



SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution
MANGALURU

SCEM/PRIN/2022-23/079a

20/12/2022

NOTE

To,

The Head of the Department,
Information Science and Engineering.

Sub.: Approved copy of the 2021 Scheme and Syllabus for the THIRD Semester effective from the Academic Year 2022-23.

Ref.: 1. Proceedings of the 2nd Academic Council Meeting of SCEM

2. Proceedings of the Joint Board of Studies

3. Proceedings of the BoS in Computer Science and Engineering & Allied Branches

With respect to the above subject, the Academic Council approved 2021 Scheme and Syllabus of the Third Semester UG for the batch of 2021-25 for the following programs is enclosed:

1. B.E. in Information Science & Engineering

2. B.E. in Computer Science & Engineering (Data Science)

You are hereby informed to use the enclosed scheme and syllabus for the Academic and Examination activities.

Further, you are informed to bring the same to the notice of the faculty members, students and the others concerned.

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Encl.:

1. 2021 Scheme and Syllabus of Information Science & Engineering (THIRD SEMESTER)
2. 2021 Scheme and Syllabus of Computer Science & Engineering (Data Science) (THIRD SEMESTER)

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COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution
MANGALURU

B.E. IN COMPUTER SCIENCE AND ENGINEERING

**SCHEME OF TEACHING AND EXAMINATIONS 2021
OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS)
(2021-SCHEME; EFFECTIVE FROM THE ACADEMIC YEAR 2023 - 23)**

III SEMESTER

| Sl. No. | Course | Course Code | Course Title | Teaching Department (TD) and Question Paper Setting Board (PSB) | Teaching Hours / Week | | | | | Examination | | | | | | | | |
|---------|--|--------------------|---|---|--|----------|---------------------|------------|-------------------|-------------|-----------|-------------|-----|---|-----|-----|-----|----|
| | | | | | Theory Lecture | Tutorial | Practical / Drawing | Self-Study | Duration in hours | CIA Marks | SEE Marks | Total Marks | | | | | | |
| | | | | | | | | | | | | | L | T | P | S | | |
| 1 | BSC | 21MAT301 | Computational Mathematics - I | Maths / Any CSE Board Department | 3 | 0 | 0 | 0 | 1 | 3 | 50 | 50 | 100 | 3 | | | | |
| 2 | IPCC | 21CS32 | Digital Logic Design and Computer Organization | Any CSE Board | 3 | 0 | 2 | 2 | 0 | 3 | 50 | 50 | 100 | 4 | | | | |
| 3 | IPCC | 21CS33 | Object Oriented Programming with Java | | 3 | 0 | 2 | 2 | 0 | 3 | 50 | 50 | 100 | 4 | | | | |
| 4 | PCC | 21CS34 | Data Structures and its Applications | | 3 | 0 | 0 | 0 | 0 | 3 | 50 | 50 | 100 | 3 | | | | |
| 5 | PCC | 21CSL35 | Data Structures Laboratory with C | | 0 | 0 | 2 | 2 | 0 | 2 | 50 | 50 | 100 | 1 | | | | |
| 6 | UHV | 21UJH36 | Social Connect and Responsibility | Any Department | 1 | 0 | 0 | 0 | 0 | 1 | 50 | 50 | 100 | 1 | | | | |
| 7 | HSMC | 21KSK37/47 | Sanskrutika Kannada | TD and PSB: HSMC | 1 | 0 | 0 | 0 | 0 | 1 | 50 | 50 | 100 | 1 | | | | |
| | HSMC | 21KBK37/47 | Balake Kannada | | | | | | | | | | | | | | | |
| | OR | | | | | | | | | | | | | | | | | |
| | HSMC | 21CIP37/47 | Constitution of India, Professional Ethics and Cyber Laws | TD: Concerned Department PSB: Concerned Board | If offered as Theory Course | | | | | 1 | | | | | | | | |
| 8 | AEC | 21CS38X / 21CSL38X | Ability Enhancement Course - III | | If offered as Lab. Course | | | | | 2 | 50 | 50 | 100 | 1 | | | | |
| | | | | | 0 | 0 | 2 | 2 | 0 | | | | | | | | | |
| | | | | | Total | | | | | | | | | | 400 | 400 | 800 | 18 |
| 9 | Scheduled activities for III to VIII Semesters | NMDC 21NS83 | National Service Scheme (NSS) | NSS | All students have to register for any one of the courses namely National Service Scheme, Physical Education (PE) (Sports and Athletics) and Yoga with the concerned coordinator of the course during the first week of III semester. The activities shall be carried out from (for 5 semesters) between III semester to VIII semester. SEE in the above courses shall be conducted during VIII semester examinations and the accumulated CIA marks shall be added to the SEE marks. Successful completion of the registered course is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE and Yoga activities. | | | | | | | | | | | | | |
| | | NMDC 21PE83 | Physical Education (PE) (Sports and Athletics) | PED | | | | | | | | | | | | | | |
| | | NMDC 21YO83 | Yoga | Yoga | | | | | | | | | | | | | | |

COURSE PRESCRIBED TO LATERAL ENTRY DIPLOMA HOLDERS ADMITTED TO III SEMESTER B.E. PROGRAMS

| I | NCMC | 21MATDIP31 | Additional Mathematics - I | Maths | 2 | 0 | 0 | 1 | 3 | 50 | 50 | 100 | 0 |
|--|-----------------------------------|------------|----------------------------|-------|---|---|---|---|---|----|----|-----|---|
| <p>Note: BSC: Basic Science Course, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, INT –Internship, HSMC: Humanity and Social Science & Management Courses, AEC– Ability Enhancement Courses. UHV: Universal Human Value Course.</p> <p>L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting department.</p> <p>21KSK37/47 Sanskritika Kannada is for students who speak, read and write Kannada and 21KKBK37/47 Balake Kannada is for non-Kannada speaking, reading, and writing students.</p> <p>Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory part of the IPCC shall be evaluated both by CIA and SEE. The practical part shall be evaluated by only CIA (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering (BE) 2021-22 may be referred.</p> <p>21INT49 Inter/Intra Institutional Internship: All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory 21INT49 Inter/Intra Institutional Internship of 03 weeks during the intervening period of III and IV semesters. The internship shall be slated for CIA only and will not have SEE. The letter grade earned through CIA shall be included in the IV semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequently after satisfying the internship requirements. The faculty coordinator or mentor shall monitor the students' internship progress and interact with them for the successful completion of the internship.</p> <p>Non-Credit Mandatory Courses (NCMC):</p> <p>(A) Additional Mathematics I:</p> <p>1) This course is prescribed in the III semester to the to the lateral entry Diploma holders admitted to the second year of the B.E., programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Assessment (CIA). These courses are slated for both CIA and SEE.</p> <p>2) Additional Mathematics I shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.</p> <p>3) Successful completion of the courses Additional Mathematics I shall be indicated with Pass (PP) grade in the grade card. Non-completion of the courses will lead to the award of Not Pass (NP) Grade.</p> <p>4) In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIA marks and 40% of the prescribed SEE marks, shall be deemed to have secured an NP grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s.</p> <p>(B) National Service Scheme/Physical Education (Sport and Athletics)/ Yoga:</p> <p>1) Securing 40% or more in CIA, 40% or more marks in SEE and 40% or more in the sum total of CIA + SEE leads to successful completion of the registered course.</p> <p>2) In case, students fail to secure 40 % marks in SEE, they have to appear for SEE during the subsequent examinations and obtain the minimum requirement.</p> <p>3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum requirements as mentioned in (B).I, they shall be awarded with NP Grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s.</p> <p>4) Successful completion of the course shall be indicated with a PP Grade in the grade card.</p> <p>5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.</p> | | | | | | | | | | | | | |
| ABILITY ENHANCEMENT COURSE - III | | | | | | | | | | | | | |
| 21CSL381 | Competitive Programming using C++ | 21CSL383 | AUTOSAR | | | | | | | | | | |
| 21CSL382 | Fundamentals of R programming | | | | | | | | | | | | |



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COMPUTATIONAL MATHEMATICS I

(2021-Scheme; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|----------|------------|----|
| Course Code | 21MAT301 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 3:0:0:1 | SEE Marks | 50 |
| Total Hours of Pedagogy | 50 | Exam Hours | 03 |

CREDITS – 3

COURSE PREREQUISITES:

- Applied Mathematics-I, Applied Mathematics-II

COURSE OBJECTIVES:

- Enable the students to use the concepts of Fourier series and transforms to solve engineering problems.
- Study the various Numerical methods of solving first order Differential Equations.
- Develop combinatorics skills and apply the concept of recurrence relation and generating functions.
- Apply the concepts of mathematical logic to real life problems.
- Study the basic concepts of relations and functions and apply them to combinatorial problems.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|---|-----------------|
| Fourier series: Periodic functions, Dirichlet's condition. Fourier series of periodic functions and arbitrary period. Half-range Fourier series. Practical harmonic analysis and applications. | 14 Hours |
| Fourier transforms: Infinite Fourier transforms, Fourier sine, and cosine transforms. Inverse Fourier transforms. Application of Fourier transforms for Signals. | |

MODULE - II

| | |
|--|----------------|
| Numerical solution of ODEs of the first order and first degree: Taylor's series method, Modified Euler's method. Problems on Runge -Kutta method of fourth order, Milne's and Adam-Bash forth predictor corrector method. | 6 Hours |
|--|----------------|

MODULE - III

| | |
|--|-----------------|
| Combinatorics: Counting Principle, Permutations and Combinations, Binomial Theorem, Recurrence relations, Generating functions. Applications of Combinatorics in Computer Network Security. | 10 Hours |
|--|-----------------|

MODULE - IV

| | |
|--|-----------------|
| Mathematical Logic: Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference. Quantifiers- Definitions, Uses, and the Proofs of Theorems. Applications of Mathematical Logic in Artificial Intelligence. | 10 Hours |
|--|-----------------|

(5 Set)



MODULE - V

Relations: Cartesian Products and Relations, Properties of Relations, Computer Recognition – Zero-One Matrices and Directed Graphs, Equivalence Relations and Partitions. Partial Orders – Hasse Diagrams, Lattices, Groups.

10 Hours

Functions: One-One, Onto Functions. The Pigeonhole Principle, Function Composition, and Inverse Functions. Applications of Relations and Functions in Database Management systems.

ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Assignments | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

CO - ASSESSMENT MAPPING

| Continuous Internal Assessment (CIA) (50%) | | | | Semester End Exam (SEE) (50%) | |
|--|-------|------|---------------------------------|-------------------------------|--|
| Continuous Internal Evaluation (CIE) (60%) | | | Assignment/ Activities (40%) | | |
| I | II | III | | | |
| Syllabus Coverage | | | Syllabus Coverage | Syllabus Coverage | |
| 40% | 30% | 30% | 100% | 100% | |
| *M I | | | M I | M I | |
| M II | M II | | M II | M II | |
| | M III | | M III | M III | |
| | | M IV | M IV | M IV | |
| | | M V | M V | M V | |

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

M - Module

ASSIGNMENT TYPES WITH WEIGHTAGES

| Sl. No. | Assignment Description | Max. Weightage (%) | Max. Marks |
|---------|--|--------------------|------------|
| 1 | Written Assignments | 25 % | 05 |
| 2 | Quiz | 10 % | 02 |
| 3 | Case Studies | 25 % | 05 |
| 4 | Seminar/Presentation | 15 % | 03 |
| 5 | Peer - to -Peer Learning | 10 % | 02 |
| 6 | Activity Based Learning | 50 % | 10 |
| 7 | Project Based Learning | 50 % | 10 |
| 8 | Field Work + Report | 50 % | 10 |
| 9 | Industry Visit + Report | 50 % | 10 |
| 10 | NPTEL/MOOC Courses – Registration and Assignment Submissions | 50 % | 10 |
| | NPTEL Certification | 75 % | 15 |
| 11 | Any other Innovative Assignments (CL4 and above) | 50 % | 10 |

Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands

SEE QUESTION PAPER PATTERN:

- The question paper will have TEN full questions from FIVE Modules

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2. There will be 2 full questions from each module. Every question will carry a maximum of 20 marks.
3. Each full question may have a maximum of four sub-questions covering all the topics under a module.
4. The students will have to answer FIVE full questions, selecting one full question from each module.

TEXT BOOKS:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. Ralph P Grimaldi: Discrete and Combinatorial Mathematics, 5th edition, Pearson Education. 2004

REFERENCE BOOKS:

1. C Ray Wylie, Louis C Barrett: "Advanced Engineering Mathematics", 6th Edition,
2. B.V Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill,
3. Thomas Koshy: Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
2. <https://youtu.be/p2b2Vb-cYCs>
3. <https://youtu.be/O3U8fomrAug>
4. <https://youtu.be/UKHBWzoOKsY>
5. <https://youtu.be/spUNpyF58BY>
6. <https://youtu.be/X-z6e1zZw80>

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DIGITAL LOGIC DESIGN AND COMPUTER ORGANIZATION

(2021-Scheme; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|-----------|------------|----|
| Course Code | 21CS32 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 3:0:2:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 40L + 20P | Exam Hours | 03 |

CREDITS – 4

COURSE PREREQUISITES:

- Basic logic design principles and various function of digital computer.

COURSE OBJECTIVES:

- Illustrate combinational digital circuits.
- Demonstrate the use of flipflops and apply for registers and counters.
- Explain the basic sub systems of a computer, their organization, structure and operation.
- Describe memory hierarchy and concept of cache memory.
- Describe arithmetic and logical operations with integer operands.
- Demonstrate different ways of communicating with I/O devices and standard I/O interfaces.
- Illustrate organization of a simple processor and other computing systems using instruction level parallelism.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|--|----------------|
| Combinational Logic design: Karnaugh Map, Minimization of complete and incomplete Boolean expressions using K-Map, Multiplexers, Three state buffers, Decoders and Encoders, Programmable Logic devices. <i>(Text book 1:Part B: Chapter 5 (Sections 5.1 to 5.4),Chapter 9 (Sections 9.1 to 9.6))</i> | 8 Hours |
|--|----------------|

MODULE - II

| | |
|---|----------------|
| Sequential Logic Design: Flip-Flops and its Applications: Master Slave Flip-Flops, Edge-Triggered Flip-Flops, Registers, Counters, Design of Synchronous Counters. <i>Text book 1:Part B: Chapter 11 (Sections 11), Chapter 12(Sections 12)</i> | 8 Hours |
|---|----------------|

MODULE - III

| | |
|--|----------------|
| Basic Structure of Computers: Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. | 8 Hours |
| Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations. <i>Text book 2: Chapter1 – 1.3, 1.4, 1.6 (1.6.1-1.6.4, 1.6.7, Chapter5 – 5.1 to 5.4, 5.5 (5.5.1, 5.5.2), 5.6</i> | |

MODULE - IV

| | |
|--|----------------|
| Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers. | 8 Hours |
|--|----------------|



| | | | |
|---|--|---------------------------------|--------------------------------------|
| Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Direct Memory Access, Buses, Interface Circuits. | | | |
| <i>Textbook 2: Chapter2-2.1, Chapter6 – 6.1 to 6.3 Chapter4 – 4.1, 4.2, 4.4, 4.5, 4.6</i> | | | |
| MODULE - V | | | |
| Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Hard-wired Control, Micro programmed Control. | | | 8 Hours |
| Machine Instructions and Addressing Modes: Memory Location and Addresses, Instructions and Instruction Sequencing, Addressing Modes | | | |
| <i>Textbook 2: Chapter7 – 7.1, 7.2,7.4, 7.5 Chapter2 – 2.2 to 2.5</i> | | | |
| LABORATORY COMPONENTS | | | |
| Exp. No. | Experiment Description | | Bloom's Taxonomy Level |
| 1. | Design and implement Half adder, Half subtractor, Full adder and Full Subtractor using basic gates. | | CL4 |
| 2. | Given a 4-variable logic expression, simplify it using appropriate technique and realize the simplified logic expression using 8:1 multiplexer IC. | | CL4 |
| 3. | Design and implement code converter I) Binary to Gray (II) Gray to Binary Code. | | CL4 |
| 4. | Design and implement a mod-n (n<8) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working. | | CL4 |
| 5. | Design and implement an asynchronous counter using decade counter IC to count up from 0 to n (n<=9) and demonstrate on 7-segment display. | | CL4 |
| 6. | Synthesis of Combinational Multipliers to multiply two 4-bit binary numbers. | | CL4 |
| 7. | Design and simulate Booth's Multiplier to multiply two signed integers. | | CL4 |
| 8. | Design and realization of 16-bit ALU (Arithmetic Logic Unit). | | CL4 |
| 9. | Design and simulate 4x4 RAM. | | CL4 |
| ASSESSMENT STRATEGY | | | |
| Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods: | | | |
| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Practical Session (Laboratory Component) | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |
| CO - ASSESSMENT MAPPING | | | |
| Continuous Internal Assessment (CIA) (50%) | | | Semester End Exam (SEE) (50%) |
| Continuous Internal Evaluation (CIE) (60%) | | Practical Sessions (40%) | |
| I | II | | III |
| Syllabus Coverage | | | Syllabus Coverage |
| 40% | 30% | 30% | 100% |
| M I | | | M I |
| M II | M II | | M II |
| | M III | | M III |
| | | M IV | M IV |
| | | M V | M V |



NOTE:

- Assessment will be both CIA and SEE.
- The practical sessions of the IPCC shall be for CIE only.
- The Theory component of the IPCC shall be for both CIA and SEE respectively.
- The questions from the practical sessions shall be included in Theory SEE.

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

SEE QUESTION PAPER PATTERN:

- The question paper will have **TEN** full questions from **FIVE** Modules
- There will be 2 full questions from each module. Every question will carry a maximum of 20 marks.
- Each full question may have a maximum of four sub-questions covering all the topics under a module.
- The students will have to answer **FIVE** full questions, selecting one full question from each module.

TEXT BOOKS:

1. Charles H Roth and Larry L Kinney, Analog and Digital Electronics, Cengage Learning, 2019. (Chapters: 5, 9, 11, 12)
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002 (Chapters: 1, 2, 4, 5, 6, 7)

REFERENCE BOOKS:

1. Digital Principles and Design, Donald D. Givone, 1st Edition, 2002, Tata McGraw-Hill Publishers.
2. Computer Organization and Architecture Designing For Performance, William Stallings 11th Edition, 2019, Pearson.
3. Logic and Computer Design Fundamentals, M. Morris Mano Charles Kime, 4th Edition 2014, Pearson.
4. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008
5. Digital Design and Computer Architecture, David M Harris, Sarah L Harris, 2nd Edition, 2013, Elsevier Morgan Kaufmann Publishers.

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. <https://nptel.ac.in/courses/108/105/108105132/>
2. <https://nptel.ac.in/courses/106/103/106103068/>
3. <https://nptel.ac.in/content/storage2/courses/106103068/pdf/coa.pdf>
4. <https://nptel.ac.in/courses/106/105/106105163/>
5. <https://nptel.ac.in/courses/106/106/106106092/>
6. <https://nptel.ac.in/courses/106/106/106106166/>
7. <http://www.nptelvideos.in/2012/11/computer-organization.html>
8. <http://vlabs.iitkgp.ac.in/coa/index.html>
9. <http://vlabs.iitkgp.ac.in/dec>



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OBJECT ORIENTED PROGRAMMING WITH JAVA

(2021 Scheme; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|-----------|------------|----|
| Course Code | 21CS33 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 3:0:2:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 40L + 20P | Exam Hours | 03 |

CREDITS – 4

COURSE PREREQUISITES:

- Fundamental knowledge of Programming.

COURSE OBJECTIVES:

- Learn fundamental Object-Oriented features of Java, classes, objects and its methods.
- Set up Java JDK environment to create, debug and run simple Java programs.
- Explore the concepts of Inheritance, Packages and Interfaces.
- Create Multi-threaded programs, Event handling mechanisms
- Demonstrate the usage of NodeJS and Java API

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

The Java Language: An overview of Java, Data types, Variables and Arrays, Operators and Control statements. A closer look at methods and classes. A closer look at methods and classes.

Introducing classes: Fundamentals of classes and objects, A closer look at methods and classes.

Textbook 1: Chapter 1 to Chapter 7

MODULE - II

Inheritance: Inheritance basics, Usage of Super and final keywords, Multilevel Inheritance, Constructors, Method overriding, Dynamic method dispatch, Abstract classes.

Packages and Interfaces: Packages, Access Protection, Interfaces.

Textbook 1: Chapter 8 to Chapter 9

MODULE - III

Exception Handling: Fundamentals, Exception types, Uncaught Exceptions, Usage of try, catch, throw, throws, and finally keywords. Nested try, Multiple catch clauses, Java's built-in exceptions, User defined exceptions.

Multithreaded Programming: The Java thread model, the main thread, thread creation, Thread priorities, Synchronization, Interthread communication, Deadlock, Suspending, Resuming, Stopping threads, Producer consumer problem.



| | | | | |
|--|---|--------------------------|-------------------------------|------------------------|
| Textbook 1: Chapter 10 to Chapter 11 | | | | |
| MODULE - IV | | | | |
| Event Handling: AWT Fundamentals, The delegation event model, Event classes, Sources of events, Event listener interfaces, Adapter class, Inner classes. Introduction to Swings. Node JS : The JavaScript Revolution , Getting Started with Node , Using the Terminal, Editors, npm, A Simple Web Server with Node, Event-Driven Programming using NodeJS. | | | | 8 Hours |
| Textbook 1: Chapter 22 Textbook 2 : Chapter 1-2 | | | | |
| MODULE - V | | | | |
| Java API – Overview, Object-Relational Mapping, Java Support for Persistence, Another Standard, The Java Persistence API, Entity, Entity Metadata, Annotations, XML, Configuration by Exception, Creating an Entity, Entity Manager, Obtaining an Entity Manager, Persisting an Entity Finding an Entity, Removing an Entity, Updating an Entity, Transactions, Queries, Putting It All Together, Packaging It Up. | | | | 8 Hours |
| Textbook 3: Chapter 1-2 | | | | |
| LABORATORY COMPONENTS | | | | |
| Exp. No. | Experiment Description | | | Bloom's Taxonomy Level |
| 1. | Demonstration of the Java fundamentals | | | CL3 |
| 2. | Demonstrating creation of Java classes, objects, constructors, declaration and initialization of variables. | | | CL3 |
| 3. | Demonstrate the core object-oriented concept of Inheritance, polymorphism | | | CL3 |
| 4. | Demonstration of packages. | | | CL3 |
| 5. | Demonstration of Interface in Java | | | CL3 |
| 6. | Demonstration of multi-threaded programming. | | | CL3 |
| 7. | Demonstration of Exception handling in Java | | | CL3 |
| 8. | Demonstration of Event handling and NodeJS in Java. | | | CL3 |
| 9. | Demonstration of Java API. | | | CL3 |
| ASSESSMENT STRATEGY | | | | |
| Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods: | | | | |
| Sl. No. | Assessment Description | | Weightage (%) | Max. Marks |
| 1 | Continuous Internal Assessment (CIA) | | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | | 60 % | 30 |
| | Practical Session (Laboratory Component) | | 40 % | 20 |
| 2 | Semester End Examination (SEE) | | 100 % | 50 |
| CO - ASSESSMENT MAPPING | | | | |
| Continuous Internal Assessment (CIA) (50%) | | | Semester End Exam (SEE) (50%) | |
| Continuous Internal Evaluation (CIE) (60%) | | Practical Sessions (40%) | | |
| I | II | III | | |
| Syllabus Coverage | | | Syllabus Coverage | Syllabus Coverage |
| 40% | 30% | 30% | 100% | 100% |
| M I | | | M I | M I |
| M II | M II | | M II | M II |



| | | | | |
|--|-------|------|-------|-------|
| | M III | | M III | M III |
| | | M IV | M IV | M IV |
| | | M V | M V | M V |

NOTE:

- Assessment will be both CIA and SEE.
- The practical sessions of the IPCC shall be for CIE only.
- The Theory component of the IPCC shall be for both CIA and SEE respectively.
- The questions from the practical sessions shall be included in Theory SEE.

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

SEE QUESTION PAPER PATTERN:

- The question paper will have **TEN** full questions from **FIVE** Modules
- There will be 2 full questions from each module. Every question will carry a maximum of 20 marks.
- Each full question may have a maximum of four sub-questions covering all the topics under a module.
- The students will have to answer **FIVE** full questions, selecting one full question from each module.

TEXT BOOKS:

1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 1, 2, 3, 4, 5, 6, 8, 9,10, 11, 21, 22, 29, 30,31)
2. Ethan Brown , Web Development with Node and Express :Leveraging the java development stack. Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472, 2014
3. Mike Keith and Merrick Schincariol Foreword by Linda DeMichiel, JPA Specification Lead , [JAVA][Pro JPA 2 - Mastering the Java Persistence API,2009,

REFERENCE BOOKS:

1. Sourav Sahay, Object Oriented Programming with C++, 2nd Ed, Oxford University Press,2006
2. E Balagurusamy, Programming with Java, McGraw Hill, 6th Edition, 2019.
3. Mahesh Bhavne and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. https://onlinecourses.nptel.ac.in/noc22_cs102/
2. <https://www.geeksforgeeks.org>



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DATA STRUCTURES AND ITS APPLICATIONS

(Scheme-2021; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|---------|------------|----|
| Course Code | 21CS34 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 3:0:0:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 40L | Exam Hours | 03 |

CREDITS – 3

COURSE PREREQUISITES:

- Knowledge of Mathematics and C Programming.

COURSE OBJECTIVES:

This course will enable students to:

- Explain the fundamental knowledge of various types of data structures and their applications essential for implementing solutions to problems.
- Illustrate representations and implementations of various linear and non-linear data structures such as Stack, Queues, linked list, Trees, Graphs and Hashing.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|--|----------------|
| Introduction to Data Structures: Classifications, Data structure Operations, Demonstration of Sparse Matrices with arrays, Strings: Operations and Pattern Matching Algorithms. | 8 Hours |
| Stack: Concepts and Operations, Array Representation of Stacks, Stacks using Dynamic Arrays. | |
| Applications of Stack: Infix to Postfix Conversion, Evaluation of Postfix expression, Recursion: Ackermann function. | |

MODULE - II

| | |
|--|----------------|
| Queues: Introduction to Queues, Array and Linked Representation of Queues, Operations on queues, Circular queues Operations, Circular queues using Dynamic arrays, Dequeues, Priority Queues. | 8 Hours |
| Applications of Queues: Job Scheduling. | |

MODULE - III

| | |
|--|----------------|
| Linked List: Introduction to Linked Lists, Representation of linked lists in Memory, Dynamic Memory allocation functions, Singly Linked list Operations: Traversing, Searching, Insertion and Deletion, Header linked lists, Doubly Linked lists Operations, Circular linked lists, Linked Stacks and Queues. | 8 Hours |
| Applications of Linked Lists: Polynomials, Sparse matrix representation. | |

MODULE - IV

| | |
|--|----------------|
| Trees: Terminologies, Binary Trees, Properties of Binary trees, Array and linked representation of Binary Trees, Binary Tree Traversals, threaded binary trees, Binary Search Trees: Definition, Insertion, Deletion, Traversal, Searching, AVL tree, B-Tree. | 8 Hours |
|--|----------------|



| Application of Trees: Evaluation of Arithmetic Expression. | | | |
|--|--|--------------------|--------------------------------------|
| MODULE - V | | | |
| Graphs: Terminologies, Graph representations, Traversal methods: Breadth First Search and Depth First Search. | | | 8 Hours |
| Hashing: Introduction, Hash Table organizations, Hashing Functions, Static and Dynamic Hashing | | | |
| ASSESSMENT STRATEGY | | | |
| Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods: | | | |
| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Assignments | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |
| CO - ASSESSMENT MAPPING | | | |
| Continuous Internal Assessment (CIA) (50%) | | | Semester End Exam (SEE) (50%) |
| Continuous Internal Evaluation (CIE) (60%) | | | Assignment/ Activities (40%) |
| I | II | III | |
| Syllabus Coverage | | | Syllabus Coverage |
| 40% | 30% | 30% | 100% |
| M I | | | M I |
| M II | M II | | M II |
| | M III | | M III |
| | | M IV | M IV |
| | | M V | M V |
| <i>Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.</i> | | | |
| ASSIGNMENT TYPES WITH WEIGHTAGES | | | |
| Sl. No. | Assignment Description | Max. Weightage (%) | Max. Marks |
| 1 | Written Assignments | 25 % | 05 |
| 2 | Quiz | 10 % | 02 |
| 3 | Case Studies | 25 % | 05 |
| 4 | Seminar/Presentation | 15 % | 03 |
| 5 | Peer - to - Peer Learning | 10 % | 02 |
| 6 | Activity Based Learning | 50 % | 10 |
| 7 | Project Based Learning | 50 % | 10 |
| 8 | Field Work + Report | 50 % | 10 |
| 9 | Industry Visit + Report | 50 % | 10 |
| 10 | NPTEL/MOOC Courses – Registration and Assignment Submissions | 50 % | 10 |
| | NPTEL Certification | 75 % | 15 |
| 11 | Any other Innovative Assignments (CL4 and above) | 50 % | 10 |
| <i>Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands</i> | | | |
| SEE QUESTION PAPER PATTERN: | | | |
| <ul style="list-style-type: none"> The question paper will have TEN full questions from FIVE Modules There will be 2 full questions from each module. Every question will carry a maximum of 20 marks. | | | |



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- Each full question may have a maximum of four sub-questions covering all the topics under a module.
- The students will have to answer FIVE full questions, selecting one full question from each module.

TEXT BOOKS:

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

REFERENCE BOOKS:

1. Gilberg and Forouzan, Data Structures : A Pseudo-code approach with C, 2nd Ed, Cengage Learning, 2014.
2. Jean Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013.
3. A M Tenenbaum, Data Structures using C, PHI, 1989.
4. Robert Kruse, Data Structures and Program Design in C, 2nd Ed, PHI, 1996.

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. https://www.youtube.com/watch?v=3Xo6P_V-qns&t=201s
2. <https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html>
3. <https://nptel.ac.in/courses/106/102/106102064>
4. <https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html>
5. <https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html>
6. <https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html>



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DATA STRUCTURES LABORATORY WITH C

(2021-Scheme; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|---------|------------|----|
| Course Code | 21CSL35 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 0:0:2:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 24P | Exam Hours | 02 |

CREDITS – 1

COURSE PREREQUISITES:

- Basic Maths and Fundamentals of C Programming.
- Usage of IDEs like NetBeans

COURSE OBJECTIVES:

- To get practical experience in design, develop, implement, analyze and testing of various algorithms.
- To visualize and understand linear/nonlinear data structures with their applications such as Stack, Queues, Linked List, Trees, Graphs and Hashing.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Demonstration
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

LIST OF EXPERIMENTS

Design, develop, and implement the specified algorithms using Python Programming under LINUX/Windows environment.

| Exp. No. | Description |
|----------|---|
| 1 | <p>Design and Implement a program in C on Frequency Histogram, that builds a frequency array for data values in the range 1 to n and then prints their histogram. The program should,</p> <ol style="list-style-type: none"> Read, Store and Print the data in an array. Analyze the data in the array, one element at a time. Add 1 to the corresponding element in a frequency array based on the data value. Print a histogram using asterisks for each occurrence of an element. |
| 2 | <p>Design and Implement a program in C that simulates a mouse in a maze. The entrance spot, where the mouse starts its journey, is chosen by the user who runs the program. It can be changed each time.</p> <p>The sample maze is represented below,</p> <div align="center"> </div> <p>The program must print the path taken by the mouse from the starting point to the final point, including all</p> |



| 2 | spots that have been visited and backtracked. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|--|-----------|---------|-----------|---------|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|----|---|---|---|---|----|---|---|---|---|----|---|---|---|---|----|---|---|---|---|
| 3 | Design and Implement a program in C for the following Stack Applications, a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^ b. Conversion of Arithmetic Expressions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Design and Implement a program in C to categorize the data. Consider the following sample list of numbers, <table border="1"><tr><td>3</td><td>22</td><td>12</td><td>6</td><td>10</td><td>34</td><td>65</td><td>29</td><td>9</td><td>30</td><td>81</td><td>4</td><td>5</td><td>19</td><td>20</td><td>57</td><td>44</td><td>99</td></tr></table> Categorize and sort them into different groups as mentioned below: Group 1: Less than 10 Group 2: Between 10 and 19 Group 3: Between 20 and 29 Group 4: 30 and greater | 3 | 22 | 12 | 6 | 10 | 34 | 65 | 29 | 9 | 30 | 81 | 4 | 5 | 19 | 20 | 57 | 44 | 99 | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 22 | 12 | 6 | 10 | 34 | 65 | 29 | 9 | 30 | 81 | 4 | 5 | 19 | 20 | 57 | 44 | 99 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Design and Implement a menu driven program in C for the following operations on Doubly Linked List (DLL) of Student Data with the fields: USN, Name, Dept, Marks, Ph. No. a. Create a DLL of N Students Data by using end insertion. b. Display the status of DLL and count the number of nodes in it c. Perform Insertion and Deletion at End of DLL d. Perform Insertion and Deletion at Front of DLL e. Display the total and average marks for each student | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Design and Implement a program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes, a. Represent and Evaluate a Polynomial $P(x, y, z) = 6x^2y^2z - 4yz^5 + 3x^3yz + 2xy^5z - 2xyz^3$. b. Find the sum of two polynomials POLY1(x, y, z) and POLY2 (x, y, z) and store the result in POLYSUM (x, y, z). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Design and Implement a program in C that reads a list of names and telephone numbers to inserts them into a Binary Search Tree for the following operations, a. Search the list for a specified name. b. Insert a new name. c. Delete an existing name. d. Traverse the phone list using Inorder, Preorder and Postorder. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | A company has seven top officers working for it. They are each fluent in at least one language according to the following sample table, <table border="1"><tr><th>Officer</th><th>Hindi</th><th>Malayalam</th><th>Kannada</th><th>Telugu</th></tr><tr><td>01</td><td>-</td><td>-</td><td>Y</td><td>-</td></tr><tr><td>02</td><td>-</td><td>-</td><td>Y</td><td>Y</td></tr><tr><td>03</td><td>-</td><td>-</td><td>-</td><td>Y</td></tr><tr><td>04</td><td>-</td><td>Y</td><td>-</td><td>Y</td></tr><tr><td>05</td><td>Y</td><td>Y</td><td>-</td><td>-</td></tr><tr><td>06</td><td>Y</td><td>-</td><td>Y</td><td>-</td></tr><tr><td>07</td><td>-</td><td>Y</td><td>-</td><td>-</td></tr></table> Design and Implement a program in C for the following operations on Graphs (G), a. Create a graph using adjacency matrix indicating people who can communicate directly with each other. b. Print all the officers which are reachable from a given officer as a starting node in a digraph. Example: An officer wants to send a message to each other officer: A message comes to an officer; he reads it and transmits it to another officer possibly after translation to someone who has not read it. | Officer | Hindi | Malayalam | Kannada | Telugu | 01 | - | - | Y | - | 02 | - | - | Y | Y | 03 | - | - | - | Y | 04 | - | Y | - | Y | 05 | Y | Y | - | - | 06 | Y | - | Y | - | 07 | - | Y | - | - |
| Officer | Hindi | Malayalam | Kannada | Telugu | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01 | - | - | Y | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02 | - | - | Y | Y | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03 | - | - | - | Y | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04 | - | Y | - | Y | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05 | Y | Y | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06 | Y | - | Y | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07 | - | Y | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Design and Implement a program in C that uses Hash Function $H:K \rightarrow L$ as $H(K)=K \bmod m$ (remainder method) and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Note: Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.

Note: Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.



ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Laboratory Work (A) | 50 % | 25 |
| | Laboratory Test (B) | 30 % | 15 |
| | Open Ended Experiments /Mini Projects (C) | 20 % | 10 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

ASSESSMENT STRATEGY:

- I. In Laboratory Courses where (B) and (C) are not the components of the assessment pattern, then (A) will have 100% weightage (50 Marks).

Assessment Mode: Weekly Assessment of Laboratory Work (50 Marks) - the marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment, each of 25 marks) of the students in each laboratory session. The average of all the marks obtained across the sessions will be the Final CIA marks.

- II. In Laboratory Courses where (C) is not a component of the assessment pattern, then (A) will have 50% weightage (25 Marks), and (B) will have 50% weightage (25 Marks).

Assessment Mode: The marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment) (A) and One Laboratory Test (B).

- In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A).
- A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier. The obtained marks are scaled down to 25 Marks (B)

The Sum of marks obtained across (A) and (B) will be the Final CIA marks.

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) – 25 Marks (Weekly Assessment), (B) – 15 Marks (Laboratory Examination), (C) – 10 marks (Open Ended Experiments/Mini Projects)

- The respective course instructor will design the assessment criteria for the said assessment components.
- The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.
- In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

SEE QUESTION PAPER PATTERN:

1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.
3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.
4. Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.

LEARNING RESOURCES

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw.
3. Gilberg & Forouzan, Data Structures: A Pseudo - Code Approach with C, 2nd Ed, Cengage Learning, 2014.
4. Michael J. Folk, Bill Zoellick and Greg Riccardi, "File Structures - An ObjectOriented Approach with C++", Pearson Education, 2004.

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. https://www.youtube.com/watch?v=3Xo6P_V-qns&t=201s



2. <https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html>
3. <https://nptel.ac.in/courses/106/102/106102064>
4. <https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html>
5. <https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html>
6. <https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html>
7. <https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/index.html>



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SOCIAL CONNECT & RESPONSIBILITIES

(Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|---------|------------|----|
| Course Code | 21UHV36 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 1:0:0:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 15 | Exam Hours | 03 |

CREDITS – 1

COURSE PREREQUISITES:

- Have/Develop the critical analysis of the day today happenings.

COURSE OBJECTIVES:

This course will enable students to:

- Enable the student to do a deep drive into societal challenges being addressed by NGO(s), social enterprises & The government and build solutions to alleviate these complex social problems through immersion, design & technology.
- Provide a formal platform for students to communicate and connect to their surroundings
- Enable to create a responsible connection with society

TEACHING - LEARNING STRATEGY:

These are some sample strategies; which course faculty members can incorporate in the Teaching Learning Process:

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other Innovative initiatives with respect to the Course Contents

COURSE CONTENTS

MODULE - I

| | |
|--|----------------|
| Connectivity with Nature: Importance of plantation of a tree - process and nurturing (suggested to plant or adopt) They will also make an excerpt either as a documentary or a photoblog describing the plant's origin, its usage in daily life, and its appearance in folklore and literature. | 3 Hours |
|--|----------------|

MODULE - II

| | |
|--|----------------|
| Heritage walk and Regional Crafts: Know the Heritage place related to you (the history and culture), connecting to people around through their history, knowing the city and its craftsman, photoblog and documentary on evolution and practice of various craft forms. | 3 Hours |
|--|----------------|

MODULE - III

| | |
|---|----------------|
| Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus. | 3 Hours |
|---|----------------|

MODULE - IV

| | |
|--|----------------|
| Water Conservation: Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photo blog presenting the current practices. | 3 Hours |
|--|----------------|

MODULE - V

| | |
|--|----------------|
| Food Practices: City's culinary practices, food lore, and indigenous materials of the region used in cooking. | 3 Hours |
|--|----------------|



Activities Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art. **PEDAGOGY** The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector? **COURSE TOPICS:** The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversational will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem. A total of 14-20 hrs. engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into 10 groups of 35 each. Each group will be handled by two faculty mentors. Faculty mentors will design the activities (particularly Jamming sessions open mic ,and poetry) Faculty mentors has to design the evaluation system

ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Assignments | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

CO - ASSESSMENT MAPPING

| Continuous Internal Assessment (CIA) (50%) | | | | Semester End Exam (SEE) (50%) | |
|--|-------|------|---------------------------------|-------------------------------|--|
| Continuous Internal Evaluation (CIE) (60%) | | | Assignment/ Activities (40%) | | |
| I | II | III | | | |
| Syllabus Coverage | | | Syllabus Coverage | Syllabus Coverage | |
| 40% | 30% | 30% | 100% | 100% | |
| M I | | | M I | M I | |
| M II | M II | | M II | M II | |
| | M III | | M III | M III | |
| | | M IV | M IV | M IV | |
| | | M V | M V | M V | |

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's level. Ny COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

ASSIGNMENT TYPES WITH WEIGHTAGES

| Sl. No. | Assignment Description | Max. Weightage (%) | Max. Marks |
|---------|--|--------------------|------------|
| 1 | Written Assignments | 25 % | 05 |
| 2 | Quiz | 10 % | 02 |
| 3 | Case Studies | 25 % | 05 |
| 4 | Seminar/Presentation | 15 % | 03 |
| 5 | Peer - to -Peer Learning | 10 % | 02 |
| 6 | Activity Based Learning | 50 % | 10 |
| 7 | Project Based Learning | 50 % | 10 |
| 8 | Field Work + Report | 50 % | 10 |
| 9 | Industry Visit + Report | 50 % | 10 |
| 10 | NPTEL/MOOC Courses – Registration and Assignment Submissions | 50 % | 10 |

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| | | | |
|----|--|------|----|
| | NPTEL Certification | 75 % | 15 |
| 11 | Any other Innovative Assignments (CL4 and above) | 50 % | 10 |

Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands

SEE QUESTION PAPER PATTERN:

- A Jamming session will be conducted at the end of the course for 50 marks
- Jamming session includes -Platform to connect to others, Share the stories with others, Share the experience of Social Connect, Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.
- Faculty mentor has to design the evaluation system for Jamming session

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE BOOKS:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. <https://www.aicteindia.org/sites/default/files/Vol.%20II%20%20AICTE%20UG%20%20Curriculum.>



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ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

(2021-Scheme; Effective from the Academic Year 2022 - 2023)

III/IV SEMESTER

| | | | |
|---|------------|------------|----|
| Course Code | 21KSK37/47 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 1:0:0:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 15 | Exam Hours | 01 |

CREDITS – 1

COURSE PREREQUISITES:

- Kannada Language & Kannada Literature

COURSE OBJECTIVES:

- To bring out the best talents in students, in terms of language skills.
- To increase students' abilities to use planning, drafting and editing in Kannada language to improve their work
- To enable students to write Kannada correctly and meaningfully, i.e. to write letters, applications.
- To give an ideology about Kannada Literature.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

ಘಟಕ - ೧ ಅರ್ಜಿಗಳು, ಪತ್ರಗಳು

03 Hours

೧. ಪತ್ರ ವ್ಯವಹಾರ - ಸರ್ಕಾರಿ ಪತ್ರಗಳು, ಅರೆಸರ್ಕಾರಿ ಪತ್ರಗಳು ಮತ್ತು ವೈಯಕ್ತಿಕ ಪತ್ರಗಳು
೨. ಆಹ್ವಾನ ಪತ್ರಿಕೆ, ಜಾಹೀರಾತು, ಪತ್ರಿಕಾ ಪ್ರಕಟಣೆ
೩. ಅರ್ಜಿ ನಮೂನೆಗಳು

MODULE - II

ಘಟಕ - ೨ ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯಭಾಗ

03 Hours

೧. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ
೨. ಕೀರ್ತನೆಗಳು: ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸಿದರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
೩. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫರು

MODULE - III

ಘಟಕ - ೩ ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ

03 Hours

೧. ಡಿವಿಜಿ ಯವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು
೨. ಕುರುಡು ಕಾಂಬಾಣ : ದ. ರಾ. ಬೇಂದ್ರೆ
೩. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು



MODULE - IV

ಘಟಕ - ೪ ಲೇಖನಗಳು

03 Hours

೧. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ.ಎಸ್. ಮೂರ್ತಿರಾವ್
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ - ಕರಗೌಡ ಬೀಚನಹಳ್ಳಿ

MODULE - V

ಘಟಕ - ೫ ಕಥೆಗಳು

03 Hours

೧. ಯುಗಾದಿ - ವಸುದೇಂದ್ರ
2. ಬೆಡ್ ನಂಬರ್ ಏಳು - ತ್ರಿವೇಣಿ

ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Assignments | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

CO - ASSESSMENT MAPPING

| Continuous Internal Assessment (CIA) (50%) | | | | Semester End Exam (SEE) (50%) | |
|--|-------|------|---------------------------------|-------------------------------|--|
| Continuous Internal Evaluation (CIE) (60%) | | | Assignment/ Activities (40%) | | |
| I | II | III | | | |
| Syllabus Coverage | | | Syllabus Coverage | Syllabus Coverage | |
| 40% | 30% | 30% | 100% | 100% | |
| M I | | | M I | M I | |
| M II | M II | | M II | M II | |
| | M III | | M III | M III | |
| | | M IV | M IV | M IV | |
| | | M V | M V | M V | |

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

ASSIGNMENT TYPES WITH WEIGHTAGES

| Sl. No. | Assignment Description | Max. Weightage (%) | Max. Marks |
|---------|--|--------------------|------------|
| 1 | Written Assignments | 25 % | 05 |
| 2 | Quiz | 10 % | 02 |
| 3 | Case Studies | 25 % | 05 |
| 4 | Seminar/Presentation | 15 % | 03 |
| 5 | Peer - to - Peer Learning | 10 % | 02 |
| 6 | Activity Based Learning | 50 % | 10 |
| 7 | Project Based Learning | 50 % | 10 |
| 8 | Field Work + Report | 50 % | 10 |
| 9 | Industry Visit + Report | 50 % | 10 |
| 10 | NPTEL/MOOC Courses – Registration and Assignment Submissions | 50 % | 10 |
| | NPTEL Certification | 75 % | 15 |



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|----|--|------|----|
| 11 | Any other Innovative Assignments (CL4 and above) | 50 % | 10 |
|----|--|------|----|

Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands

SEE QUESTION PAPER PATTERN:

1. The question paper will have **SEVENTY MCQ** questions of 1 Marks each and **SIX** main questions of 5 Marks each.
2. Main questions will be asked from all **FIVE** modules.

TEXT BOOKS:

1. ಡಾ. ಹಿ. ಜಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ - ೧. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ. 1st Edition, 2020
2. ಆಡಳಿತ ಕನ್ನಡ (ಪತ್ರಿಕೆ - ೧, ಬ್ಲಾಕ್ ೪) ಪ್ರಕಟಣೆ: ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮುಕ್ತ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಮೈಸೂರು, 1st Edition, 2015
3. ಕನ್ನಡ ಮನಸು - ಇಂಜಿನಿಯರಿಂಗ್ ಪ್ರಥಮ ಪದವಿ ತರಗತಿ ಕನ್ನಡ ಪಠ್ಯ, ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ, 5th Edition, 2018

REFERENCE BOOKS:

೧. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ - ಕನ್ನಡ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ೨೦೧೭
2. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ - ರಂ. ಶ್ರೀ. ಮುಗಳ, ಉಷಾ ಸಾಹಿತ್ಯ, ಮೈಸೂರು
3. ಸಮಗ್ರ ಪಚನ ಸಂಪುಟಗಳು - ಎಂ. ಎಂ. ಕಲಬುರ್ಗಿ, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ನಿರ್ದೇಶನಾಲಯ, ಬೆಂಗಳೂರು.

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. https://shashiexambooks.blogspot.com/2018/02/blog-post_20.html
2. <https://themindpalace.in/index.php/category/kannada/kannada-authors/>



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ಬಳಕೆ ಕನ್ನಡ

(2021- Scheme; Effective from the Academic Year 2022 - 2023)

III/IV SEMESTER

| | | | |
|---|------------|------------|----|
| Course Code | 21KBK37/47 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 1:0:0:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 15 | Exam Hours | 01 |

CREDITS – 1

COURSE PREREQUISITES:

- Kannada Language & Kannada Literature

COURSE OBJECTIVES:

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

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|---|-----------------|
| Introduction, Necessity of learning a local language. Methods to learn the Kannada language. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities Key to Transcription. Kannada letter writing practice. | 03 Hours |
|---|-----------------|

MODULE - II

| | |
|--|-----------------|
| Personal Pronouns, Possessive Forms, Interrogative words Possessive forms of nouns, dubitive question and Relative nouns Qualitative, Quantitative and Color Adjectives, Numerals. Predictive Forms, Locative Case | 03 Hours |
|--|-----------------|

MODULE - III

| | |
|--|-----------------|
| Dative Cases, and Numerals - Ordinal numerals and Plural markers Defective / Negative Verbs Tenses | 03 Hours |
|--|-----------------|

MODULE - IV

| | |
|--|-----------------|
| Permission, Commands, encouraging and Urging words (Imperative words and sentences) Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs. Comparative, Relationship, Identification and Negation Words. | 03 Hours |
|--|-----------------|

MODULE - V

| | |
|--|-----------------|
| Conversation: Introducing each other Telephone Conversation Conversation in Market Enquiry about College | 03 Hours |
|--|-----------------|



ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Assignments | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

CO - ASSESSMENT MAPPING

| Continuous Internal Assessment (CIA) (50%) | | | | Semester End Exam (SEE) (50%) | |
|--|-------|------|---------------------------------|-------------------------------|--|
| Continuous Internal Evaluation (CIE) (60%) | | | Assignment/ Activities (40%) | | |
| I | II | III | | | |
| Syllabus Coverage | | | Syllabus Coverage | Syllabus Coverage | |
| 40% | 30% | 30% | 100% | 100% | |
| M I | | | M I | M I | |
| M II | M II | | M II | M II | |
| | M III | | M III | M III | |
| | | M IV | M IV | M IV | |
| | | M V | M V | M V | |

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

ASSIGNMENT TYPES WITH WEIGHTAGES

| Sl. No. | Assignment Description | Max. Weightage (%) | Max. Marks |
|---------|--|--------------------|------------|
| 1 | Written Assignments | 25 % | 05 |
| 2 | Quiz | 10 % | 02 |
| 3 | Case Studies | 25 % | 05 |
| 4 | Seminar/Presentation | 15 % | 03 |
| 5 | Peer - to - Peer Learning | 10 % | 02 |
| 6 | Activity Based Learning | 50 % | 10 |
| 7 | Project Based Learning | 50 % | 10 |
| 8 | Field Work + Report | 50 % | 10 |
| 9 | Industry Visit + Report | 50 % | 10 |
| 10 | NPTEL/MOOC Courses – Registration and Assignment Submissions | 50 % | 10 |
| | NPTEL Certification | 75 % | 15 |
| 11 | Any other Innovative Assignments (CL4 and above) | 50 % | 10 |

Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands

SEE QUESTION PAPER PATTERN:

- The question paper will have **SEVENTY MCQ** questions of 1 Marks each and **SIX** main questions of 5 Marks each.
- Main questions will be asked from all **FIVE** modules.

TEXT BOOKS:

- ಬಳಕೆ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ; ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.
- ವ್ಯಾಪಕಾರಿಕ ಕನ್ನಡ (ಪತ್ರಿಕೆ - ೧, ಬ್ಲಾಕ್ ೪) ಪ್ರಕಟಣೆ: ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮುಕ್ತ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಮೈಸೂರು.



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REFERENCE BOOKS:

1. Kannada Kali (ಕನ್ನಡ ಕಲಿ) – ಲಿಂಗದೇವರು ಹಳಮನೆ, A Text Book to Learn Kannada by Non – Kannadigas who come to study Diploma, Engineering and Health Sciences in Karnataka, ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ.
2. Spoken Kannada – ಮಾತಾಡುವ ಕನ್ನಡ, ಪ್ರಕಟಣೆ – ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ ಬೆಂಗಳೂರು.

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. <https://www.wikihow.com/Learn-Kannada>
2. <https://www.languageshome.com/English-Kannada.htm>
3. <https://www.alllanguageresources.com/kannada/>



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CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAWS

(2021- Scheme; Effective from the Academic Year 2022 - 2023)

SEMESTER – III/IV

| | | | |
|---|------------|------------|----|
| Course Code | 21CIP37/47 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 1:0:0:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 18 | Exam Hours | 01 |

CREDITS – 1

COURSE PREREQUISITES:

- Understanding of social science and civics

COURSE OBJECTIVES:

- To Assimilate and get familiarized with basic information about Indian Constitution and provide overall legal literacy to the young technocrats to manage complex societal issues in the present scenario
- To identify their individual roles and ethical responsibilities towards society.
- To understand engineering ethics & responsibilities, through the learning of these topics students will be able to understand human rights/values and its implications in their life.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

Introduction and Basic Information about making of Indian Constitution. The role of the Constituent assembly after partition of India. Modern Indian political Boundaries. Preamble of the constitution. Citizenship provisions. Fundamental rights and its enforcement. Fundamental Duties and its scope and significance in Nation building. Directive Principles of state policy and its present relevance in our society with examples.

8 Hours

MODULE - II

Union Executive, Union Legislature and Union Judiciary. State Executive, State Legislature, State Judiciary. Parliamentary Committees, Important Parliamentary Terminologies & Judicial Reviews

3 Hours

MODULE - III

Election Commission of India. Emergency Provisions such as national emergency, state emergency and financial emergency. Amendment Provisions to Constitution. Panchayat & Municipality/ urban local administration. Special Constitutional provisions for SC & ST, OBC.

2 Hours

MODULE - IV

Scope and Aims of Engineering & Professional Ethics. Business Ethics, Corporate Ethics, Personal Ethics. Engineering and Professionalism, Positive and Negative faces of Engineering Ethics. Code of Ethics as defined in the website of Institution of Engineers. Profession, Professionalism and Professional Responsibility. Clash of Ethics. Conflict of Interest.

2 Hours

Responsibilities in Engineering. Impediments to Responsibility. IPR (Intellectual Property Rights)



MODULE - V

Cyber Laws its objectives and functions. Types of Cyber Crimes. Internet censorship.

3 Hours

Enforcement agencies. Information Technology Act, 2000.

ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Assignments | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

CO - ASSESSMENT MAPPING

| Continuous Internal Assessment (CIA) (50%) | | | | Semester End Exam (SEE) (50%) | |
|---|-------|------|---------------------------------|-------------------------------|--|
| Continuous Internal Evaluation (CIE) (60%) | | | Assignment/ Activities (40%) | | |
| I | II | III | | | |
| Syllabus Coverage | | | Syllabus Coverage | Syllabus Coverage | |
| 40% | 30% | 30% | 100% | 100% | |
| M I | | | M I | M I | |
| M II | | | M II | M II | |
| | M III | | M III | M III | |
| | M IV | | M IV | M IV | |
| | | M V | M V | M V | |
| | | M VI | M VI | M VI | |

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

ASSIGNMENT TYPES WITH WEIGHTAGES

| Sl. No. | Assignment Description | Max. Weightage (%) | Max. Marks |
|---------|--|--------------------|------------|
| 1 | Written Assignments | 25 % | 05 |
| 2 | Quiz | 10 % | 02 |
| 3 | Case Studies | 25 % | 05 |
| 4 | Seminar/Presentation | 15 % | 03 |
| 5 | Peer - to - Peer Learning | 10 % | 02 |
| 6 | Activity Based Learning | 50 % | 10 |
| 7 | Project Based Learning | 50 % | 10 |
| 8 | Field Work + Report | 50 % | 10 |
| 9 | Industry Visit + Report | 50 % | 10 |
| 10 | NPTEL/MOOC Courses – Registration and Assignment Submissions | 50 % | 10 |
| | NPTEL Certification | 75 % | 15 |
| 11 | Any other Innovative Assignments (CL4 and above) | 50 % | 10 |

Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands

SEE QUESTION PAPER PATTERN:

1. The question paper will have 50 MCQ questions.
2. Each MCQ questions consisting of 1 mark.

TEXT BOOKS:



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1. G.B. Reddy, Mohd. Suhaib: "Constitution Of India And Professional Ethics" I K International Publishing House Pvt. Ltd.
2. Dr. Jyothi Rattan: "Cyber Laws and Information Technology" Bharath Law House Pvt. Ltd.

REFERENCE BOOKS:

1. J.N. Pandey – "Constitutional Law of India", 49th Ed., 2012, Central Law Agency Publishing
2. M.V Pylee – "Constitution Of India", 5th Ed., Vikas Publishing House, New Delhi

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. https://www.youtube.com/watch?v=vq2Q1_v6TNU



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COMPETITIVE PROGRAMMING USING C++

(2021-Scheme; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|----------|------------|----|
| Course Code | 21CSL381 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 0:0:2:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 24P | Exam Hours | 02 |

CREDITS – 1

COURSE PREREQUISITES:

- Basics of C/C++ Programming.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|---|----------------|
| Competitive Programming: Introduction, Programming Contests, Tips for Practicing. | 4 Hours |
| Recap of C/C++: Review of language fundamentals, Standard libraries, programming examples. | |

MODULE - II

| | |
|---|----------------|
| Programming Techniques: Language Features, Recursive Algorithms, Bit Manipulation. | 4 Hours |
| Efficiency: Time Complexity, Algorithm Design examples, Code Optimization. | |
| Sorting and Searching: Sorting Algorithms, Solving problems by Sorting, Binary Search. | |

MODULE - III

| | |
|--|----------------|
| Data Structures: Dynamic Arrays, Set Structures and Experiments. | 4 Hours |
| Dynamic Programming: Basic Concepts, Examples, Backtracking. | |
| Graph Algorithms: Basics of Graphs, Graph Traversal, Shortest Paths, Directed Acyclic Graphs, Successor Graphs. | |

MODULE - IV

| | |
|--|----------------|
| Tree Algorithms: Basic Techniques, Tree Structures, Minimum Spanning Trees, Tree Queries, Advanced Techniques. | 4 Hours |
| Mathematical Study: Number Theory, Combinatorics, Matrices, Probability, Game Theory, Fourier Transform, Geometric Techniques, Sweep Line Algorithms. | |



MODULE - V

String Algorithms: Basic Concepts, String hashing, Z-Algorithms, Suffix Arrays, String Automata

4 Hours

ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Laboratory Work (A) | 50 % | 25 |
| | Laboratory Test (B) | 30 % | 15 |
| | Open Ended Experiments /Mini Projects (C) | 20 % | 10 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

ASSESSMENT STRATEGY:

I. In Laboratory Courses where (B) and (C) are not the components of the assessment pattern, then (A) will have 100% weightage (50 Marks).

Assessment Mode: Weekly Assessment of Laboratory Work (50 Marks) - the marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment, each of 25 marks) of the students in each laboratory session. The average of all the marks obtained across the sessions will be the Final CIA marks.

II. In Laboratory Courses where (C) is not a component of the assessment pattern, then (A) will have 50% weightage (25 Marks), and (B) will have 50% weightage (25 Marks).

Assessment Mode: The marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment) (A) and One Laboratory Test (B).

- In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A).
- A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier. The obtained marks are scaled down to 25 Marks (B)

The Sum of marks obtained across (A) and (B) will be the Final CIA marks.

III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) – 25 Marks (Weekly Assessment), (B) – 15 Marks (Laboratory Examination), (C) – 10 marks (Open Ended Experiments/Mini Projects)

- The respective course instructor will design the assessment criteria for the said assessment components.
- The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.
- In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

SEE QUESTION PAPER PATTERN:

1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.
3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.
4. Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.

TEXT BOOKS:

1. Guide to Competitive Programming - Learning and Improving Algorithms through Contests by Antti Laaksonen, Second Edition, Springer, 2020.
2. Programming Challenges - The Programming Contest Training Manual by Steven S Skiena, Miguel A. Revilla, 2013.



FUNDAMENTALS OF R PROGRAMMING

(2021-Scheme; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|----------|------------|----|
| Course Code | 21CSL382 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 0:0:2:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 24P | Exam Hours | 02 |

CREDITS – 1

COURSE PREREQUISITES:

- Basics of C/C++ Programming.

COURSE OBJECTIVES:

This course will enable students to:

- Explore and understand how R and R Studio interactive environment.
- To learn and practice programming techniques using R programming.
- Read Structured Data into R from various sources.
- Understand the different data Structures, data types in R.
- To develop small applications using R Programming

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|---|----------------|
| History and Overview of R , Basic Features of R, Design of the R System, Getting Started with R. Numeric, Arithmetic, Assignment, and Vectors: R for Basic Math, Arithmetic, Variables, Functions, Vectors, Expressions and assignments Logical expressions. | 4 Hours |
|---|----------------|

MODULE - II

| | |
|---|----------------|
| Matrices and Arrays: Defining a Matrix, Sub-setting, Matrix Operations, Conditions and Looping: if statements, looping with for, looping with while, vector-based programming. | 4 Hours |
|---|----------------|

MODULE - III

| | |
|---|----------------|
| Lists and Data Frames: Data Frames, Lists, Special values, the apply family. | 4 Hours |
|---|----------------|

MODULE - IV

| | |
|---|----------------|
| Functions: Calling functions, scoping, Arguments matching, writing functions: The function command, Arguments, specialized function. | 4 Hours |
|---|----------------|

MODULE - V

| | |
|--|----------------|
| String Algorithms: Basic Concepts, String hashing, Z-Algorithms, Suffix Arrays, String Automata | 8 Hours |
|--|----------------|

ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|--------------------------------------|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |



| | | | |
|---|---|--------------|-----------|
| | Laboratory Work (A) | 50 % | 25 |
| | Laboratory Test (B) | 30 % | 15 |
| | Open Ended Experiments /Mini Projects (C) | 20 % | 10 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

ASSESSMENT STRATEGY:

- I. In Laboratory Courses where (B) and (C) are not the components of the assessment pattern, then (A) will have 100% weightage (50 Marks).

Assessment Mode: Weekly Assessment of Laboratory Work (50 Marks) - the marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment, each of 25 marks) of the students in each laboratory session. The average of all the marks obtained across the sessions will be the Final CIA marks.

- II. In Laboratory Courses where (C) is not a component of the assessment pattern, then (A) will have 50% weightage (25 Marks), and (B) will have 50% weightage (25 Marks).

Assessment Mode: The marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment) (A) and One Laboratory Test (B).

- In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A).
- A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier. The obtained marks are scaled down to 25 Marks (B)

The Sum of marks obtained across (A) and (B) will be the Final CIA marks.

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) – 25 Marks (Weekly Assessment), (B) – 15 Marks (Laboratory Examination), (C) – 10 marks (Open Ended Experiments/Mini Projects)

- The respective course instructor will design the assessment criteria for the said assessment components.
- The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.
- In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

SEE QUESTION PAPER PATTERN:

1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.
3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.
4. Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.

TEXT BOOKS:

1. Guide to Competitive Programming - Learning and Improving Algorithms through Contests by Antti Laaksonen, Second Edition, Springer, 2020.
2. Programming Challenges - The Programming Contest Training Manual by Steven S Skiena, Miguel A. Revilla, 2013.



AUTOSAR
(2021-Scheme; Effective from the Academic Year 2022 - 2023)
III SEMESTER

| | | | |
|---|----------|------------|----|
| Course Code | 21CSL383 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 0:0:2:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 24P | Exam Hours | 02 |

CREDITS – 1

COURSE PREREQUISITES:

- Basics of C/C++ Programming.

COURSE OBJECTIVES:

This course will enable students to:

- Understand AUTOSAR Classic architecture and deployment.
- Write basic AUTOSAR software.

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Demonstration
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|---|---------|
| Introduction to AUTOSAR, AUTOSAR Architecture, Need for AUTOSAR, Applications of AUTOSAR, Membership structure, Standards - ISO 26262, IEC 61508 for Automotive Electric/Electronic Systems. Introduction to ECU and CAN, COMASSO project, Alternatives to AUTOSAR - Automotive Grade Linux, GENIVI Alliance. | 5 Hours |
|---|---------|

MODULE - II

| | |
|--|---------|
| AUTOSAR Base Software-Overview of BSW, about AUTOSAR Classic Release R21-11, Concept of Virtual Functional Bus, Interfaces of AUTOSAR, Software Components, Demo of AUTOSAR base software. | 5 Hours |
|--|---------|

MODULE - III

| | |
|---|---------|
| AUTOSAR Port Interfaces, Compositions and Connectors - Introduction, Sender Receiver Interface, Client Server Interface, Port Interface, Compositions, Connectors | 5 Hours |
|---|---------|

MODULE - IV

| | |
|---|---------|
| AUTOSAR Runnables and Events; AUTOSAR Run Time Environment (RTE), RTE Interfaces, RTE scheduling, RTE generator | 5 Hours |
|---|---------|

MODULE - V

| | |
|---|---------|
| Application software summary, AUTOSAR methodology, Limitations of non AUTOSAR software, MCAL Layer development, ECU Abstraction Layer development; ARXML Configuration, Creating ARXML interfaces | 4 Hours |
|---|---------|



ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|---|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Laboratory Work (A) | 50 % | 25 |
| | Laboratory Test (B) | 30% | 15 |
| | Open Ended Experiments /Mini Projects (C) | 20 % | 10 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

ASSESSMENT STRATEGY:

- I. In Laboratory Courses where (B) and (C) are not the components of the assessment pattern, then (A) will have 100% weightage (50 Marks).
Assessment Mode: Weekly Assessment of Laboratory Work (50 Marks) - the marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment, each of 25 marks) of the students in each laboratory session. The average of all the marks obtained across the sessions will be the Final CIA marks.
- II. In Laboratory Courses where (C) is not a component of the assessment pattern, then (A) will have 50% weightage (25 Marks), and (B) will have 50% weightage (25 Marks).
Assessment Mode: The marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment) (A) and One Laboratory Test (B).
 - o In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A).
 - o A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier. The obtained marks are scaled down to 25 Marks (B)The Sum of marks obtained across (A) and (B) will be the Final CIA marks.
- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) – 25 Marks (Weekly Assessment), (B) – 15 Marks (Laboratory Examination), (C) – 10 marks (Open Ended Experiments/Mini Projects)
 - The respective course instructor will design the assessment criteria for the said assessment components.
 - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.
 - In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

SEE QUESTION PAPER PATTERN:

1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.
3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.
4. Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.

Reference Web Links and Video Lectures (e – Resources):

1. <https://www.AUTOSAR.org/standards/>
2. <https://www.comasso.org/>
3. AUTOSAR Architecture (Learn from Scratch with Demo) - <https://www.udemy.com/course/AUTOSAR-architecture/>



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ADDITIONAL MATHEMATICS-I

(2021- Scheme; Effective from the Academic Year 2022 - 2023)

III SEMESTER

| | | | |
|---|-------------|------------|----|
| Course Code | 21MATDIP301 | CIA Marks | 50 |
| Number of Contact Hours/Week (L: T: P: S) | 2:0:0:1 | SEE Marks | 50 |
| Total Hours of Pedagogy | 25 | Exam Hours | 03 |

CREDITS – 0

COURSE PREREQUISITES:

- Basics of Differentiation and Integration

COURSE OBJECTIVES:

- Enable the students to use the concepts of Vector and Vector Differentiation
- Study the various methods Solving first order Linear Differential Equations.
- Understand the Basic Concept of Partial Differentiation

TEACHING - LEARNING STRATEGY:

Following are some sample strategies that can be incorporate for the Course Delivery

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses
- Any other innovative initiatives with respect to the Course contents

COURSE CONTENTS

MODULE - I

| | |
|--|----------------|
| Vector Algebra -Basic Properties, Dot product and Cross Product of two vectors, -Problems. Complex Numbers: Polar form, Amplitude and Modulus of a complex number. De-Moivre's theorem, Argand Diagram. | 5 Hours |
|--|----------------|

MODULE - II

| | |
|---|----------------|
| Differential calculus: Review of elementary differential calculus, nth derivative of elementary functions, Leibnitz Rule, Polar curves - the angle between the radius vector and tangent, Angle between Two curves, Pedal equations. | 5 Hours |
|---|----------------|

MODULE - III

| | |
|--|----------------|
| Differential Equations: Solving first order Linear differential equations using Variable separable method, Exact Differential Equations, Linear Differential Equations. | 5 Hours |
|--|----------------|

MODULE - IV

| | |
|--|----------------|
| Partial differentiation: Total derivatives- differentiation of composite functions. Euler's Theorem- Problems. Jacobians-simple problems. | 5 Hours |
|--|----------------|

MODULE - V

| | |
|--|----------------|
| Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence- physical interpretation; solenoidal and irrotational vector fields-Illustrative problems | 5 Hours |
|--|----------------|



ASSESSMENT STRATEGY

Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods:

| Sl. No. | Assessment Description | Weightage (%) | Max. Marks |
|---------|--------------------------------------|---------------|------------|
| 1 | Continuous Internal Assessment (CIA) | 100 % | 50 |
| | Continuous Internal Evaluation (CIE) | 60 % | 30 |
| | Assignments | 40 % | 20 |
| 2 | Semester End Examination (SEE) | 100 % | 50 |

CO - ASSESSMENT MAPPING

| Continuous Internal Assessment (CIA) (50%) | | | Semester End Exam (SEE)(50%) | |
|--|-------|------|---------------------------------|-------------------|
| Continuous Internal Evaluation (CIE) (60%) | | | Assignment/ Activities (40%) | |
| I | II | III | | |
| Syllabus Coverage | | | Syllabus Coverage | Syllabus Coverage |
| 40% | 30% | 30% | 100% | 100% |
| M I | | | M I | M I |
| M II | M II | | M II | M II |
| | M III | | M III | M III |
| | | M IV | M IV | M IV |
| | | M V | M V | M V |

Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

ASSIGNMENT TYPES WITH WEIGHTAGES

| Sl. No. | Assignment Description | Max. Weightage (%) | Max. Marks |
|---------|--|--------------------|------------|
| 1 | Written Assignments | 25 % | 05 |
| 2 | Quiz | 10 % | 02 |
| 3 | Case Studies | 25 % | 05 |
| 4 | Seminar/Presentation | 15 % | 03 |
| 5 | Peer - to -Peer Learning | 10 % | 02 |
| 6 | Activity Based Learning | 50 % | 10 |
| 7 | Project Based Learning | 50 % | 10 |
| 8 | Field Work + Report | 50 % | 10 |
| 9 | Industry Visit + Report | 50 % | 10 |
| 10 | NPTEL/MOOC Courses – Registration and Assignment Submissions | 50 % | 10 |
| | NPTEL Certification | 75 % | 15 |
| 11 | Any other Innovative Assignments (CL4 and above) | 50 % | 10 |

Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands

SEE QUESTION PAPER PATTERN:

- The question paper will have **TEN** full questions from **FIVE** Modules
- There will be 2 full questions from each module. Every question will carry a maximum of 20 marks.
- Each full question may have a maximum of four sub-questions covering all the topics under a module.
- The students will have to answer **FIVE** full questions, selecting one full question from each module.



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TEXT BOOKS:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.

REFERENCE BOOKS:

1. B.V Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill,
2. H.K.Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication (2014).

REFERENCE WEB LINKS AND VIDEO LECTURES (E - RESOURCES):

1. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
2. <http://academicearth.org/>
3. <http://www.bookstreet.in>.
4. VTU e-Shikshana Program

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