



SAHYADRI
DE ENGINEERING & MAN

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 2022 - 23)

OUTCOME BASED EDUCATION(OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS)
(2021 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2022 - 23)

IV SEMESTER

Sl. No.	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours / Week				Examination				
					L	T	P	S	Duration in hours	CIA Marks	SEE Marks	Total Marks	Credits
1	BSC	21MAT401	Computational Mathematics - II	Maths / Any CSE Board	3	0	0	1	3	50	50	100	3
2	IPCC	21CS42	Embedded System Concepts with ARM	Any CSE Board	3	0	2	0	3	50	50	100	4
3	IPCC	21CS43	Operating Systems	Any CSE Board	3	0	2	0	3	50	50	100	4
4	PCC	21CS44	Design and Analysis of Algorithms	Any CSE Board	3	0	0	0	3	50	50	100	3
5	AEC	21BE45	Biology for Engineers	BT, CHE, PHY	2	0	0	0	2	50	50	100	2
6	PCC	21CSL46	Design and Analysis of Algorithms Laboratory with Python	Any CSE Board	0	0	2	0	2	50	50	100	1
7	HSMC	21KSK37/47	Samskrutika Kannada	TD and PSB: HSMC	1	0	0	0	1	50	50	100	1
	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	21CS48X / 21CSL48X	Ability Enhancement Course - IV	Any Department	1	0	0	0	50	50	100	1	
9	UHV	21UH49	Understanding Harmony and Ethical Human Conduct	Evaluation by the appropriate authorities	0	0	2	0	2	50	50	100	1
10	INT	21INT49	Inter/Intra Institute Internship	Completed	3	100	---	100	2	2	2	2	
				Total	550	450	450	1000	22				

Chairperson

Board of Studies

Computer Science & Engineering & Allied Program

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

1	NCMC	21MATDIP41	Additional Mathematics - II	Maths	2	0	0	1	3	50	50	100	0
---	------	------------	-----------------------------	-------	---	---	---	---	---	----	----	-----	---

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.

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.

21KSK37/47 Samskrutika Kannada is for students who speak, read and write Kannada and **21KBK37/47** Balake Kannada is for non-Kannada speaking, reading, and writing students.

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.

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.

Non-Credit Mandatory Courses (NCMC):

(A) Additional Mathematics II:

- 1) This course is prescribed in the IV semester 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.
- 2) Additional Mathematics II 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.
- 3) Successful completion of the course Additional Mathematics II 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.
- 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

ABILITY ENHANCEMENT COURSE - IV

21CSL481	Competitive Programming Using GO	21CSL483	SENSOR SYSTEM and IOT
21CSL482	Data Visualization using R Programming		


Chairperson
 Board of Studies
 Computer Science & Engineering & Allied Program


Principal
 Siddhanta College of Engineering & Management
 An Autonomous Institution
 Mangaluru



COMPUTATIONAL MATHEMATICS-II

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

IV- SEMESTER

Course Code	21MAT401	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, Computational Mathematics-I

COURSE OBJECTIVES:

- Study the techniques of complex variables and functions together with their derivatives, Contour integration and transformations
- Enable the students to apply basic concepts of graph theory on developing algorithms
- Understand the concept of probability and enable the students to predict the outcome of simple experiments
- Enable the students to use various tests of significance in engineering problems
- Understand the concept of optimization techniques

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

Calculus of Complex functions & Construction of Analytic functions: Introduction to function of a complex variable, limits, continuity, differentiability. Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms. Properties and construction of analytic functions.	10 Hours
---	-----------------

Construction of analytic functions: Milne-Thompson method

Applications of Calculus for Data Science.

MODULE - II

Introduction to Graph Theory: Definitions and Examples, Subgraphs, Complements, Coloring, Matching.	10 Hours
--	-----------------

Trees: Definitions, Properties- Examples, Routed Trees, Trees and Sorting, Weighted Trees, and Prefix Codes.

Applications of Graph Theory in Data Structures and Algorithms.

MODULE - III

Probability Distribution Functions: Random variables (discrete and continuous), Probability mass/density functions, Binomial, Poisson distributions-problems. Exponential and Normal distributions-problems, Joint Probability distribution for two discrete random variables, Expectation and Covariance. Markov chain.	10 Hours
---	-----------------

Applications of Probability Distributions in System Modeling and Simulations.





MODULE - IV

Sampling: Sampling distribution, Central limit theorem (only statement). Point estimation, Interval estimation.	10 Hours
Testing Hypothesis: Null hypothesis, Alternate hypothesis, Type- I & II error.	
Test of significance for small samples: Student's t-distribution, Chi-square distribution as a test of goodness of fit.	
Test of significance for large samples: Z-test (for proportions and means) Probable limits for proportions.	
Applications of Sampling Methods in Data Mining and Analytics.	

MODULE - V

Optimization Techniques: Solving Linear Programming Problem by Graphical method and Simplex Method.	10 Hours
Curve Fitting & Statistical Methods: Curve fitting by the method of least squares- fitting the curves of the form- $y = ax + b$, $y = axb$, and $y = ax^2 + bx + c$ correlation-Karl Pearson's coefficient of correlation. Rank Correlation, Lines of regression-problems	
Applications of Statistical Methods in Machine Learning.	

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:

1. The question paper will have **TEN** full questions from **FIVE** Modules
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:

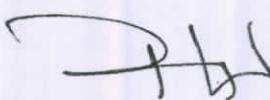
1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. Ralph P Grimaldi: Discrete and Combinatorial Mathematics, 5th edition, Pearson Education. 2004

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. <https://www.youtube.com/watch?v=1HDRmEGdb9A>
2. <https://www.youtube.com/watch?v=AQHcZklcltI>
3. <https://www.youtube.com/watch?v=8Kg2ljBCm-k>
4. <https://www.youtube.com/watch?v=Wa6kaCwyYRk>
5. <http://nptel.ac.in/courses.php?disciplineID=111>
6. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))


 Principal
 Sahyadri College of Engineering & Management
 An Autonomous Institution
 Mangaluru



EMBEDDED SYSTEM CONCEPTS WITH ARM

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

IV SEMESTER

Course Code	21CS42	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 Embedded systems and basic concepts of ARM architecture and programming.

COURSE OBJECTIVES:

- Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system.
- Program ARM controller using the various instructions.
- Identify the applicability of the embedded system.
- Comprehend the real time operating system used for the embedded system.

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

Embedded System design concepts: Embedded Vs General computing system, History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems. Characteristics and Quality Attributes of Embedded Systems, Operational quality attributes, non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design and Program Modelling, embedded firmware design and development.	8 Hours
---	----------------

Text book 2: Chapter 1(Sections 1.2 to 1.6); Chapter-3, Chapter-4, Chapter-7 (Sections 7.1, 7.2 only), Chapter-9 (Sections 9.1, 9.2, 9.3.1, 9.3.2 only)

MODULE - II

ARM Embedded Systems: RISC, ARM Design Philosophy, Embedded System Hardware and Software. ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and Vector Table, Core Extensions.	8 Hours
--	----------------

Text book 1: Chapter 1 - 1.1 to 1.4, Chapter 2 - 2.1 to 2.5

MODULE - III

ARM Instructions Set: Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instructions, Program Status Register Instruction.	8 Hours
---	----------------

Text book 1: Chapter 3: Sections 3.1 to 3.6 (Excluding 3.5.2)

MODULE - IV

Interfacing: Interfacing Sensors, Actuators, LED, 7 segment display, stepper motor, Keyboard, Push button	8 Hours
---	----------------



switch, Timers. Communication Interface (onboard and external types), Embedded firmware, Other system components.

Text book 2: Chapter 2 (Sections 2.1 to 2.6)

MODULE - V

RTOS and IDE for Embedded System Design: Real time Operating System basics, how to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan.

8 Hours

Case Study: VxWorks v/s Lynx OS.

Text book 2: Chapter-10 (Sections 10.1 to 10.10 only), Chapter 12, Chapter-13 (block diagram before 13.1 to 13.6 only)

LABORATORY COMPONENTS

Exp. No.	Experiment Description	Bloom's Taxonomy Level
1.	Write an ALP to (a). add two 16-bit binary numbers. (b). find factorial of a number.	CL3
2.	Write an ALP to find the square of a number (1 to 10) using look-up table.	CL3
3.	Write an ALP to find the largest/smallest number in an array of 32 numbers.	CL3
4.	Write an ALP to arrange a series of 32-bit numbers in ascending/descending order.	CL3
5.	Write an ALP to count the number of ones and zeros in two consecutive memory locations.	CL3
6.	Display "Hello World" message using Internal UART.	CL3
7.	Interface (a) Stepper motor (b) DC motor to rotate it in clockwise and anti-clockwise direction.	CL3
8.	Interface a DAC and generate the following waveforms: (a). Square Wave (b). Triangular wave	CL3
9.	Display the Hex digits 0 to F on a 7-segment LED interface, with an appropriate delay in between.	CL3
10.	Demonstrate the use of an external interrupt to toggle an LED On /Off.	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

40%

30%

30%

Syllabus Coverage

100%

Syllabus Coverage

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:

1. The question paper will have **TEN** full questions from **FIVE** Modules
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:

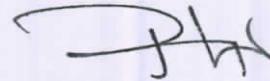
1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008. (Chapters: 1, 2, 3, 4, 5, 6, 7)
2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd edition. (Chapters: 9, 10, 12)

REFERENCE BOOKS:

1. William Hohl, Christopher Hinds ARM ASSEMBLY LANGUAGE Fundamentals and Techniques, 2nd Edition, CRC Press, 2015.
2. Gibson ARM Assembly Language An Introduction, Second Edition, 2007.
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

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

1. https://onlinecourses.nptel.ac.in/noc22_cs93/unit?unit=17&lesson=18
2. https://onlinecourses.nptel.ac.in/noc22_cs93/unit?unit=26&lesson=27
3. https://onlinecourses.nptel.ac.in/noc22_cs93/unit?unit=43&lesson=44
4. https://onlinecourses.nptel.ac.in/noc22_cs93/unit?unit=52&lesson=53
5. https://onlinecourses.nptel.ac.in/noc22_cs93/unit?unit=75&lesson=76



Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



OPERATING SYSTEMS

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

IV SEMESTER

Course Code	21CS43	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:

- Data Structures, Object Oriented Programming, Computer Organization.

COURSE OBJECTIVES:

- Students will understand the types of operating system and ability to create threads and perform Inter process communication.
- Students can understand CPU scheduling and able to solve process synchronization problems.
- Students can understand the issues surrounding deadlock handling and memory management.
- Students can gather the knowledge about paging and segmentation methods suitable for virtual memory. Ability to manage files and directory.
- Students will be able to understand the recovery and manage disk spaces. Knowledge of files systems and Android OS.
- Students can simulate the working of operating system, also algorithm used in operating system and develop dummy operating system

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

Operating Systems and Structures: Introduction, user view, system view, Single processor systems, multiprocessors systems, clustered systems, multiprogramming and multitasking, dual mode and multimode operations, Distributed systems, Computing environments, Operating System services, System Calls, Linkers and Loader, Operating system design and implementation, Operating System Structures.	8 Hours
--	----------------

Process Management: Process concept, process state, process control block, Context switch; Operations on processes, Inter process communication.	
---	--

MODULE - II

Multi-Threaded Programming: Overview of Threads, Multithreading models, Thread Libraries, Implicit Threading, Threading issues,	8 Hours
--	----------------

CPU Scheduling: Schedulers, Pre-emptive and non-pre-emptive scheduling, dispatcher; Scheduling Criteria.	
---	--

Scheduling Algorithms: FCFS, SJF, SRTF, RR, Priority, HRRN, multi-level feedback Queue scheduling, Multiprocessor scheduling.	
--	--





MODULE - III

Process Synchronization: Background, Critical section problem, Peterson's solution; Synchronization hardware, mutex, Semaphores, Monitors, Classical problems of synchronization:	8 Hours
--	----------------

Deadlocks: System model, Necessary conditions for deadlocks, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance -Resource allocation graph algorithm, banker's algorithm, Deadlock Detection, Recovery from deadlock.

MODULE - IV

Memory Management: Background, Contiguous memory allocation, Paging, Swapping.	8 Hours
---	----------------

Virtual Memory Management: Background; Demand paging: Copy-on-write; Page replacement Algorithms - FIFO, Optimal, LRU; Thrashing

File System Interface and Operations: Access methods, Directory structures, Protection, File system structure, Directory implementation, Allocation methods, Free space management.

MODULE - V

Storage Management and Security: Mass storage structures; Disk scheduling algorithms, Swap space management.	8 Hours
---	----------------

Protection: Goals, Principles and Domains of protection, Access matrix, Implementation of access matrix, Revocation of access rights, Access control.

Virtual Machines: overview, Benefits and features, Building Blocks, Types of Virtual machines and Their implementations.

LABORATORY COMPONENTS

Exp. No.	Experiment Description	Bloom's Taxonomy Level
1.	Analyse and execute different types of System Calls for Process creation and Termination.	CL4
2.	Analyse and execute a C program to simulate the non-preemptive CPU scheduling algorithms	CL4
3.	Demonstrate classical problems of synchronization using C program.	CL4
4.	Demonstrate Banker's algorithm for the purpose of deadlock avoidance using C program.	CL4
5.	Demonstrate different page replacement algorithms using C program.	CL4
6.	Analyse and Compare different Disk scheduling algorithms using C program	CL4
7.	Compare and simulate file allocation strategies using C program	CL4
8.	OS Protection and Security – Installing Firewall, Protections, Threat Detections.	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	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:

- Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 10th edition, Wiley-India, 2021
- M. Morris Mano, Computer System Architecture, PHI, 3rd Edition

REFERENCE BOOKS:

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

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

- <https://www.geeksforgeeks.org/operating-systems/>
- https://www.youtube.com/watch?v=RozoeWzT7IM&list=PLdo5W4Nhv31a5ucW_S1K3-x6ztBRD-PNa
- https://en.wikipedia.org/wiki/Operating_system
- <https://www.youtube.com/watch?v=By6IWjiPpVI&list=PLG9aCp4uE-s17rFjWM8KchGlffXgOzzVP>
- <https://www.youtube.com/watch?v=bkSWJJZNgf8&list=PLxCzCOWd7aiGz9donHRrE9I3Mwn6XdP8>

Principal

Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



DESIGN AND ANALYSIS OF ALGORITHMS

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

IV SEMESTER

Course Code	21CS44	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:

- Fundamental knowledge of Mathematics, Data Structures.

COURSE OBJECTIVES:

- Describe the techniques for analyzing algorithms and how to evaluate their performance. Indicate the effectiveness of the method using asymptotic notations.
- Utilize algorithm design techniques including the brute force approach, greedy approach, divide-and-conquer strategy, decrease-and-conquer strategy, transform-and-conquer strategy, dynamic programming, backtracking, and branch-and-bound to solve issues.
- Decide on the best data structure and algorithm design technique for the given application.
- Recognize the fundamental ideas behind NP-complete and NP-hard class issues.

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 Algorithms- Properties, Specification, Fundamentals of Algorithmic Problem solving, Analysis Framework.	8 Hours
---	----------------

Performance Analysis: Estimating Space complexity and Time complexity of algorithms. Asymptotic Notations with examples, Basic efficiency classes, Mathematical analysis of Non-Recursive and Recursive Algorithms with Examples.

Brute force design techniques: Selection sort, sequential search and String-matching algorithm with complexity Analysis.

Textbook 1: Chapter 1(Section 1.1,1.2), Chapter 2(section 2.1, 2.2, 2.3, 2.4), Chapter 3(3.1, 3.2)

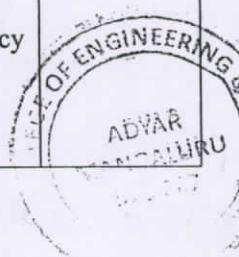
Textbook 2: Chapter 1(Sections 1.1,1.2)

MODULE - II

Divide and Conquer: General method, Recurrence equation for divides and conquers, solving it using Master's theorem. , Divide and Conquer algorithms and complexity Analysis of Finding the maximum & minimum, Binary search, Merge sort, Quick sort.	8 Hours
---	----------------

Decrease and Conquer Approach: Introduction, Insertion sort, Topological Sorting and efficiency analysis.

Textbook 1: Chapter 4 (Sections 4.1,4.2,4.3), Chapter 5(Section 5.1,5.3)





Textbook 2: Chapter 3(Sections 3.1,3.3,3.4,3.5,3.6)

MODULE - III

Greedy Method: General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines, Minimum cost spanning tree algorithms: Prim's Algorithm, Kruskal's Algorithm. **Single source shortest paths:** Dijkstra's Algorithm. **Optimal Tree problems:** Huffman Trees and Codes. **Transform and Conquer Approach:** Heaps and Heap Sort.

8 Hours

Textbook 1: Chapter 9(Section 9.1,9.2,9.3,9.4), Chapter 6(section 6.4)

Textbook 2: Chapter 4(Sections 4.1,4.3,4.5)

MODULE - IV

Dynamic Programming: General method with Examples, Multistage Graphs.

8 Hours

Transitive Closure: Warshall's Algorithm. All Pairs Shortest Paths: Floyd's Algorithm, Knapsack problem, Optimal Binary Search Trees, Travelling Sales Person problem.

Space-Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching Harspool's algorithm.

Textbook 1: Chapter 8(Sections 8.2,8.3,8.4), Chapter 7 (Sections 7.1,7.2)

Textbook 2: Chapter 5 (Sections 5.1,5.2,5.5, 5.9)

MODULE - V

Backtracking: General method, N-Queens problem, Sum of subsets problem, Graph colouring, Hamiltonian cycles Problems.

8 Hours

Branch and Bound: Basic concepts, Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem.

NP-Complete and NP-Hard problems: Basic concepts, Non- deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.

Textbook 1: Chapter 12 (Sections 12.1,12.2) Chapter 11(Section 11.3)

Textbook 2: Chapter 7 (Sections 7.1,7.2,7.3,7.4,7.5) Chapter 11 (Section 11.1)

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.

TEXT BOOKS:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 3rd Edition, Pearson.
2. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, Universities Press

REFERENCE BOOKS:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 3rd Edition, PHI.
2. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education).

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

1. https://www.youtube.com/watch?v=gY0MwGLq9W8&list=PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639_P
2. <https://www.youtube.com/watch?v=5Y8Lfsreeck&list=PL7DC83C6B3312DF1E>
3. https://www.youtube.com/watch?v=S47aSEqm_0I&list=PLgj_V-ZKxRKrxgFyOutPJpoLFBaQMOpK-


Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



BIOLOGY FOR ENGINEERS

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

IV SEMESTER

Course Code	21BE45	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	2:0:0:0	SEE Marks	50
Total Hours of Pedagogy	28L	Exam Hours	02

CREDITS – 2

COURSE PREREQUISITES:

- Basic Concepts of Biology

COURSE OBJECTIVES:

- Implementation of new technology in medical Science.
- Use modern technical skills to bring out innovations in medical field.

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

Human Anatomy –Biology, classification, nature and scope. Cell – The unit of life – Meaning of cell, the Plant Cell and animal Cell, protoplasm, Plant Tissue and Animal Tissue. Brain as a CPU system - architecture, CNS and Peripheral Nervous System, signal transmission, EEG.	6 Hours
--	----------------

MODULE - II

Common Diseases and Vaccination - Allergies, Colds and Flu - causes and precautions. First vaccine in the world, Vaccine for Rabies and RNA vaccines for Covid- critical analysis, case study of process of development of Covid vaccine.	6 Hours
--	----------------

Forensics – DNA fingerprinting. Engineering solutions for Parkinson's disease. Heart disease and its types. Modern technologies to detect heart diseases.	
--	--

MODULE - III

Biosensors: Various components of biosensors, Transducers in Biosensors: Various types of transducers; principles and applications, applications of biosensors.	6 Hours
--	----------------

Telemedicine: Block diagram of telemedicine system, origin and development of Telemedicine, Benefits and limitations of Telemedicine.	
--	--

MODULE - IV

Biomechanics of Joints: Skeletal Joints, Skeletal Muscles, Joint Function, forces and stresses in human joints, Mechanics of the Elbow, Shoulder, Spinal Column, Hip, Knee and Ankle, Applications of prosthetics.	6 Hours
---	----------------

Bio-fluid Mechanics: Circulatory System in the Human Body, Modeling of Flow in Blood Vessels, Blood Flow Theory.	
---	--

Biomaterials: Definition and classification of biomaterials, biocompatibility and biodegradability, Biomedical Implants.	
---	--

MODULE - V





Artificial Intelligence for Medical Applications: Introduction to Artificial intelligence and machine learning in medical Science. Application of AI in Imaging and Computer-aided Diagnosis, Neuroscience and drug discovery, Genetic algorithms.	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
	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%
MI			MI	MI
MII	MIII		MII	MII
	MIII		MIII	MIII
		MIV	MIV	MIV
		MV	MV	MV

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	Case Studies	25 %	05
3	Seminar/Presentation	25 %	05
4	Peer - to - Peer Learning	25 %	05

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.
- Each full question consists of 20 marks.
- There will be 2 full questions from all the **FIVE** modules.
- Each full question will have a maximum of three sub-questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

1. Brian R Eggin - Biosensors an Introduction , First edition, John Wiley & Sons Publishers, 1996.
2. R S Khandpur, "Telemedicine technology and applications", PHI Learning Pvt. Ltd, New Delhi, 2017.
3. N. Ozkaya and M. Nordin : Fundamentals of Biomechanics-Equilibrium, Motion and Deformation, Springer-Verlag,2nd Edition,1999.

REFERENCE BOOKS:

1. Biomaterials Science and Tissue Engineering: Principles and Methods,By Bikramjit Basu,Cambridge IISc Series.

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

1. <https://www.youtube.com/watch?v=96-u9s6D16k>
2. https://www.youtube.com/watch?v=4_emccqgYMs
3. https://onlinecourses.nptel.ac.in/noc22_cs56/preview
4. https://onlinecourses.nptel.ac.in/noc22_cs29/preview



DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY WITH PYTHON

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

IV SEMESTER

Course Code	21CSL46	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:

- Knowledge of Mathematics, Data Structures and Python Programming
- Usage of IDEs like Jupyter Notebook/ PyCharm

COURSE OBJECTIVES:

- Design, analyze, and implement various algorithms in Python.
- Make use of different algorithmic design techniques to solve problems.
- Analyze and contrast the effectiveness of various algorithms.

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

PRE-REQUISITE EXPERIMENTS

Exp. No.	Description
1	Write a Python program to create an array of 5 integers and display the array items. Access individual elements through indexes.
2	Write a Python program to find the greatest common divisor (GCD) of two integers.
3	Write a Python program to construct the following pattern, using a nested for-loop. * * * * * * * * *

LIST OF EXPERIMENTS

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

Exp. No.	Description
1	Design an application to create a list of TV channels (minimum 10) that includes the numbers of viewers and viewing time. Rate the channels based on the number of viewers (1 High - 6 low). Plot graphs to analyze the running times of different sorting algorithms.
2	Design and implement an application that considers the problem of scheduling n jobs of known durations t_1, t_2, \dots, t_n for execution by a single processor. The jobs can be executed in any order, one job at a time. Find and display the schedule that minimizes the total time spent by all the jobs in the system by maximizing the profit.



3	Develop an optimal route for a scenario where you want to buy a ticket to a baseball game. Along the way from your house to reaching the destination, someone you know who lives on that street would give you money. Visit towns for the collection of more money to buy a ticket.
4	Design an application for a thermal power station and electrical lines that are connected among various power stations. The costs of electrification involved appear as weights on the edges. Obtain the minimum possible connection among the thermal stations so that any two thermal stations can be linked with the minimum cost involved.
5	Develop a program for the following: a. To construct a Huffman code for a given English text and encode it. b. To decode an English text which has been encoded with a Huffman code.
6	The owner of a gourmet coffee shop wishes to mix a 10-pound bag of coffee using various types of coffee beans in such a way to produce the coffee blend at the maximum cost. The weights of the objects in the problem correspond to the quantity in pounds available of each type of coffee bean. The value of each quantity of coffee beans is the total cost of that quantity in rupees. Apply the Knapsack algorithm to maximize the profit.
7	Design an application for drilling an optimal printed circuit board. To drill two holes of different diameters consecutively, the head of the machine has to move to a toolbox and change the drilling equipment. This is quite time consuming. Thus, it is clear that one has to choose some diameter, drill all holes of the same diameter, change the drill, drill the holes of the next diameter, etc. Thus, this drilling problem has to minimize the travel time for the machine head. Find the optimal time to drill the circuit board.
8	Design an application for the university to schedule an exam. Given a list of different subjects and students who are enrolled in many subjects, many subjects would have common students of the same batch, some backlog students, etc. Find the solution to the following: a. Obtain the schedule for the exam so that no two exams with a common student are scheduled at the same time. b. How many minimum time slots are needed to schedule all exams?
9	Design and implement for a given chess board having $N \times N$ cells, you need to place N queens on the board in such a way that no queen attacks any other queen. If it is possible to place all the N queens in such a way that no queen attacks another queen, then print N lines having N Queens. If there is more than one solution of placing the queens, print all of them. If it is not possible to place all N queens in the desired way, then print "Not possible".

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

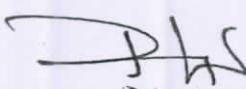
1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

REFERENCE BOOKS:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 3rd Edition, Pearson.
2. Computer Algorithms/C++, Ellis Horowitz, Sartaj Sahni and Rajasekaran, 2nd Edition, Universities Press.

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

1. <https://nptel.ac.in/courses/106106182>



Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



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

ಫಳಕ – ೧ ಅಜೆಂಟ್, ಪತ್ರಗಳು	03 Hours
೧. ಪತ್ರ ವ್ಯವಹಾರ – ಸರ್ಕಾರಿ ಪತ್ರಗಳು, ಅರೆಸರ್ಕಾರಿ ಪತ್ರಗಳು ಮತ್ತು ವೈಯಕ್ತಿಕ ಪತ್ರಗಳು	
೨. ಆಹ್ವಾನ ಪತ್ರಿಕೆ, ಜಾಹೀರಾತು, ಪತ್ರಿಕೆ ಪ್ರಕಟನೆ	
೩. ಅಜೆಂಟ ನಮೂನೆಗಳು	

MODULE - II

ಫಳಕ – ೨ ಆಧುನಿಕ ಪ್ರೂಪದ ಕಾವ್ಯಭಾಗ	03 Hours
೧. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಷಯಕೂಡಾಡೇವಿ, ಅಲ್ಲಿಮಪ್ಪಬ್ಬಿ, ಅಯ್ಯಾಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಅಯ್ಯಾಕ್ಕಿ ಲಕ್ಷ್ಮೀಯ್ಯ ೨. ಕೀರತನಮ್ಮೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರಧಾಸರು ತಲ್ಲಿಣಿಸದಿರು ಕಂಡು ತಾಳು ಮನವೇ – ಕನಕದಾಸರು ೩. ತತ್ತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು – ಶಿಶುನಾಳ ಶರೀಫರು	

MODULE - III

ಫಳಕ – ೩ ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ	03 Hours
೧. ದಿವಿಡಿ ಯವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಅಯ್ಯಾ ಕೆಲವು ಭಾಗಗಳು ೨. ಕುರುಕು ಕಾಂಚಾಣ : ದ. ರಾ. ಬೇಂದ್ರೆ ೩. ಕೊಸಬಾಳನ ಗೀತೆ : ಕುವೆಂಪು	





MODULE - IV

ಫಳಕ - 4 ಲೇಖನಗಳು

03 Hours

1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ವಿಕಿರ್ಯ - ಎ.ಎನ್. ಮೂರ್ತಿರಾವ್
2. ಕರ್ತವ್ಯ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ - ಕರೀಗಿಡ ಬೀಳನಹಳ್ಳಿ

MODULE - V

ಫಳಕ - 5 ಕಥೆಗಳು

03 Hours

1. ಯುಗಾದ - ವಸುದೇಂದ್ರ
2. ಬೆಡ್ ನಂಬರ್ ಏಳು - ಶ್ರೀಮಣಿ

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:

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. ಚೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ್ - ಗ. ಸಂಸ್ಕೃತಿಕ ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಕ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.
1st Edition, 2020
2. ಆದಳತ ಕನ್ನಡ (ಪತ್ರಿಕೆ - ಗ, ಬಾಳ್ ಇ) ಪ್ರಕಟಕೆ: ಕನಾಡ ರಾಜ್ಯ ಮತ್ತು ವಿಶ್ವವಿದ್ಯಾಲಯ, ಮೈಸೂರು, 1st Edition, 2015
3. ಕನ್ನಡ ಮನಸು - ಇಂಡಿನಿಯರಿಂಗ್ ಪ್ರಾಥಮ ಪದವಿ ತರಗತಿ ಕನ್ನಡ ಪತ್ರ, ಪ್ರಕಟಕೆ: ಪ್ರಸಾರಾಂಗ ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ, 5th Edition, 2018

REFERENCE BOOKS:

1. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ - ಕನ್ನಡ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ೨೦೧೨
2. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ - ರಂ. ಶ್ರೀ. ಮುಗ್ಡ, ಉತ್ತಾ ಸಾಹಿತ್ಯ, ಮೈಸೂರು
3. ಸಮಗ್ರ ವಚನ ಸಂಪುಟಗಳು - ಎಂ. ಎಂ. ಕಲಬ್ರಗೆ, 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/>

Principal

Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



ಒಳಕೆ 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 conservation, 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:

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. ಬಳಕೆ ಕನ್ನಡ – ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ; ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.
2. ವ್ಯಾವಹಾರಿಕ ಕನ್ನಡ (ಪತ್ರಿಕೆ – ೧, ಬಾಬ್ರ್ ಇ) ಪ್ರಕಟಣೆ: ಕನಾಟಕ ರಾಜ್ಯ ಮತ್ತು ವಿಶ್ವವಿದ್ಯಾಲಯ, ಮೈಸೂರು.

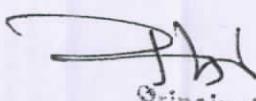


REFERENCE BOOKS:

1. Kannada Kali (ಕನ್ನಡ ಕಲಿ) – ಲಿಂಗದೇವರು ಹಳೇಮನೆ, A Text Book to Learn Kannada by Non – Kannadigas who come to study Diploma, Engineering and Health Sciences in Karnataka, ಪ್ರಕಟಕೆ: ಪ್ರಸಾರಾಂಗ ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ.
2. Spoken Kannada – ಮಾತಾಡುವ ಕನ್ನಡ, ಪ್ರಕಟಕೆ – 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.alllanguagesresources.com/kannada/>


Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangalore



CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAWS

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

III/IV-SEMESTER

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
---	----------------

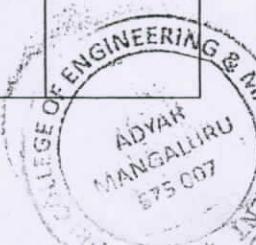
MODULE - III

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 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:

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



TEXT BOOKS:

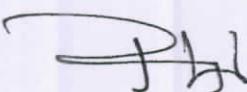
1. G.B. Reddy, Mohd. Suhaib: "Constitution Of India And Professional Ethics" I K International Publishing House Pvt. Ltd.
2. Dr. Jyothi Rattan: "Cyber Laws and Information Technology" Bharath Law House Pvt. Ltd.

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


Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



BIOLOGY FOR ENGINEERS

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

IV SEMESTER

Course Code	21BE45	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	2:0:0:0	SEE Marks	50
Total Hours of Pedagogy	28L	Exam Hours	02

CREDITS – 2

COURSE PREREQUISITES:

- Basic Concepts of Biology

COURSE OBJECTIVES:

- Implementation of new technology in medical Science.
- Use modern technical skills to bring out innovations in medical field.

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

Human Anatomy –Biology, classification, nature and scope. Cell – The unit of life – Meaning of cell, the Plant Cell and animal Cell, protoplasm, Plant Tissue and Animal Tissue. Brain as a CPU system - architecture, CNS and Peripheral Nervous System, signal transmission, EEG.	6 Hours
--	----------------

MODULE - II

Common Diseases and Vaccination - Allergies, Colds and Flu - causes and precautions. First vaccine in the world, Vaccine for Rabies and RNA vaccines for Covid- critical analysis, case study of process of development of Covid vaccine.	6 Hours
--	----------------

Forensics – DNA fingerprinting. Engineering solutions for Parkinson's disease. Heart disease and its types. Modern technologies to detect heart diseases.	6 Hours
--	----------------

Biosensors: Various components of biosensors, Transducers in Biosensors: Various types of transducers; principles and applications, applications of biosensors.	6 Hours
--	----------------

Telemedicine: Block diagram of telemedicine system, origin and development of Telemedicine, Benefits and limitations of Telemedicine.	6 Hours
--	----------------

MODULE – IV	6 Hours
--------------------	----------------

Biomechanics of Joints: Skeletal Joints, Skeletal Muscles, Joint Function, forces and stresses in human joints, Mechanics of the Elbow, Shoulder, Spinal Column, Hip, Knee and Ankle, Applications of prosthetics.	6 Hours
---	----------------

Bio-fluid Mechanics: Circulatory System in the Human Body, Modeling of Flow in Blood Vessels, Blood Flow Theory.	6 Hours
---	----------------

Biomaterials: Definition and classification of biomaterials, biocompatibility and biodegradability, Biomedical Implants.	6 Hours
---	----------------

MODULE - V





Artificial Intelligence for Medical Applications: Introduction to Artificial intelligence and machine learning in medical Science. Application of AI in Imaging and Computer-aided Diagnosis, Neuroscience and drug discovery, Genetic algorithms.	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
	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%
MI			MI	MI
MII	MII		MII	MII
	MIII		MIII	MIII
		MIV	MIV	MIV
		MV	MV	MV

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	Case Studies	25 %	05
3	Seminar/Presentation	25 %	05
4	Peer - to - Peer Learning	25 %	05

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.
- Each full question consists of 20 marks.
- There will be 2 full questions from all the **FIVE** modules.
- Each full question will have a maximum of three sub-questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

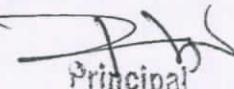
1. Brian R Eggins - Biosensors an Introduction , First edition, John Wiley & Sons Publishers, 1996.
2. R S Khandpur, "Telemedicine technology and applications", PHI Learning Pvt. Ltd, New Delhi, 2017.
3. N. Ozkaya and M. Nordin : Fundamentals of Biomechanics-Equilibrium, Motion and Deformation, Springer-Verlag,2nd Edition,1999.

REFERENCE BOOKS:

1. Biomaterials Science and Tissue Engineering: Principles and Methods,By Bikramjit Basu,Cambridge IISc Series.

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

1. <https://www.youtube.com/watch?v=96-u9s6D16k>
2. https://www.youtube.com/watch?v=4_emccqgYMs
3. https://onlinecourses.nptel.ac.in/noc22_cs56/preview
4. https://onlinecourses.nptel.ac.in/noc22_cs29/preview


Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangalore



UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

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

IV SEMESTER

Course Code	21UH49	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:

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

COURSE OBJECTIVES:

This course will enable students to:

- To make the students to understand, the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and the movement towards value-based living in a natural way.
- To highlight possible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior, and mutually enriching interaction with Nature.

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 Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education). Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations.	3 Hours
--	----------------

MODULE - II

Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.	3 Hours
---	----------------

MODULE - III

Harmony in the Family and Society : Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationships, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.	3 Hours
--	----------------





MODULE - IV

Harmony in the Nature/Existence:

Understanding Harmony in Nature, Inter-connectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

3 Hours

MODULE - V

Implications of the Holistic Understanding – a Look at Professional Ethics:

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

3 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		
40%	30%	30%	Syllabus Coverage	Syllabus Coverage
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:

- 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. The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
2. The Teacher's Manual Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G

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.
6. Gandhi - Romain Rolland (English)

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

1. <https://www.aicteindia.org/sites/default/files/Vol.%20II%20%20AICTE%20UG%20%20Curriculum>.
2. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
3. https://fdp-si.aicte-india.org/8dayUHV_download.php
4. <https://www.youtube.com/watch?v=8ovkLRYXljE>.


Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



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

IV SEMESTER

Course Code	21MATDIP41	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, Additional Mathematics 1

COURSE OBJECTIVES:

- Enable the students to use the concepts of Vector and Vector Differentiation
- Study the various methods Solving first order first degree Linear 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
- 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

Numerical Methods: Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formula, Newton's divided difference and Lagrange's formula (All formulae without proof). Solution of polynomial and transcendental equations-Newton-Raphson and Regula-Falsi methods (only formulae)-illustrative examples.	5 Hours
---	----------------

Numerical integration: Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rules, Weddle's rule (without proof)-

MODULE - II

Linear Algebra: Rank of a matrix-echelon form. Solution of the system of linear equations consistency. Gauss-elimination method, Gauss- Jordan method and Approximate solution by Gauss-Seidel method. Eigenvalues and eigenvectors Rayleigh's power method. Diagonalization of a square matrix of order two.	5 Hours
--	----------------

MODULE - III

Integral Calculus: Integration of product of two functions using Bernoulli's Rule, Reduction formula – Derivation of Reduction formula of $\cos nx$ and $\sin nx$.	5 Hours
--	----------------

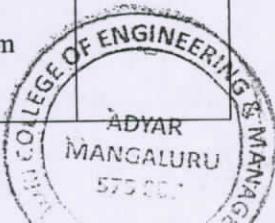
MODULE - IV

Differential Equations of higher-order: - Second order linear ODEs with constant coefficients-Inverse differential operators	5 Hours
---	----------------

MODULE - V

Laplace Transform: Definition and Laplace transforms elementary functions (statements only). Laplace transforms of Periodic functions and unit-step function. Properties of Laplace transform.	5 Hours
---	----------------

Inverse Laplace Transform: Various Techniques of Inverse Laplace Transform, Convolution Theorem





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%	100%
MI			MI	MI
MII	MII		MII	MII
	MIII		MIII	MIII
		MIV	MIV	MIV
		MV	MV	MV

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.

TEXT BOOKS:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- E.Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.



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. H.K.Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication (2014).

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

1. <https://www.youtube.com/watch?v=1HDRmEGdb9A>
2. <https://www.youtube.com/watch?v=AQHcZklclI>
3. <https://www.youtube.com/watch?v=8Kg21jBCm-k>
4. <https://www.youtube.com/watch?v=Wa6kaCwyYRk>
5. <http://nptel.ac.in/courses.php?disciplineID=111>
6. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
7. <http://academicearth.org/>
8. <http://www.bookstreet.in.>
9. VTU e-Shikshana Program



Principal

Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



COMPETITIVE PROGRAMMING USING GO

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

IV SEMESTER

Course Code	21CSL481	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 any Programming.

COURSE OBJECTIVES:

This course will enable students to:

- Understand the usage of running multiple processes at the same time.
- Unleash the Ability to Write Better and Optimized Codes.

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 Go: Hello-World, Command-Line Arguments, Finding Duplicate Lines, Animated GIFs, fetching a URL, Fetching URLs Concurrently, A Web Server, Loose Ends.	5 Hours
Program Structure: Names, Declarations, Variables, Assignments, Type Declarations, Packages and Files, Scope.	

MODULE - II

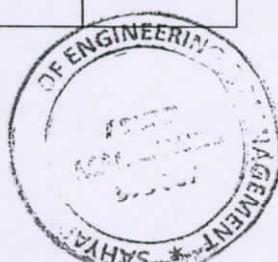
Basic Data Types: Integers, Floating-Point Numbers, Complex Numbers, Booleans, Strings, Constants. Composite Types: Arrays, Slices, Maps, Structs, JSON, Text and HTML Templates. Functions: Function Declarations, Recursion, Multiple return values, Errors, Function Values, Anonymous functions.	5 Hours
---	----------------

MODULE - III

Methods: Declarations, Methods with a Pointer Receiver, Composing Types by Struct Embedding, Method values and expressions. Interfaces: Interfaces as Contacts, Interface Types, parsing flags, Sorting with sort. interface, http. handler interface, error interface, Examples.	5 Hours
--	----------------

MODULE - IV

Goroutines and Channels: Goroutines, Examples, Channels, looping in parallel, Example: Concurrent Web Crawler, multiplexing with select, Example: Concurrent Directory Traversal, Cancellation.	5 Hours
--	----------------





MODULE - V

Packages and Go Tool: Concepts, import paths, The Package Declaration, Import Declarations, Blank imports, Packages and Naming, The Go Tool	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. The Go Programming Language, Alan A. A. Donovan, Google Inc., Brian W. Kernighan Princeton University, Addison Wesley Professional Computing Series
2. Head First Go- A brain friendly Guide, Jay McGavren, O'Reilly publishers



DATA VISUALIZATION USING R PROGRAMMING

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

IV SEMESTER

Course Code	21CSL482	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:

- Knowledge of Programming Subjects like C, C++, Java and Python.

COURSE OBJECTIVES:

- 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

INPUT/OUTPUT: Accessing the Keyboard and Monitor, Reading and Writing Files, Accessing the Internet.	4 Hours
--	---------

MODULE - II

STRING MANIPULATION: An Overview of String-Manipulation Functions, Regular Expressions, Efficient Data Handling in R	4 Hours
--	---------

MODULE - III

GRAPHICS: Creating Graphs, Customizing Graphs, Saving Graphs to Files	4 Hours
---	---------

MODULE - IV

The ggplot2 Package for Graphics: Quick Plots and Basic Control, Working with Layers, Plot Types	6 Hours
--	---------

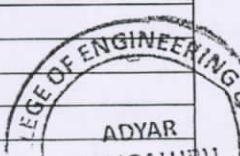
MODULE - V

Lattice Graphics: The Lattice Package, creating a Simple Lattice Graph, Lattice Graph Types, Controlling Styles.	6 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:

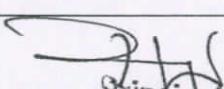
1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.
3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 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. The art of R programming , by Norman Matloff
2. Sams Teach Yourself R in 24 Hours, Andy Nicholls, Richard Pugh, Aimee Gott.

REFERENCE BOOKS:

1. Michael J. Crawley, "Statistics: An Introduction using R", Second edition, Wiley,2015
2. R Programming for Data Science Roger D. Peng


Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru



SENSOR SYSTEM AND IOT

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

IV SEMESTER

Course Code	21CSL483	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	20P	Exam Hours	03

CREDITS – 1

COURSE PREREQUISITES:

- Basic Knowledge of Mathematics and Embedded Systems.

COURSE OBJECTIVES:

- To skill the students in the Internet of Things, gateways, clouds.
- To Skill the students to design the application using IoT enabled Biomedical Sensor.
- To enable the students to design the application using IOT enabled environmental sensor.
- To enable the students to contribute for design of autonomous Vehicles.
- To enable the students to design the Image processing-based application.

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

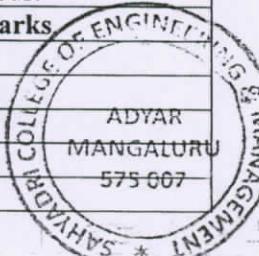
LIST OF EXPERIMENTS

Sl. No.	Description
1	Interfacing Light and Temperature to Arduino/Raspberry Pi/STM32 and upload sensed data to cloud
2	ADC interface to Arduino/Raspberry Pi/STM32 to acquire ECG signal and upload sensed data to mobile
3	Hall effect sensor interface to Arduino/Raspberry Pi/STM32
4	Interfacing LIDAR Unit to Arduino/Raspberry Pi/STM32
5	Interfacing RADAR sensor to Arduino/Raspberry Pi/STM32
6	Interfacing Camera to Arduino/Raspberry Pi/STM32
7	Interfacing Gyro Sensor to Arduino/Raspberry Pi/STM32
8	Interfacing Accelerometers to Arduino/Raspberry Pi/STM32
9	Interfacing humidity and air quality sensor to Arduino/Raspberry Pi/STM32
10	To interface blue tooth with Arduino/Raspberry Pi/STM32 and write a program to send sensor data to smart phone using Bluetooth
11	To interface Zigbee with Arduino/Raspberry Pi/STM32
12	To interface Wi-Fi with Arduino/Raspberry Pi/STM32

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.

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/>


Principal
Sahyadri College of Engineering & Management
An Autonomous Institution
Mangaluru