIT – III	**8 Hours**

Solution of algebraic and transcendental equations: Introduction, Bisection method, Regula-Falsi & Newton-Raphson method:- Illustrative examples only.

Numerical solution of ordinary differential equations (ODE's): Numerical solutions of

ODE's of first order and first degree – Introduction. Taylor's series method. Modified Euler's method, Runge - Kutta method of fourth order (All formulae without proof)**.** Illustrative examples only. **Numerical methods for system of linear equations**- Gauss-Jacobi and Gauss- Seidel iterative methods. Determination of largest eigen value and corresponding eigen vector by power method.	
Self-study component:	Solution of equations using secant method, Picards method.

UNIT – IV	**8 Hours**
Random variables and Probability Distributions: Review of random variables. Discrete and continuous random variables-problems. Binomial, Poisson, Exponential and Normal distributions (with usual notation of mean and variance)-: problems. **Joint Probability Distributions :** Introduction, Joint probability and Joint distribution of discrete random variables and continuous random variables	
Self-study component:	Geometric and Gamma distributions- problems.

UNIT – V	**8 Hours**
Stochastic Processes and sampling theory: **Markov Chains:** Markov chains, Classification of Stochastic processes, Probability vector, Stochastic matrix, Regular stochastic matrix, Transition probabilities and Transition probability matrix. **Testing of Hypothesis** Sampling distributions-introduction. Standard error, Type-I and Type-II errors. Testing of hypothesis and confidence intervals for means. Student's ***t*** – distribution and Chi-square distribution as a test of goodness of fit - Illustrative examples only.	
Self-study component:	Classification of Stochastic process, Bernoulli Process, Poisson Process

Course Outcomes: On completion of the course, student should be able to:

CO1	**Apply** the concepts of an analytic function and their properties to solve the problems arising in engineering field
CO2	**Use** the concept of correlation and regression analysis to fit a suitable mathematical model for thestatistical samples arise in engineering field
CO3	**Apply** the acquired knowledge of numerical technique to solve equations approximately having no analytical solutions.
CO4	**Explain** discrete and continuous probability distributions in analyzing the probability models and solveproblems involving Markov chains.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php
4. https://www.iitg.ac.in/physics/fac/charu/courses/ph503/book.pdf

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**										
CO2	**3**	**2**										
CO3	**3**	**3**										
CO4	**2**	**3**										
CO5	**3**	**3**										
Strength of correlation: Low-1, Medium- 2, High-3												

THEORY OF COMPUTATION [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER - IV**			
Course Code:	**P21IS402**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3:0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives:

- Design finite automata
- Design regular expression
- Design CFG
- Design push-down automata
- Design Turing machines

UNIT – I	**8 Hours**
FINITE AUTOMATA :Chomsky Hierarchy, Deterministic finite automata, Nondeterministic finite automata, Finite automata with Epsilon transitions, Application of finite automata	
Self-study component:	Extended transitions and languages for DFA,NFA and ϵ-NFA

UNIT – II	**8 Hours**
REGULAR EXPRESSIONS, LANGUAGES AND PROPERTIES: Regular expressions, Finite Automata and Regular Expressions, Pumping Lemma for regular languages,Equivalence and minimization of automata, Applications.	
Self-study component:	Closure properties; Decision properties

UNIT – III	**8 Hours**
CONTEXT FREE GRAMMERS, LANGUAGES AND PROPERTIES: Context –free grammars, Parse trees, Ambiguity in CFG**,**The pumping lemma for CFLs, Normal forms : Chomsky's Normal Forms ,GNF, Applications.	
Self-study component:	Closure properties of CFLs.

UNIT – IV	**8 Hours**
PUSHDOWN AUTOMATA :Definition of the Pushdown automata, the languages of a PDA, Deterministic Pushdown Automata, Equivalence of PDA's and CFG's, CFG to PDA.	
Self-study component:	PDA to CFG

UNIT – V	**8 Hours**
TURING MACHINES The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines, Undecidable problem that is RE, Post's Correspondence problem.	
Self-study component:	Problems that Computers cannot solve, Turing Machine and Computers.

COs	Course Outcomes with action verbs for the course topics
CO1	**Understand** the basic concept of Automata.
CO2	**Apply** the knowledge of Automata Theory for formal Languages
CO3	**Analyze** automata and their computational power to recognize languages
CO4	**Design an** automaton.

Text Book(s):

1. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw Hill, 2007.

Reference Book(s):

1. John E... Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson education, 2014.
2. Daniel I.A. Cohen: Introduction to Computer Theory, 2nd Edition, John Wiley & Sons, 2004.

Web and Video link(s):

1. **https://www-2.dc.uba.ar/staff/becher/Hopcroft-Motwani-Ullman-2001.pdf**
2. **https://www.mog.dog/files/SP2019/Sipser_Introduction.to.the.Theory.of.Computation.3E.pdf**

E-Books/Resources:

1. **https://tinyurl.com/bdfst7kn**

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Understand** the basic concept of Automata.	3	2	1									
CO2	**Apply** the knowledge of Automata Theory for formal Languages	3	1	1									
CO3	**Analyze** automata and their computational power to recognize languages	1	3	1									
CO4	**Design** an automaton.	1	1	3									

DESIGN AND ANALYSIS OF ALGORITHMS

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21IS403**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3:0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Prerequisites: Students should have knowledge of Programming language and Data structures.

Course Learning Objectives: This coursewill enable students to:

- Explain various computational problem-solving techniques.
- Apply appropriate method to solve a given problem.
- Describe various methods of algorithm analysis.

UNIT - I	**8 Hours**

Introduction: Algorithm, Fundamentals of Algorithmic problem solving, Important Problem Types, Fundamental Data Structures - Graphs, Fundamentals of the **Analysis of Algorithm Efficiency**: Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical analysis of Non-Recursive Algorithms with Examples [Max Element, Unique Elements]and Recursive Algorithms with Examples [Factorial, Tower of Hanoi].

Self-study component:	Additional Examples of Mathematical analysis of Non-Recursive& Recursive Algorithms.

UNIT - II	**8 Hours**

Brute Force and Exhaustive Search: Selection Sort, Brute-Force String Matching,Exhaustive Search [Traveling Salesman Problem and Knapsack Problem].**Decrease and Conquer**: Introduction, Insertion Sort, Depth First Search, Breadth FirstSearch, Topological Sorting, Algorithms for Generating Combinatorial Objects.

Self-study component:	Bubble Sort and Sequential Search.

UNIT - III	**8 Hours**

Divide and Conquer: Merge sort, Quick Sort, Multiplication of Large integers and Strassen' Matrix Multiplication.**Transform and Conquer**: Presorting, Balanced Search Trees, Heaps and Heap sort.

Self-study component:	Binary Tree Traversals and Related Properties.

UNIT - IV	**8 Hours**

Space and Time Tradeoffs: Sorting by counting, Input Enhancement in String Matching, Hashing. **Dynamic Programming**: Three Basic Examples, the Knapsack Problem, Warshall's and Floyd's Algorithms.

Self-study component:	B-Trees, Optimal Binary Search Trees.

UNIT - V	8 Hours
Greedy Technique: Kruskal's Algorithm, Prim's Algorithm, Dijikstra's Algorithm. Limitations of Algorithm Power: P, NP and NP- Complete Problems. Coping with theLimitations of Algorithm Power: Backtracking: n-Queens Problem, Subset-Sum Problem, Branch and Bound: Knapsack Problem.	
Self-study component:	Lower Bound Arguments, Decision trees.
Course Outcomes: On completion of this course, students are able to:	
CO1	.Understand the basic concepts of various algorithmic techniques
CO2	Analyze the asymptotic performance of algorithms
CO3	Design solutions for the given problem using algorithmic technique.

Text Book(s):

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 3rd Edition, 2011. Pearson.

Reference Book(s):

1. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.

Web and Video link(s):

1. Algorithms: Design and Analysis, Part 1 (Coursera) | MOOC List (mooc-list.com)
2. https://onlinecourses.nptel.ac.in/noc15 _cs02/preview

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Understand** the basic concepts of various algorithmic techniques	3											
CO2	**Analyze** the asymptotic performance of algorithms	1	2										
CO3	**Design** solutions for the given problem using algorithmic technique.	1	2	2									

DATABASE MANAGEMENT SYSTEM

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21IS404**	**Credits:**	**04**
Teaching Hours/Week (L: T:P):	**3:0:2**	**CIE Marks:**	**50**
Total Theory Teaching Hours: **Total Laboratory Hours:**	**40** **24**	**SEE Marks:**	**50**

Course Learning Objectives:

1. To learn the basic knowledge of Database Management System and various types of data models.
2. To learn the concept and syntax of ER Diagram, relational data model and relational algebra.
3. To learn and write various SQL queries.
4. To learn the concept of Normalization.
5. To learn the various issues in Transaction processing.

UNIT – I	**8 Hours**

Introduction to Databases: Introduction, Characteristics of the database approach, Advantages of using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence.

Introduction to ER model: Entity Types, Entity Sets, attributes and keys, Relation Types, Relationship Sets, roles, and structural constraints, Weak Entity Types, ER Diagrams.

Self-study component:	Actors on the scene, Workers behind the scene, Database Languages and Interfaces, Relationship Types of Degree Higher Than Two
Practical Topics: **(6Hours)**	1. Introduction to ER diagram tool. (Draw.io) 2. Create an ER diagrams Company Database system and Banking database System using tool.

UNIT – II	**8 Hours**

Relational Model: Relational Model Concepts, Relational Model Constraints,update operations dealing with constraint violations, Relational Database Design using ER-to-Relational mapping.

Relational Algebra: Unary and Binary relational operations, Examples of simple queries in relational algebra.

Creation of table in SQL:SQL DataDefinition and Data types.

Self-study component:	Additional relational operations,
Practical Topics: **(6 Hours)**	1. **Consider the company database and create the below tables by properly specifying the primary keys and the foreign keys** **Employee** (Fname: varchar, Minit: Char, Lname: varchar, ssn:int, Bdate: Date, Address: varchar, Sex: char, salary: decimal, Super_ssn:int, DNO:int)

	Department (Dname: varchar, Dnumber: int, mgr_ssn: int, mgr_start_date: date) **Dept_location** (Dnumber: int, Dlocation: varchar) **Project** (pname: varchar, pnumber: int, plocation: varchar, dnum:int) **Works_on** (Essn: int, pno:int, hours: decimal) **Dependent** (Essn: char, dependent_name: varchar, sex: char, Bdate: date, relationship: varchar) 2. Insert at least five tuples in each relation.
UNIT – III	**8 Hours**
SQL: Specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, More Complex SQL Retrieval Queries.	
Self-study component:	Schema change statements in SQL.
Practical Topics: **(4 Hours)**	1. Retrieve the name and address of all employees who work for the 'Research' department. 2. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date. 3. For each employee, retrieve the employee's first and last name and the first and last name of his or her immediate supervisor. 4. Make a list of all project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manager of the department that controls the project. 5. Retrieve all employees whose address is in Houston, Texas 6. Retrieve all employees in department 5 whose salary is between $30,000 and $40,000. Execute above quires for the Company database defined in Unit-II.
UNIT – IV	**8 Hours**
Specifying Constraints as Assertions and Triggers**,** Views in SQL. **Basics of Functional Dependencies and Normalization for Relational Databases:** Informal design guidelines for relation schema, Functional Dependencies: Inference rules, Normal Forms based on Primary Keys:First ,Second and Third Normal Forms, Boyce–Codd Normal Form.	
Self-study component:	Nested Queries
Practical Topics: **(4 Hours)**	1. Retrieve the names of all employees who do not have supervisors. 2. Retrieve the name of each employee who has a dependent with the same first name and is the same gender as the employee 3. Retrieve the names of employees who have no dependents. 4. List the names of managers who have at least one dependent. 5. Retrieve the Social Security numbers of all employees who work on project numbers 1, 2, or 3.

	6. Find the sum of the salaries of all employees of the 'Research' department, as well as the maximum salary, the minimum salary, and the average salary in this department. 7. For each department, retrieve the department number, the number of employees in the department, and their average salary. Execute above quires for the Company database defined in Unit-II.
UNIT – V	**8 Hours**
Database Design: Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. **Transaction Processing :** Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, characterizing schedules based on Serializability: Serial, Non-serial and conflict-serializable, Testing for conflict serializability of a schedule.	
Self-study component:	Characterizing schedules based on recoverability
Practical Topics: **(4 Hours)**	Consider the following database for a **Banking enterprise:** **BRANCH** (branch-name: string,branch-city: string,assets: real) **ACCOUNT** (accno:int,branch-name: string,balance: real) **DEPOSITOR** (customer-name: string,accno:int) **CUSTOMER** (customer-name: string,customer-street: string,city: string) **LOAN** (loan-number:int,branch-name: string,loan-number-int) **BORROWER** (customer-name: string,customer-street: string,city: string) 1) Create the above tables by properly specifying the primary and foreign keys 2) Enter 5 tuples for each relation 3) Find all the customers who have atleast two accounts at the main branch 4) Find all the customers who have an account at all the branches located in a specified city 3. Demonstrate how you delete all account tuples at every branch located in a specified city

Course Outcomes: On completion of this course, students are able to:

COs	Course Outcomes with *Action verbs* for the Course topics.
CO1	**Apply** the database concepts to create the relations by specifying various constraints.
CO2	**Desi**gn ER diagrams for given scenario.
CO3	**Apply** suitable normalization technique to improve database design.
CO4	**Conduct** experiments on given database using modern tools: Draw io,MySQL.

Text Book(s):

1. Fundamentals of Database Systems – Elmasri and Navathe, 6th Edition, Addison-Wesley, 2011.

Reference Book(s):

1. Data Base System Concepts – Silberschatz, Korth and Sudharshan, 5th Edition, Mc-Graw Hill, 2006
2. An Introduction to Database Systems – C.J. Date, A. Kannan, S. Swamynatham, 8th Edition, Pearson Education, 2006.

Web and Video link(s):

1. https://onlinecourses.nptel.ac.in/noc22_cs91/
2. https://youtu.be/c5HAwKX-suM

NPTEL Web Course:

1. https://onlinecourses.nptel.ac.in/noc18_cs15/preview
2. http://nptel.ac.in/courses/106106093/
3. http://nptel.ac.in/courses/106106095/

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Apply** the database concepts to create the relations by specifying various constraints.	3											
CO2	**Desi**gn ER diagrams for given scenario.	2	2	3									1
CO3	**Apply** suitable normalization technique to improve database design.	3	1	2									
CO4	Conduct experiments on given database using modern tools: Draw io,MySQL.	2	2	2	1	3				1			1

OPERATING SYSTEM

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21IS405**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3:0:2**	**CIE Marks:**	**50**
Total Theory Teaching Hours: **Total Laboratory Hours:**	**40** **24**	**SEE Marks:**	**50**

Course Learning Objectives:

- To familiarize the operations performed by OS as a resource Manager.
- To impart various scheduling policies of OS.
- To teach different memory management techniques..

UNIT – I	**8 Hours**

Introduction: Purpose of Operating System, Computer System Architecture, Operating System Structure, Operating System Operations

System Structures: Operating System Services,User and Operating system interface, System Calls, Types of System calls, System programs.

Processes: Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication.

Self-study component:	Computer system Organization, Computing Environments, Operating System Structure(chapter 2)
Practical Topics: **(6 Hours)**	1. Program to implement the Process system calls. 2. Program to create a Process using API.

UNIT – II	**8 Hours**

Threads: Overview,Multicore Programming, Multithreading Models.

File-system Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation methods.

Self-study component:	Threading Issues,Free Space Management
Practical Topics: **(6 Hours)**	1. Program to implement Sequential file allocation method. 2. Program to simulate Single level directory file organization technique.

UNIT – III	**8 Hours**

Process Synchronization: Critical Section Problem, Peterson's solution, Mutex locks, Semaphores, Classic Problems of Synchronization.

CPU Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms-FCFS, SJF, RR, priority.

Self-study component:	Synchronization Hardware ,Multiple-Processor Scheduling
Practical Topics: **(4 Hours)**	1. Program to simulate the concept of Dining-Philosopher's problem. 2. Program to implement CPU scheduling algorithm for Shortest Job First CPU Scheduling algorithm.

UNIT – IV	**8 Hours**

Deadlocks: System Model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock Detection.

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging.

Self-study component:	Recovery from deadlock, Structure of Page Table
Practical Topics: **(4 Hours)**	1. Simulate Banker's algorithm for Dead Lock Avoidance. 2. Program to implement and simulate the MFT algorithm.

UNIT – V	**8 Hours**

Virtual Memory: Background, Demand paging, Copy on write, Page replacement algorithms-. FIFO page replacement, Optimal page replacement, LRU page replacement

Mass-storage structure: Disk Structure, Disk Scheduling.

Self-study component:	Thrashing, Disk Attachment.
Practical Topics: **(4 Hours)**	1. Program to implement FIFO page replacement technique. 2. Program to simulate FCFS Disk scheduling algorithm.

Course Outcomes: On completion of this course, students are able to:

COs	**Course Outcomes** with ***Action verbs*** for the Course topics.
CO1	**Apply** Various Process Scheduling Algorithms, Disk Scheduling algorithms, Page replacement algorithms and Deadlock detection and avoidance techniques for providing Operating System functionalities.
CO2	**Analyze** and interpret operating system concepts to acquire a detailed understanding of the course.
CO3	**Understand** and explore the fundamental concepts of various operating system services.
CO4	**Conduct** experiments using Programming Language to demonstrate the Basic features of Operating System.

Text Book(s):

1. Operating System Concepts Abraham Silberschatz, Peter Baer Galvin and Greg Gagn, 9th edition, John Wiley &Sons, Inc.

Reference Book(s):

1. Ann McHoes Ida M Flynn, Understanding Operating System, Cengage Learning, 6th Edition
2. D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI (EEE), 2014.
4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

Web and Video link(s):

1. https://www.youtube.com/watch?v=vBURTt97EkA&list=PLBlnK6fEyqRiVhbXDGLXDk_OQAeuVcp2O.
2. https://www.youtube.com/watch?v=783KAB-tuE4&list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f

E-Books/Resources:

- **https://www.researchgate.net/publication/354665053_Operating_System_Concepts_9th201212.**

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Apply** Various Process Scheduling Algorithms, Disk Scheduling algorithms, Page replacement algorithms and Deadlock detection and avoidance techniques for providing Operating System functionalities.	2	2	1									
CO2	**Analyze** and interpret operating system concepts to acquire a detailed understanding of the course.	2	2										
CO3	**Understand** and explore the fundamental concepts of various operating system services.	2	1										
CO4	**Conduct** experiments using Programming Language to demonstrate the Basic features of Operating System.	2	2	1	1								

DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY			
Course Code:	**P21ISL406**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:0:2**	**CIE Marks:**	**50**
Total Number of Lab Hours:	**24**	**SEE Marks:**	**50**

Note: Implement the following programs using *C* Language

Experiments

1.	Print all the nodes reachable from a given starting node in a digraph using BFS method.
2. `	Obtain the Topological ordering of vertices in a given digraph (DFS Based).
3.	Sort a given set of elements using Merge sort method and determine the time taken to sort the elements. Repeat the experiment for different values of *n*, the number of elements in the list to be sorted and plot a graph of the time taken versus *n*.
4.	Sort a given set of elements using Quick sort method and determine the time taken to sort the elements. Repeat the experiment for different values of *n*, the number of elements in the list to be sorted and plot a graph of the time taken versus *n*.
5.	Find the Pattern string in a given Text string using Horspool's String Matching Algorithm.
6.	Sort a given set of elements using Heap Sort algorithm.
7.	Implement 0/1 Knapsack problem using Dynamic Programming.
8.	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra's algorithm.
9.	Find minimum cost spanning tree of a given undirected graph using Kruskal's algorithm.
10.	Implement Sum-of-Subset problem of a given set S = {s1, s2, ..., sn} of 'n' positive integers whose sum is equal to a given positive integer 'd'.

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**Implement** the algorithms based on various algorithm design techniques.	2	2	2		2							
CO2	**Analyze** the efficiency of various algorithms.	2	2										

Employability Enhancement Skills (EES) - IV
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – IV

Course Code:	**P21HSMC408**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable students to:

- Solve problems on ages, mixtures and alligations and progressions.
- Understand the concepts of Data interpretation, crypt arithmetic and data sufficiency.
- Understand the basic concepts of C programming language.
- Apply programming constructs of C language to solve the real-world problem.
- Explore user-defined data structures like arrays, structures and pointers in implementing solutions to the problems.
- Design and Develop solutions to problems using functions.

UNIT – I	**10 Hours**

Quantitative Aptitude: Problems on Ages, Mixtures and Alligations, Progressions.

Logical Reasoning: Data Interpretation, Cryptarithmetic, Data sufficiency.

Self-Study: Sequential output tracing

UNIT – II	**08 Hours**

C Programming: Data types and Operators, Control statements, Looping, Arrays and Strings

Self-Study: Pre-processors

UNIT – III	**10 Hours**

C Programming: Functions, Recursion, Structure, Pointers, Memory management.

Self-Study: Enum and Union

Course Outcomes: On completion of this course, students are able to:

CO – 1:	Solve the problems based on ages, Mixtures, alligations and progressions.
CO – 2:	Apply suitable programming constructs of C language to solve the given problem.
CO – 3:	Design and Develop solutions to problems using functions and recursion.

Text Book(s):

1. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
2. Exploring C by Yashavant Kanetkar, 2nd edition, BPB Publications
3. 3. Test Your C Skills by Yashavant Kanetkar, 2nd edition, BPB Publications

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. Reema Thareja, Programming in C, 2nd Edition, Oxford University Press, 2016.
3. Schaum's outlines, Programming with C, Byron Gottfried, 3rdEdition, Tata McGraw-Hill Publication, 2017.

Web and Video link(s):

1. NPTEL Course: Problem Solving through Programming in C, Prof. Anupam Basu, IIT Kharagpur

https://nptel.ac.in/courses/106/105/106105171/

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - IV]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	2	1	-	-	-	-	-	3	1	2	2
CO-3	-	1	2	-	-	-	-	-	-	2	-	1

Internship - I [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – IV**			
Course Code:	**P21INT409**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0 : 0 : 0**	**CIE Marks:**	**-**
Internship duration	**2 weeks**	**SEE Marks:**	**100**

All the students registered to II year of BE shall have to undergo a mandatory internship of 02 weeks during the intervening vacation of II and III semesters or III and IV semester. Internship shall include Inter / Intra Institutional activities. A Semester End Examination (Presentation followed by question-answer session) shall be conducted during IV semester and the prescribed credit shall be included in IV semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent Semester End Examination after satisfying the internship requirements. (The faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship.)

List of Activities

1. Activities concerned with the works of Indian scholars like Charaka and Susruta, Aryabhata, Bhaskaracharya, Chanakya, Madhava, Patanjali, Panini and Thiruvalluvar, among numerous others. (Reference NEP 2020, page 04)
2. Activities such as training with higher Institutions or Soft skill training organized by Training and Placement Cell of the respective institutions.
3. Contribution at incubation/ innovation /entrepreneurship cell of the institute.
4. Participation in conferences/ workshops/ competitions etc.
5. Learning at Departmental Lab/Tinkering Lab/ Institutional workshop.
6. And working for consultancy/ research project with-in the institute. [Serial numbers 2 to 6, AICTE Internship Policy.pdf page 8]
7. Learning MS Word, Excel, Microsoft equations, MS drawing tools, MS Power point, etc.
8. Coding.
9. Mini-projects using commercially available assembled electronic products.
10. Debates, quizzes, and group discussions: On technica
11. Essay competitions: Both in Kannada and English on technical topics already studied.
12. Survey and study of published literature on the assigned topic: Technical paper survey, Preparation of synopsis. Exposure to technical paper publications.
13. Athletics and Sports.
14. Photography.
15. Short film production: Contemporary aspects, Technical aspects etc.
16. Music Competition (Vocal and Instrumental): Classical – Indian and western, Sugama- Sangeetha (Bhava Geethegalu), Folk songs, film songs etc.
17. Internship in Disaster Management. [AICTE APH 2021-22 pdf page166]

18. Solar energy connected activities that help common man. [AICTE APH 2021-22 pdf page166]
19. Working with Smart City Administration.
20. Hackathon (it is a design sprint-like event in which computer programmers and others involved in software development, including graphic designers, interface designers, project managers, and others, often including domain experts, collaborate intensively on software projects).
21. Industrial Safety, Fire Safety, Electrical Safety, Chemical Process Safety, Food Safety etc.
22. Internship and project work in Indian Knowledge System related Areas / Topics.
23. Industrial visits / small scale Industries / Factories / Cottage Industries / substation visit / short project tour, etc., and submission of report.

Documents to be submitted by Students for Internship Evaluation

I. **Student's Diary**

The main purpose of writing a daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students shall record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any, and activities carried out. It should contain the sketches and drawings related to the observations made by the students. The daily training diary should be signed after every day or at least twice a week by the Faculty/ in charge of the section (external expert) where the student has been working.

The student's Diary should be submitted by the students along with attendance record. It shall be evaluated on the basis of the following criteria:

- **(i)** Regularity in the maintenance of the diary.
- **(ii)** Adequacy and quality of information recorded.
- **(iii)** Drawings, sketches, and data recorded.
- **(iv)** Thought process and recording techniques used.
- **(v)** Organization of the information.

II. **Internship Report**

After completion of the Internship, the student shall prepare, with daily dairy as a reference, a comprehensive report in consultation with the evaluators to indicate what he has observed and learned in the training period along with the internship outcomes. The training report should be signed by the Evaluator.

The Internship report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed.

- **(i)** Originality.
- **(ii)** Adequacy and purposeful write-up.
- **(iii)** Organization, format, drawings, sketches, style, language etc.
- **(iv)** Variety and relevance of learning experience.

Practical applications relationships with basic theory and concepts taught in the course.

Table – 1: Intra and Inter Institute Activities and Assessment Rubrics					
Sl No	**Sub Activity Head**	**Performance/ Appraisal**	**Assessment Rubrics (Allotted marks decide the letter grade)**	**Proposed Document as Evidence**	**Evaluated by**
1	Inter/Intra Institutional Workshop/ Training.	Excellent	80 to 100	**(i)** Student's Diary and **(ii)** Internship Report along with the certificate issued from relevant authorized Authority	**i)** Institute Faculty together with External Expert if any. **(ii)** Training and Placement Officer. **(iii)** Physical Education Officer or the concerned in charge Officer of the Activity
		Good	79 to 60		
		Satisfactory	59 to 40		
		Unsatisfactory and fail	<39		

Basic Engineering Mathematics - II [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – IV (Lateral Entry: Common to all branches)**			
Course Code:	**P21MDIP401**	**Credits:**	**00**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**-**

Course objective: The mandatory learning course **P21MADIP401** viz., **BASIC ENGINEERING MATHEMATICS-II** aims to provide essential concepts of linear algebra, introductory concepts of second & higher order differential equations along with various techniques/ methods to solve them, Laplace & inverseLaplace transforms and elementary probability theory.

UNIT – I	**8 Hours**

Linear Algebra: Introduction - Rank of matrix by elementary row operations - Echelon form of a matrix. Consistency of system of linear equations - Gauss elimination method. Gauss-Jordan and LU decomposition methods. Eigen values and Eigen vectors of a square matrix.

Self-study component:	Application of Cayley-Hamilton theorem (without proof) tocompute the inverse of a matrix-Examples.

UNIT – II	**8 Hours**

Higher order ODE's: Linear differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators. and variation of parameters. Solution of Cauchy's homogeneous linear equation and Legendre's linear differential equation.

Self-study component:	Method of undetermined coefficients

UNIT – III	**8 Hours**

Multiple Integrals: Double and triple integrals-region of integration. Evaluation of double integrals by change of order of integration.

Vector Integration: Vector Integration: Integration of vector functions. Concept of a line integrals, surface and volume integrals. Green's, Stokes's and Gauss theorems (without proof) problems.

Self-study component:	Orthogonal curvilinear coordinates.

UNIT – IV	**8 Hours**

Laplace transforms: Laplace transforms of elementary functions. Transforms of derivatives and integrals, transforms of periodic function and unit step function-Problems only. Inverse Laplace transforms: Definition of inverse Laplace transforms. Evaluation of Inverse transforms by standard methods.

Self-study component:	Application to solutions of linear differential equations and simultaneous differential equations.

UNIT – V	8 Hours

Probability: Introduction. Sample space and events. Axioms of probability. Addition and multiplication theorems. Conditional probability – illustrative examples.

Self-study component:	State and prove Bayes's theorem.

Course Outcomes: After the successful completion of the course, the students are able to

CO1	**Apply** matrix theory for solving systems of linear equations in the different areas of linear algebra.
CO2	**Solve** second and higher order differential equations occurring in of electrical circuits, damped/un-damped vibrations.
CO3	**Identify** - the technique of integration to evaluate double and triple integrals by change of variables, and vector integration technique to compute line integral
CO4	**Explore** the basic concepts of elementary probability theory and, apply the same to the problems ofdecision theory.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition), Khanna Publishers, New Delhi.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill publications, New Delhi, 11thReprint, 2010.

REFERENCE BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics (Latest Edition), Wiley Publishers, New Delhi.
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing HousePvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–Westpress, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										
CO2	**3**	**2**										
CO3	**2**	**3**										
CO4	**2**	**2**										
CO5	**3**											
Strength of correlation: Low-1, Medium- 2, High-3												

Employability Enhancement Skills (EES) - II
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – IV

Course Code:	**P21HDIP408**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**-**

Course Learning Objectives: This course will enable students to:

- Get introduced to the concepts of teamwork and leadership
- Understand the importance of professional etiquettes
- Describe the reading with comprehension
- Explain the purpose, plan and ways to identify specific details in a paragraph for better comprehension
- Form grammatically correct sentences
- Explain the basic concepts in calculating simple interest and compound interest
- Explain concepts behind logical reasoning modules of direction sense, coding & decoding, series and visual reasoning

UNIT – I	**10 Hours**

Soft Skills: Etiquette, Presentation Skills, Introduction to Body Language, Interpersonal and Intrapersonal Skills, Team work, Leadership skills, Extempore

Self-Study: Concepts of Sympathy and Empathy

UNIT – II	**10 Hours**

Verbal Ability: Verbal Analogies, Sentence completion & correction, Reading comprehension

Self-Study: Paragraph sequencing

UNIT – III	**8 Hours**

Quantitative Aptitude: Simple & Compound Interest, Ratio & Proportion, Time & Work

Logical Reasoning: Direction Sense, Coding and Decoding, Series, Visual reasoning

Self-Study: Directions and Pythagoras Theorem, differences between mirror and water images

Course Outcomes: On completion of this course, students are able to:

CO – 1:	Exhibit amplified level of confidence to express themselves in English
CO – 2:	Critical awareness of the importance of teamwork and development of the skills for building effective teams
CO – 3:	Solve the questions under reading comprehension confidently with higher accuracy
CO – 4:	Solve the problems based on interest, ratio & proportion, time & work
CO – 5:	Solve logical reasoning problems based on direction sense, coding & decoding and series

Text Book(s):

1. Word Power Made Easy New Revised and Expanded Edition, First Edition, Norman Lewis, Goyal Publisher.
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):

1. Teamwork Skills: Communicating Effectively in Groups
   https://www.coursera.org/learn/teamwork-skills-effective-communication

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - II]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	3	1	2	2
CO-3	-	-	-	-	-	-	-	-	-	2	-	1
CO-4	2	-	-	-	-	-	-	-	-	-	-	-
CO-5	2	-	-	-	-	-	-	-	-	-	-	-

BE – III / IV Semester – Common to all

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ			
ವಿಷಯ ಸಂಕೇತ (**Course Code**)	**P21KSK307/407**	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	**50**
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ **Teachin Hours / Week (L:T:P)**	**0-2-0**	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು	**50**
ಒಟ್ಟು ಬೋಧನ ಅವಧಿ	**25 ಗಂಟೆಗಳು**	ಒಟ್ಟು ಅಂಕಗಳು	**100**
ಕ್ರೆಡಿಟ್ಸ್ (**Credits)**	**1**	ಪರೀಕ್ಷೆಯ ಅವಧಿ	**01 ಗಂಟೆ**

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

೧. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಾಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

೨. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಹಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಾಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.

೩. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು

೪. ಕನ್ನಡ ಶಬ್ದಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷಿಯ ಬಳಕಿ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process – General Instructions):

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

೧. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

೨. ಇತ್ರೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು – ಅಂದರೆ ಕವಿ–ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.

೩. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ – ೧ ಲೇಖನಗಳು

೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ – ಹಂಪ ನಾಗರಾಜಯ್ಯ

೨. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ – ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ

೩. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ – ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೋ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

ಘಟಕ – ೨ ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ	
೧. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ. ೨. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ – ಕನಕದಾಸರು ೩. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು – ಶಿಶುನಾಳ ಶರೀಫ	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
ಘಟಕ – ೩ ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ	
೧. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು ೨. ಕುರುಡು ಕಾಂಚಾಣ: ದಾ.ರಾ. ಬೇಂದ್ರೆ ೩. ಹೊಸಬಾಳಿನ ಗೀತೆ: ಕುವೆಂಪು	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
ಘಟಕ – ೪ ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	
೧. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ – ಎ ಎನ್ ಮೂರ್ತಿರಾವ್ ೨. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ: ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
ಘಟಕ – ೫ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ	
೧. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ ೨. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (Course Outcomes)

೧. ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.
೨. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ.
೩. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.
೪. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.

ಮೌಲ್ಯಮಾಪನದ ವಿಧಾನ (Assessment Details – both CIE and SEE)

(methods of CIE – MCQ, Quizzes, Open book test, Seminar or micro project)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and 35% marks in SEE to pass. Theory Semester End Exam (SEE) is conducted for 50 marks (01 hour duration). Based on this grading will be awarded.

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour)**

Two assignments each of **10 Marks**

CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam

SEE will be conducted as per the scheduled timetable, with common question papers for the subject,

1. The question paper will have 25 questions. Each question is set for 02 marks.

2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ:

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ
ಡಾ. ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಎಲ್. ತಿಮ್ಮೇಶ,
ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

BE – III / IV Semester – Common to all

ಬಳಕೆ ಕನ್ನಡ – Balake Kannada (Kannada for Usage) **ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ – (Prescribed Textbook to Learn Kannada)**			
ವಿಷಯ ಸಂಕೇತ (**Course Code**)	**P21KBK307/407**	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	**50**
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ **Teachin Hours / Week (L:T:P)**	**0-2-0**	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು	**50**
ಒಟ್ಟು ಬೋಧನ ಅವಧಿ	**25** ಗಂಟೆಗಳು	ಒಟ್ಟು ಅಂಕಗಳು	**100**
ಕ್ರೆಡಿಟ್ಸ್ (**Credits**)	**1**	ಪರೀಕ್ಷೆಯ ಅವಧಿ	**01** ಗಂಟೆ

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು (Course Learning Objectives):

- To create the awareness regarding the necessity of learning local language for comfortable and healthy life.
- To enable learners to Listen and understand the Kannada language properly.
- To speak, read and write Kannada language as per requirement.
- To rain the learners for correct and polite conservation.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process – General Instructions):

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

೧. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಟಿಯು ಸೂಚಿಸಿರು ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೊಗಿಸಬೇಕು.

೨. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

೩. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತೆ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.

೪. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.

೫. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module - 1

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activites
3. Key to Transcription.
4. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು –Personal Pronouns, Possessive Forms, Interrogative words

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

Module - 2	
೧. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possessive forms of nouns, dubitive question and Relative nouns ೨. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative and Colour Adjectives, Numerals ೩. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
Module - 3	
೧. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative Cases, and Numerals ೨. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers ೩. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು – Defective / Negative Verbs and Colour Adjectives	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
Module - 4	
೧. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) ೨. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication ೩. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು – Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs ೪. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ – Comparative, Relationship, Identification and Negation Words	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
Module - 5	
೧. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು – ifferint types of forms of Tense, Time and Verbs ೨. ದ್, –ತ್, –ತು, –ಇತು, –ಆಗಿ, –ಅಲ್ಲ, –ಗ್, –ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ – Formation of past, Future and Present Tense Sentences with Verb Forms ೩. Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು – Kannada Words in Conversation	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು : Course Outcomes (Course Skill Set): At the end of the Couse, The Students will be able

1. To understand the necessity of learning of local language for comfortable life.
2. To Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To communicate (converse) in Kannada language in their daily life with kannada speakers.
5. To speak in polite conservation.

(**Assessment Details – both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and aearned the credits allotted to each subject / course if the student secures not less than 35% (18 Marks out of 50) in the semester – end examination (SEE), and a minimum of 40% (40 maeks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour)**
Two assignments each of **10 Marks**

CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam (SEE)

SEE will be conducted as per the scheduled timetable, with common question papers for the subject,

1. The question paper will have 25 questions. Each question is set for 02 marks.
2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ (Text book) :
ಬಳಕೆ ಕನ್ನಡ
ಲೇಖಕರು: ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,
ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

BE – III / IV Semester – Common to all

Constitution of India and Professional Ethics (CIP)			
Course Code	**P21CIP307/407**	**CIE Marks**	**50**
Teachin Hours / Week (L:T:P)	**0-2-0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**25 Hours**	**Total Marks**	**100**
Credits	**1**	**Exam Hours**	**01 Hour**

Course Objectives: This course will enable the students

a. To know the fundamental political structure & codes, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens.

b. To understand engineering ethics and their responsibilities, identify their individual roles and ethical responsibilities towards society.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

- ✓ Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.
  - (i) Direct instructional method (Low /Old Technology),
  - (ii) Flipped classrooms (High/advanced Technological tools),
  - (iii) Blended learning (combination of both),
  - (iv) Enquiry and evaluation based learning,
  - (v) Personalized learning,
  - (vi) Problems based learning through discussion,
  - (vii) Following the method of expeditionary learning Tools and techniques,

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can enhance the students in theoretical applied andpractical skills in teaching of 21CIP39/49 in general.

Module - 1

Introduction to Indian Constitution: Definition of Constitution, Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly. Preamble of Indian Constitution & Key concepts of the Preamble. Salientfeatures of India Constitution.

Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).

Module - 2	
Fundamental Rights (FR's), Directive Principles of State Policy (DPSP's) and Fundamental Duties (FD's): Fundamental Rights and its Restriction and limitations in different Complex Situations. DPSP's and its present relevance in Indian society. Fundamental Duties and its Scope and significance inNation building.	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).
Module - 3	
Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Courtof India, Judicial Reviews and Judicial Activism.	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).
Module - 4	
State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (Why and How) and Important Constitutional Amendments till today. Emergency Provisions.	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).
Module - 5	
Professional Ethics: Definition of Ethics & Values. Professional & Engineering Ethics. Positive andNegative aspects of Engineering Ethics. Clash of Ethics, Conflicts of Interest. The impediments to Responsibility. Professional Risks, Professional Safety and liability in Engineering. Trust & Reliability inEngineering, Intellectual Property Rights (IPR's).	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).

Course outcome (Course Skill Set)

At the end of the course the student should :

CO 1: Have constitutional knowledge and legal literacy.
CO 2: Understand Engineering and Professional ethics and responsibilities of Engineers.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks that is 20 marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour**)
Two assignments each of **10 Marks**

The average of two tests, two assignments, and quiz/seminar/group discussion will be out of 50 marks

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject.

- The question paper will have 25 questions. Each question is set for 02 marks.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 50 marks. Duration of the examination is 01 Hour.

Textbook:

1. **"Constitution of India & Professional Ethics"** Published by Prasaranga or published onVTU website with the consent of the university authorities VTU Belagavi.