



KARNATAK LAW SOCIETY'S  
GOGTE INSTITUTE OF TECHNOLOGY  
"JNANA GANGA" UDYAMBAG, BELAGAVI-590008, KARNATAKA,  
INDIA.  
Approved by AICTE and UGC  
Permanently Affiliated and Autonomous Institution Under  
Visvesvaraya Technological University, Belagavi



[www.git.edu](http://www.git.edu)



**3<sup>rd</sup> and 4<sup>th</sup> Semester B.E.**

**(Computer Science and Engineering)**

**Scheme and Syllabus (2021 Scheme)**

## INSTITUTION VISION

Gogte Institute of Technology shall stand out as an institution of excellence in technical education and in training individuals for outstanding caliber, character coupled with creativity and entrepreneurial skills.

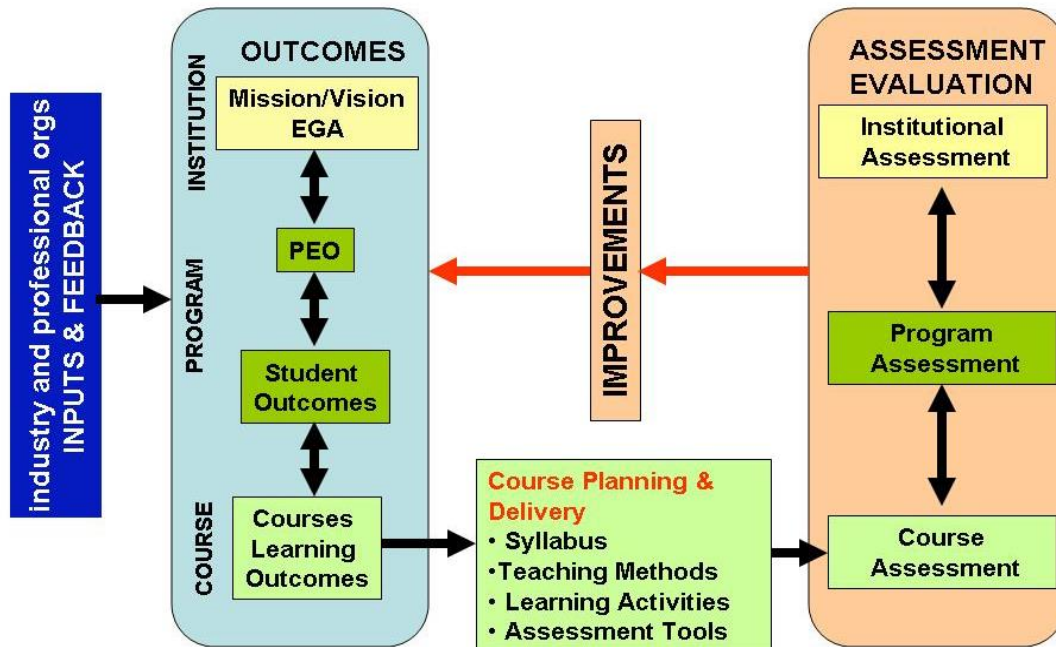
## MISSION

To train the students to become Quality Engineers with High Standards of Professionalism and Ethics who have Positive Attitude, a Perfect blend of Techno-Managerial Skills and Problem solving ability with an analytical and innovative mindset.

## QUALITY POLICY

- Imparting value added technical education with state-of-the-art technology in a congenial, disciplined and a research oriented environment.
- Fostering cultural, ethical, moral and social values in the human resources of the institution.
- Reinforcing our bonds with the Parents, Industry, Alumni, and to seek their suggestions for innovating and excelling in every sphere of quality education.

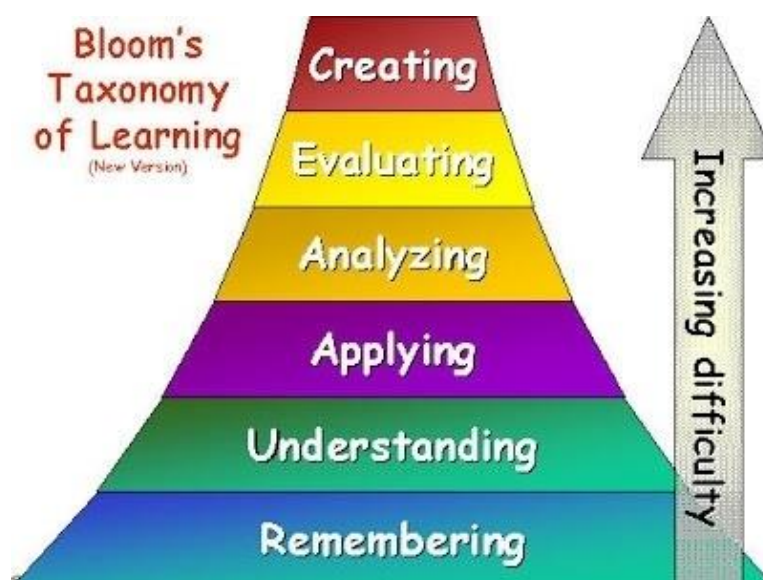
## OUTCOME BASED EDUCATION (OBE)



## BLOOM'S TAXONOMY OF LEARNING OBJECTIVES

Bloom's Taxonomy in its various forms represents the process of learning. It was developed in 1956 by Benjamin Bloom and modified during the 1990's by a new group of cognitive psychologists, led by Lorin Anderson (a former student of Bloom's) to make it relevant to the 21st century. The **revised taxonomy** given below emphasizes what a learner "Can Do".

Lower order thinking skills (LOTS)		
L1	Remembering	Retrieve relevant knowledge from memory.
L2	Understanding	Construct meaning from instructional material, including oral, written, and graphic communication.
L3	Applying	Carry out or use a procedure in a given situation – using learned knowledge.
Higher order thinking skills (HOTS)		
L4	Analyzing	Break down knowledge into its components and determine the relationships of the components to one another and then how they relate to an overall structure or task.
L5	Evaluating	Make judgments based on criteria and standards, using previously learned knowledge.
L6	Creating	Combining or reorganizing elements to form a coherent or functional whole or into a new pattern, structure or idea.



#### PROGRAM OUTCOMES:

National Board of Accreditation (NBA) has framed the Program Outcomes (PO) based on twelve Graduate Attributes (GA). These POs are generic to engineering education and applies to all branches of Engineering.

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

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

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

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

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

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

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

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

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

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

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

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

**KLS Gogte Institute of Technology**  
**1<sup>st</sup> Year B.E. (Common to all programs)**  
**Scheme of Teaching and Examination 2021-22**  
**(Effective from the academic year 2021-22)**

**Total credits for B.E. Program: 160**

**As per the guidelines of UGC CBCS the courses can be classified into:**

**Abbreviations used:**

**BSC** - Basic Science Course, **PCC**- Professional Core Course, **HSMC** - Humanity and Social Science & Management Courses, **PEC**- Professional Elective Course, **OEC** – Open Elective Course, **AEC** – Ability Enhancement Courses. **INT** – Internships, **UHV** –Universal Human Values, **MP** - Mini Project.

**L** –Lecture, **T** – Tutorial, **P**- Practical/Drawing, **S** – Self Study Component, **CIE** –Continuous Internal Evaluation, **SEE** –Semester End Examination

**Foundation Courses:** The Foundation Courses are of two kinds:

These courses are the courses based upon the content that leads to Knowledge enhancement. These courses provide opportunities to improve technological knowledge before entering industry as well as preparing students for higher degrees in technological subjects. They are mandatory for all disciplines. These courses will have 4 credits per course.

The courses are: **Basic Science Courses (BSC), Engineering Science Courses (ESC).**

**Professional Core Courses (PCC):** This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirements of a program in a said discipline of study. These courses will have 4 credits per course.

**Universal Human Value Courses (UHV):** These are value based courses aimed at man making education.

**Humanities and Social Science including Management Studies Courses(HSMS).** Humanity and Social Science Courses: The Humanities and Social Sciences are the studies of human behavior and interaction in social, cultural, environmental, economic, and political contexts. The Humanities and Social Sciences have a historical and contemporary focus, from personal to global contexts, and consider challenges for the future. Students will develop the ability to question, think critically, solve problems, communicate effectively, make decisions, and adapt to change. Thinking about and responding to issues requires an understanding of the key historical, geographical, political, economic, and societal factors involved, and how these different factors interrelate. Humanities and Social Science Courses includes-Technical-English, Courses on Regional/State languages (Kannada), etc.

**Elective Courses:** This is course, which can be chosen from the pool of papers. It may be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student proficiency skills. These courses will have 3 credits per course.

An elective may be **Discipline Centric Course (PEC)** or may be chosen from other discipline (**Open Elective Course- OEC**).

**Ability Enhancement Courses (AEC):** The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC).

“AECC” courses are the courses based upon the content that leads to Knowledge enhancement; Environmental Science, English. Biology for Engineers, Bioinformatics, Music and Vibration, Art and Architecture etc

“SEC” courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

**Mandatory Non-Credit Courses (MNC):** These courses are mandatory but do not have any credits and students must successfully complete these courses before the completion of degree.

**Credit definition:**

Offline Courses	Online Courses
<ul style="list-style-type: none"> <li>1 hour Lecture (L) per week = 1 Credit</li> <li>2 hours Tutorial (T) per week = 1 Credit,</li> <li>2 hours Practical /Drawing (P) per week = 1 Credit</li> </ul>	04 weeks =1 Credit 08 weeks = 2 Credit 12 weeks = 3 Credit
<ul style="list-style-type: none"> <li>Four-credit courses are to be designed for 50 hours of Teaching-Learning process.</li> <li>Three credit courses are to be designed for 40 hours of Teaching-Learning process.</li> <li>Two credit courses are to be designed for 25 hours of Teaching-Learning process.</li> <li>One credit courses are to be designed for 15 hours of Teaching-Learning process.</li> </ul>	

**Semester wise distribution of credits for B.E program**

Year	Semester	Credits	Total/Year	Cumulative Credits
1 <sup>st</sup>	AE, CV, ME (I-P & II-C)	19+21	40	40
	CSE, EC, EE, ISE (I-C & II-P)	18+22		
2 <sup>nd</sup>	III	20	40	80
	IV	20		
3 <sup>rd</sup>	V	23	45	125
	VI	22		
4 <sup>th</sup>	VII	17	35	160
	VIII	18		
Total			160	

**Curriculum frame work:**

**Structure of Undergraduate Engineering program**

S.No.	Category of courses	KLSGIT Breakup of credits
1	Humanities and Social Sciences including Management courses (English, Kannada, Indian Constitution, Environmental Sciences and Management)	8
2	Basic Science courses	22
3	Engineering Science courses including workshop, drawing	20
4	Professional Core Courses	49
5	Professional Elective courses relevant to chosen specialization/branch	9

6	Open subjects – Electives from other technical, emerging, arts commerce and	9
7	Mini, Project, Major Project work and Seminar	9
8	Summer Internship and Research /Industrial Internship	20
9	Ability Enhancement Courses, including Research Methodology, NCC/NSS/ Sports/Ex- Curricular, Online Certification Course	12
10	Universal Human Values	2
	<b>TOTAL</b>	<b>160</b>

#### L-T-P Model for Courses

S.No.	Contact Hours			Credits		
	L-T-P	Lecture	Tutorial	Practical	L-T-P	Total
1	3 - 0 - 0	3	0	0	3 - 0 - 0	3
2	3 - 2 - 0	3	2	0	3 - 1 - 0	4
3	3 - 0 - 2	3	0	2	3 - 0 - 1	4
4	2 - 0 - 2	2	0	2	2 - 0 - 1	3
5	1 - 0 - 4	1	0	4	1 - 0 - 2	3

**Theory courses having the corresponding lab are converted to integrated type course. Also, the electives (if possible) can also be made integrated type.**

**Integrated courses (Professional Core/Electives):** Integrated courses will have **Theory Syllabus with Practical Syllabus of the same course**. Continuous Internal Evaluation (CIE) will be conducted for the practical topics. In such a course there could be **No Semester End Examination (SEE) for the practical syllabus** of the course.

**KLS Gogte Institute of Technology**  
**B.E. in Computer Science and Engineering**  
**3<sup>rd</sup> and 4<sup>th</sup> Semester B.E. Scheme of Teaching and Examination 2021-22**  
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	IV	20		
3 <sup>rd</sup>	V	23	45	125
	VI	22		
4 <sup>th</sup>	VII	17	35	160
	VIII	18		
Total			160	160

**Curriculum frame work:****Structure of Undergraduate Engineering program**

S.No.	Category of courses	VTU Breakup of credits	KLSGIT Breakup of credits
1	Humanities and Social Sciences including Management courses (English, Kannada, Indian Constitution, Environmental Sciences and Management)	10	8
2	Basic Science courses	23	22
3	Engineering Science courses including workshop, drawing	20	20
4	Professional Core Courses	46	49
5	Professional Elective courses relevant to chosen specialization/branch	9	9
6	Open subjects – Electives from other technical, emerging, arts commerce and	6	9
7	Mini, Project, Major Project work and Seminar	13	9
8	Summer Internship and Research /Industrial Internship	20	20
9	Ability Enhancement Courses, including Research Methodology, NCC/NSS/ Sports/Ex- Curricular, Online Certification Course	11	12
10	Universal Human Values	2	2
	<b>TOTAL</b>	<b>160</b>	<b>160</b>

**L-T-P Model for Courses**

S.No.	Contact Hours			Credits		
	L-T-P	Lecture	Tutorial	Practical	L-T-P	Total
1	3 - 0 - 0	3	0	0	3 - 0 - 0	3
2	3 - 2 - 0	3	2	0	3 - 1 - 0	4
3	3 - 0 - 2	3	0	2	3 - 0 - 1	4
4	2 - 0 - 2	2	0	2	2 - 0 - 1	3
5	1 - 0 - 4	1	0	4	1 - 0 - 2	3

**New Scheme of Teaching (Including branch specific additional course)**

**B.E. (Common to all branches)**

**Scheme of Teaching and Examination 2021-22**

S.No.	Course Type	1 <sup>st</sup> Semester			Total contact hours/week			Credits	Examination			
		Course Code	Course Title	Teaching Dept.	L	T	P		CIE	SEE	Total	
1	BSC	21MAT11	Calculus and Linear Algebra	Mathematics	3	2	0	5	4	100	100	200
2	BSC	21PHY12	Applied Physics	Physics	3	0	0	3	3	100	100	200
3	ESC	21CIV13	Engineering Mechanics	CV	3	0	0	3	3	100	100	200
4	ESC	21EME14	Basics of Mechanical Engg.	ME	3	0	0	3	3	100	100	200
5	ESC	21EGR15	Engineering Graphics	ME	1	0	4	5	3	100	100	200
6	BSC	21PHL16	Applied Physics Lab	Physics	0	0	2	2	1	50	50	100
7	AEC	21IIL17	Idea to Innovation Lab	Engg. Depts	1	0	2	3	1	100	-	100
8	HSMS	21ENG18	Communicative English	English	1	0	0	1	1	50	50	100
									<b>19</b>	<b>700</b>	<b>600</b>	<b>1300</b>

S.No.	Course Type	2 <sup>nd</sup> Semester			Hours/week			Total contact hours/week	Credits	Examination		
		Course Code	Course Title	Teaching Dept.	L	T	P			CIE	SEE	Total
1	BSC	21MAT21	Differential Equations and Laplace Transforms	Mathematics	3	2	0	5	4	100	100	200
2	BSC	21CHE22	Applied Chemistry	Chemistry	3	0	0	3	3	100	100	200
3	ESC	21ELE23	Basics of Electrical and Electronics Engg.	E & E	3	0	0	3	3	100	100	200
4	ESC	21CCP24	Problem Solving using C	CSE & ISE	3	0	0	3	3	100	100	200
5	BSC	21CHL25	Chemistry Lab	Chemistry	0	0	2	2	1	50	50	100
6	ESC	21CPL26	C Programming Lab	CSE & ISE	0	0	2	2	1	50	50	100
7	ESC	21EEL27	Electrical and Electronics Engg. Lab	E & E	0	0	2	2	1	50	50	100
8	HSMS	21ENG28	Professional Writing Skills in English	English	1	0	0	1	1	50	50	100
9	AEC	21AEC29A1	Introduction to Innovation and Startup	Any Dept.	1	0	0	1	1	50	--	50
		21AEC29A2	Leadership and Public Speaking									
		21AEC29A3	Interpersonal Skills									

10	ESC	21AAE29B	Elements Of Aeronautics	AE	3	0	0	3	3	100	100	200
		21ACV29B	Basics of Civil Engineering	CV								
		21AME29B	Material Science and Engineering	ME								
									<b>21</b>	<b>750</b>	<b>700</b>	<b>1450</b>

S.No.	Course Type	1 <sup>st</sup> Semester	For CSE, EC, EE and ISE – Chemistry Cycle		Hours/week			Total contact hours/week	Credits	Examination		
		Course Code	Course Title	Teaching Dept.	L	T	P			CIE	SEE	Total
1	BSC	21MAT11	Calculus and Linear Algebra	Mathematics	3	2	0	5	4	100	100	200
2	BSC	21CHE12	Applied Chemistry	Chemistry	3	0	0	3	3	100	100	200
3	ESC	21ELE13	Basics of Electrical and Electronics Engg.	E & E	3	0	0	3	3	100	100	200
4	ESC	21CCP14	Problem Solving using C	CSE & ISE	3	0	0	3	3	100	100	200
5	BSC	21CHL15	Chemistry Lab	Chemistry	0	0	2	2	1	50	50	100
6	ESC	21CPL16	C Programming Lab	CSE & ISE	0	0	2	2	1	50	50	100
7	ESC	21EEL17	Electrical and Electronics Engg. Lab	E & E	0	0	2	2	1	50	50	100
8	HSMS	21ENG18	Communicative English	English	1	0	0	1	1	50	50	100
9	AEC	21AEC191	Introduction to Innovation and Startup	Any Dept.	1	0	0	1	1	50	--	50
		21AEC192	Leadership and Public Speaking									
		21AEC193	Interpersonal Skills									
									<b>18</b>	<b>650</b>	<b>600</b>	<b>1250</b>

S.No.	Course Type	2 <sup>nd</sup> Semester	For CSE, EC, EE and ISE – Physics Cycle		Hours/week			Total contact hours/week	Credits	Examination		
		Course Code	Course Title	Teaching Dept.	L	T	P			CIE	SEE	Total
1	BSC	21MAT21	Differential Equations and Laplace Transforms	Mathematics	3	2	0	5	4	100	100	200
2	BSC	21PHY22	Applied Physics	Physics	3	0	0	3	3	100	100	200
3	ESC	21CIV23	Engineering Mechanics	CV	3	0	0	3	3	100	100	200
4	ESC	21EME24	Basics of Mechanical Engg.	ME	3	0	0	3	3	100	100	200
5	ESC	21EGR25	Engineering Graphics	ME	1	0	4	5	3	100	100	200
6	BSC	21PHL26	Applied Physics Lab	Physics	0	0	2	2	1	50	50	100

7	AEC	21IIL27	Idea to Innovation Lab	All Engg. depts	0	0	2	2	1	100	--	100
8	HSMS	21ENG28	Professional Writing Skills in English	English	1	0	0	1	1	50	50	100
9	ESC	21ACS29	Object Oriented Programming Using C++	CSE	3	0	0	3	3	100	100	200
		21AEC29	Fundamentals of Electronics and Communication Engineering	E & C								
		21AEE29	Fundamentals of DC and AC Systems	E & E								
		21AIS29	Object Oriented Programming Using C++	ISE								
									<b>22</b>	<b>800</b>	<b>700</b>	<b>1500</b>

**NOTE:**

**Summer Internship - I:**

All the 1<sup>st</sup> year students admitted to B.E. program shall have to undergo a **mandatory summer internship of 03 weeks** during the vacation of II semesters. Summer Internship shall include Inter / Intra Institutional activities. A Viva-voce examination shall be conducted during III semester and the prescribed credit shall be included in III semesters. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements. **SEE component will be the only seminar/Presentation and question answer session.** (The faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship.)

**The course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs:**

1. The **mandatory non – credit courses Additional Mathematics I and II (MATDIP) prescribed for III and IV semesters respectively**, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech., programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the **Continuous Internal Evaluation (CIE)**. In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the requirements during subsequent semester/s to appear for CIE. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.
2. All the students admitted under the lateral entry category shall have to undergo a mandatory **SUMMER INTERNSHIP-I of 03 weeks during the intervening vacation of III and IV semesters**. Summer Internship shall include Inter / Intra Institutional activities. A Vivavoce examination shall be conducted during the IV semester and the prescribed credit shall be included in the III semester after students clear this head. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements. (The faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship.)

3 <sup>rd</sup> Semester B.E				Teaching Dept.	Hours/week			Total contact hours/week	Credits	Examination		
S.No	Course Type	Course Code	Course Title		L	T	P			CIE	SEE	Total
1	BSC	21MATCS31	Discrete Mathematical Structures and Numerical Methods	Maths	3	0	0	3	3	100	100	200
2	PCC	21CS32	Data Structures and Algorithms	CSE	3	0	2	5	4	100	100	200
3	PCC	21CS33	Object Oriented Programming using JAVA	CSE	3	0	2	5	4	100	100	200
4	PCC	21CS34	Web Technologies	CSE	3	0	2	5	4	100	100	200
5	INT	21CS35	Summer Internship –I	CSE					2	50	50	100
6	HSMS	21CS36	Constitution of India	CSE	1	0	0	1	1	50	50	100
7	UHV	21CS37	Social Connect and Responsibility	CSE	1	0	0	1	1	50	50	100
8	AEC	21AECCS381	Design Thinking	CSE	0	0	2	2	1	50	50	100
		21AECCS382	Introduction to Embedded Systems and IoT- A Hands-on Approach									
		21AECCS383	Data Visualization Tools and Techniques									
		21AECCS384	Software Tools and Technologies									
		21AECCS385	Multimedia and Animation									
9	BSC*	21DMATCS31	Bridge Course Mathematics - I	Maths	3	0	0	3	MNC	100	--	100
<b>TOTAL</b>									<b>20</b>	<b>700</b>	<b>600</b>	<b>1300</b>

\*Only for Diploma Lateral Entry Students

4 <sup>th</sup> Semester B.E				Teaching Dept.	Hours/week			Total contact hours/week	Credits	Examination		
S.No	Course Type	Course Code	Course Title		L	T	P			CIE	SEE	Total
1	BSC	21MATCS41	Fundamentals of Statistics and Probability for Data Science	Maths	3	0	0	3	3	100	100	200
2	PCC	21CS42	Database Management Systems	CSE	3	0	2	5	4	100	100	200
3	PCC	21CS43	Python Programming	CSE	3	0	2	5	4	100	100	200
4	PCC	21CS44	Software Engineering and Design	CSE	3	0	2	5	4	100	100	200
5	AEC	21CS45	Health and Wellness	CSE	2	0	0	2	2	50	50	100
6	HSMS	21CSS46 21CSB46	Sanskrutika Kannada Balake Kannada	Kan	1	1	0	1	1	50	50	100
7	UHV	21CS47	<b>Universal Human Values and Professional Ethics</b>	CSE	1	0	0	1	1	50	50	100
8	AEC	21AECCS481	Design Thinking	CSE	0	0	2	2	1	50	50	100
		21AECCS482	Introduction to Embedded Systems and IoT- A Hands-on Approach									
		21AECCS483	Data Visualization Tools and Techniques									
		21AECCS484	Software Tools and Technologies									
		21AECCS485	Multimedia and Animation									
9	BSC*	21DMATCS41	Bridge Course Mathematics - II	Maths	3	0	0	3	MNC	100	--	100
<b>TOTAL</b>									<b>20</b>	<b>700</b>	<b>600</b>	<b>1300</b>

\*Only for Diploma Lateral Entry Students

**Summer Internship-II:** At the End Of **fourth Semester four - weeks Summer Internship** Shall Be Carried Out – Based on Industrial/Govt./NGO/MSME/Rural Internship/Innovation/Entrepreneurship. It will be credited in fifth Semester. All the students admitted shall have to undergo mandatory internship of 04 weeks during the vacation of IV semesters. A Viva-Voce examination shall be conducted during V semester and the prescribed credit shall be included in V semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements. SEE component will be the only seminar/Presentation and question answer session. (The faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship).

**Kannada:** Balake Kannada (Kannada for communication) is for non-Kannada speaking, reading, and writing students, and Samskrutika Kannada (Kannada for Administration) is for students who speak, read and write Kannada.

**Professional Elective Courses [5<sup>th</sup>-7<sup>th</sup> sem]: Elective will be offered by the respective department.**

**Open Elective Courses [5<sup>th</sup>-7<sup>th</sup> sem]:** All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during the Programme. Students can select any one of the open electives offered by other Departments except those that are offered by the parent Department.

Selection of an open elective shall not be allowed if,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open electives is similar to that of the Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.
- Registration to electives shall be documented under the guidance of Programme Coordinator/ Advisor/Mentor.

**Mini-project work(Single discipline/Interdisciplinary)[6<sup>th</sup> sem]:** Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini-project can be assigned to an individual student or a group having not more than 4 students. (or Mini Project is a laboratory-oriented course which will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications)

**Research/Industrial Internship** - At the End of the sixth / Seventh semester (in two cycles to accommodate all the students of the University) Research/Industrial Internship shall be carried out – Based on industrial/Govt./NGO/MSME/Rural Internship/Innovation/Entrepreneurship. All the students admitted shall have to undergo a mandatory internship of 24 weeks during the vacation of VI/VII semesters. A Viva-Voce examination shall be conducted during VII/VIII semester and the prescribed credit shall be included in VII/VIII semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements.

**Research internship:** Students have to take up research internships at Centers of Excellence (CoE) / Study Centers established in the same institute and /or out of the institute at reputed research organizations / Institutes. A research internship is intended to give you the flavor of current research going on a particular topic/s. The internships serve this purpose. They help students get familiarized with the field, the skill needed the effort amount and kind of effort required for carrying out research in that field.

**Certification (6- 8 weeks' duration; Shall have proctored examination): It can be done any time between 5<sup>th</sup> – 8<sup>th</sup> sem and credited during the 8<sup>th</sup> semester.**

NPTEL/SWAYAM/NASSCOM /Industry-Institute partnered certification. (List of the courses will be notified by the departments)



## 3<sup>rd</sup> Semester Detailed Syllabi



## DISCRETE MATHEMATICAL STRUCTURES AND NUMERICAL METHODS

<b>Course Code:</b>	<b>21MATCS31</b>	<b>Course type</b>	<b>BSC</b>	<b>Credits L-T-P</b>	3 – 0 – 0
<b>Hours/week: L-T-P</b>	3 – 0 – 0			<b>Total credits</b>	3
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0Hrs; P = 0 Hrs Total = 40 Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course learning objectives</b>	
At the end of the course students should be able to	
1.	Get acquainted with fundamentals and all laws of logic and quantifiers.
2.	Get familiar with relations and their closures, Posets and Lattices.
3.	Understand the theory of recurrence relations and generating functions.
4.	Get acquainted with concept of numerical interpolation.
5.	Apply numerical methods to solve algebraic, transcendental and differential equations.

**Pre-requisites :** Relations, Functions ,Permutations and combinations, Algebra.

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<b>Fundamentals of Logic:</b> Basic connectives and Truth tables, Logical equivalence- Laws of Logic, Logical Implication-Rules of Inference. Quantifiers- Universal and Existential Quantifiers.	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<b>Relations:</b> Types and Properties of Relations (revision), n-ary Relations and Their Applications. Computer Recognition-Zero One Matrices and Directed graphs, Transitive, closure, Warshall's algorithm, Equivalence relation and Partitions, Posets and Hasse Diagrams, Lattices.	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<b>Recurrence relations:</b> Definition, Homogeneous recurrence relations, Non Homogeneous recurrence relations. Solution of homogeneous and non-homogeneous recurrence relations. Generating functions. Solution of recurrence relation by generating function.	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<b>Numerical Methods 1:</b> Forward and Backward differences, Newton's Forward and Backward Interpolation Formulae, Divided Difference, Newton's Divided Difference Formula (without proof). Lagrange's Interpolation Formula. Illustrative examples. Numerical Integration: Newton- Cotes Quadrature formula, Trapezoidal rule, Simpsons 1/3 <sup>rd</sup>	

<b>Unit –V</b>	<b>Contact Hours = 8 Hours</b>
<b>Numerical Methods 2:</b> Numerical solution of Algebraic and Transcendental equations: Method of false position, Newton-Raphson method (with derivation), Fixed point iteration method (without derivation). Numerical solution of Ordinary differential equations of first order: Taylor’s Series method, Euler and Modified Euler method, Fourth order Runge–Kutta method. rule, Simpsons 3/8 <sup>th</sup> rule, Weddle’s rule(without proof). Practical Examples	

#### Flipped Classroom Details

Unit No.	I	II	III	IV	V
<b>No. for Flipped Classroom Sessions</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>

Books	
<b>Text Books:</b>	
1.	Kolman, Busby, Ross “Discrete Mathematical Structures”, 6 <sup>th</sup> Edition Prentice Hall of India, 2010 onwards
2.	B.S.Grewal, “Numerical methods in Engineering and Science”, 7 <sup>th</sup> Edition onwards Khanna Publishers
<b>Reference Books:</b>	
1.	Kenneth Rosen “Discrete Mathematics and Its Applications with Combinatorics and Graph Theory (SIE)   7th Edition onwards
2.	S.S.Sastry “Introductory Methods of Numerical Analysis” , 6 <sup>th</sup> edition onwards Prentice Hall of India Private Limited
<b>E-resource’s (NPTEL/SWAYAM. Any Other)- mention links</b>	
1.	<a href="https://archive.nptel.ac.in/courses/111/107/111107062/(NM)">https://archive.nptel.ac.in/courses/111/107/111107062/(NM)</a>
2.	<a href="https://archive.nptel.ac.in/courses/111/106/111106086/(DMS)">https://archive.nptel.ac.in/courses/111/106/111106086/(DMS)</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Online Quizzes (Surprise and Scheduled)
3.	Flipped Classes	3.	Open Book Tests (OBT)/Matlab
4.	Online classes	4.	Course Seminar
		5.	Semester End Examination

Course Outcome (COs)				
At the end of the course, the student will be able to				
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr – Create		Learning Level	PO(s)	PSO(s)
1.	<b>Understand</b> and <b>Apply</b> the Logic of mathematics in the field of Computer science.	<b>Ap</b>	1	1
2.	<b>Explain</b> and <b>Analyze</b> different Relations and their closures. Posets and lattices.	<b>Ap</b>	1	1
3.	<b>Apply</b> theory of solution of recurrence relations to solve them.	<b>Ap</b>	1	1

4.	<b>Apply</b> the concepts related to finite differences with numerical data.	<b>Un</b>	1	1
5.	<b>Use</b> Numerical methods to solve algebraic and transcendental equations and differential equations.	<b>Un</b>	1	1

**Scheme of Continuous Internal Evaluation (CIE):**

Components	Addition of two IA tests	Online Quiz	Addition of two OBAs/Math tools	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100
<b>OBA- Open Book Assignment</b>					
<b>Minimum score to be eligible for CIE: 40 OUT OF 100</b>					

**Scheme of Semester End Examination (SEE):**

1.	It will be conducted for 100 marks of 3 hours' duration.
2.	<b>Minimum marks required in SEE to pass: 40 out of 100</b>
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

**Rubrics:**

Levels	Target
<b>1(Low)</b>	<b>60% of the students score Less than 50 % of the total marks.</b>
<b>2(Medium)</b>	<b>60% of the students score 50 – 70 % of the total marks.</b>
<b>3(High)</b>	<b>60% of the students score More than 70 % of the total marks.</b>

CO-PO Mapping (Planned)													CO-PSO Mapping(Planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	√										√	√	√		
2	√										√	√	√		
3	√										√	√	√		
4	√										√	√	√		
5	√										√	√	√		

## DATA STRUCTURES AND ALGORITHMS

<b>Course Code</b>	<b>21CS32</b>	<b>Course type</b>	<b>PCC</b>	<b>Credits L-T-P</b>	3 - 0- 1
<b>Hours/week: L-T-P</b>	3 - 0 - 2			<b>Total credits</b>	4
<b>Total Contact Hours</b>	L = 40Hrs; T = 0Hrs; P = 20Hrs Total = 60Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course learning objectives</b>	
1.	To learn the fundamentals of data structure and realize their importance in designing variety of applications
2.	To illustrate the implementation of data structures such as stack, queue and linked list, tree and to apply them for the given problem.
3.	To Understand importance, working and applications of algorithms in the real life problem solving.
4.	To Study different strategies of an algorithmic problem solving and analyze the time complexity of an algorithm.

**Required Knowledge of : C /C++ Programming**

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<b>Pointers and stack</b> Introduction to Pointers, Pointers and Arrays. Introduction to Structures, Declaration, Initialization. Stack and its Operations, Stack application: conversion from infix to postfix. (Text book 1: 3.1, 3.2, 3.5) (conversion from infix to postfix)	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<b>Queues and linked list</b> Queues and its operations, Circular Queue, Linked List and its Operations (dynamic implementation) (Text book 1: 4.1, 5.3)	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<b>Binary Tree and Introduction to algorithms</b> <b>Trees:</b> Binary tree, Binary search tree and tree traversals. (Text book 1: 6.1,7.1,7.2) <b>Introduction:</b> Fundamentals of Algorithmic Problem Solving, Analysis Framework, Asymptotic Notations and basic efficiency classes, Mathematical Analysis of Non-Recursive and Recursive Algorithms. (Text Book 2: Chapter 1 : 1.2, Chapter 2: 2.1, 2.2, 2.3, 2.4 ) <b>Brute Force Approach:</b> Linear search.( Text Book 2: Chapter 3:3.2)	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<b>Divide and Conquer Technique &amp; Greedy Technique</b> <b>Divide and Conquer Technique:</b> Merge Sort, Quick Sort, Binary Search, and their performance comparison. (Text Book 2: Chapter 4:4.1,4.2,4.3 ) <b>Greedy Technique:</b> Prim’s Algorithm, Dijkstra’s Algorithm, Huffman Trees. (Text Book 2: Chapter 9: 9.1,9.2,9.4)	

<b>Unit –V</b>	<b>Contact Hours = 8 Hours</b>
<b>Dynamic Programming, Backtracking, Branch and Bound</b>	
<b>Dynamic Programming:</b> Floyd’s Algorithm, Knapsack Problem. (Text Book 2: Chapter 8:8.2,8.4)	
<b>Backtracking:</b> N-Queen’s Problem, Subset Sum Problem. (Text Book 2: Chapter 12:12.1)	
<b>Branch and Bound:</b> Job Assignment Problem, Travelling Salesperson Problem. (Text Book 2: Chapter 12:12.2)	

#### Flipped Classroom Details

Unit No.	I	II	III	IV	V
<b>No. for Flipped Classroom Sessions</b>	2	2	2	2	2

#### List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	2	Stack operations
1		Stack operations
2	2	Doubly linked list
2		Queue operations
3	1	Tree traversal operations
4	3	Divide and Conquer approach
4		Divide and Conquer approach
4		Greedy Technique
5	2	Dynamic Programming
5		Backtracking

Unit No.	Self-Study Topics
II	Dynamic Memory Allocation
V	Self-Study : Space and Time Tradeoffs : Input Enhancement in String Matching: Horspool’s Algorithm .(Text Book 2: Chapter 7:7.2)

#### Books

Books	
Text Books:	
1.	Richard.F.Gilberg, Behrouz.A. Forouzan, Data Structures: A Pseudocode Approach with C, Cengage Learning, 2 <sup>nd</sup> edition 2007 and onwards.
2.	Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, PEARSON, Second Edition.
3.	Horowitz, Sahni, Anderson-Freed, Fundamentals of Data Structures in C, Universities Press, 2 <sup>nd</sup> Edition, 2007 and onwards.
Reference Books:	

1.	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Universities Press (India) Private Limited. Second Edition.
2.	Yedidyah, Augenstein, Tannenbaum: Data Structures Using C and C++, Pearson Education, 2 <sup>nd</sup> Edition and onwards.
3.	ReemaThareja, Data structures using C, Oxford Higher Education, 1 <sup>st</sup> edition, 2011 onwards.

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Enquiry Based Learning		

Course Outcome (COs)					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create					
At the end of the course, the student will be able to			Learning Level	PO(s)	PSO(s)
1.	Explain the fundamental concepts of various data structures.		Un	1,2	1
2.	Develop solutions using different data structures like Stack, Queue, linked List and Tree.		Ap	2,3,9,10,12	1,3
3.	Apply different Algorithm Design Strategies for solving the problems like Searching, Sorting, Finding shortest path etc.		Ap	2,3,9,10,12	1,3
4.	Analyze and Estimate the computational complexity of different algorithms		An	2,3,9,10,12	1,2,3

#### Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test (COMPULSORY) will be part of the CIE. **No SEE for Lab.**

THEORY (60 marks)			LAB (40 marks)		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks
<b>IA Test:</b>					
1. No objective part in IA question paper					
2. All questions descriptive					
<b>Conduct of Lab:</b>					
1. Conducting the experiment and journal: 5 marks					
2. Calculations, results, graph, conclusion and Outcome: 5 marks					
3. Viva voce: 5 marks					
<b>Lab test: (Batch wise with 15 students/batch)</b>					
1. Test will be conducted at the end of the semester					
2. Timetable, Batch details and examiners will be declared by Exam section					
3. Conducting the experiment and writing report: 5 marks					
4. Calculations, results, graph and conclusion: 10 marks					

5. Viva voce: 10 marks

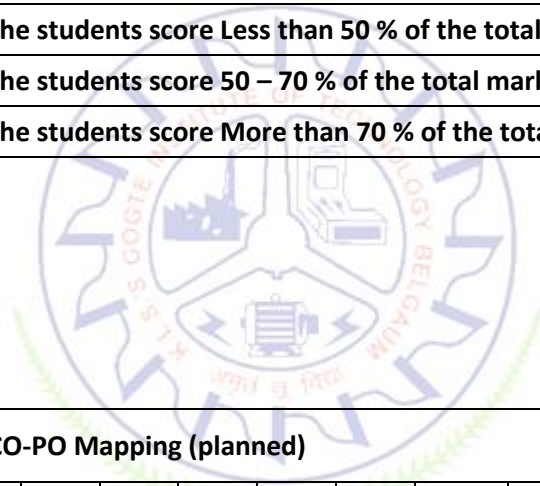
**Eligibility for SEE:**

1. 40% and above (24 marks and above) in theory component
2. 40% and above (16 marks and above) in lab component
3. **Lab test is COMPULSORY**
4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 100 marks of 3 hours' duration.
2. **Minimum marks required in SEE to pass: 40 out of 100**
3. Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

Rubrics:Levels	Target
1(Low)	60% of the students score Less than 50 % of the total marks.
2(Medium)	60% of the students score 50 – 70 % of the total marks.
3(High)	60% of the students score More than 70 % of the total marks.



CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
1	√	√											√		
2		√	√						√	√		√	√		√
3		√	√						√	√		√	√		√
4		√	√						√	√		√	√	√	√
Tick mark the CO, PO and PSO mapping															



## OBJECT ORIENTED PROGRAMMING USING JAVA

<b>Course Code</b>	<b>21CS33</b>	<b>Course type</b>	<b>PCC</b>	<b>Credits L-T-P</b>	3 - 0 - 1
<b>Hours/week: L-T-P</b>	3 - 0 - 2			<b>Total credits</b>	4
<b>Total Contact Hours</b>	L = 40Hrs; T = 0Hrs; P = 20Hrs Total = 60Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course Learning Objectives</b>	
1.	To understand the fundamentals of object-oriented programming and String class in Java.
2.	To demonstrate the object-oriented features such as encapsulation, inheritance and polymorphism to design and develop programs in Java.
3.	To understand exception handling mechanism supported in Java.
4.	To learn to use the data structures to organize data in the program using the collections framework in Java.
5.	To understand the concept of Packages, Interfaces and Lambda expressions in Java.

### Required Knowledge of: Procedure Oriented Programming Languages

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<p><b>OOP Paradigm:</b> The key attributes of object-oriented programming.</p> <p><b>Java basics:</b> The Java language, JDK, arrays, multidimensional arrays, alternative array declaration, assigning array references, using the length member, the for-each loop.</p> <p><b>Introducing classes and objects:</b> Class fundamentals, how objects are created, reference variables and assignment, String class</p>	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Methods and classes:</b> methods, returning from a method, returning a value, using parameters, constructors, parameterized constructors, the new operator revisited, garbage collection and finalizers, this keyword, controlling access to class members, pass objects to methods, argument passing, returning objects, method overloading.</p>	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Inheritance:</b> Inheritance basics, member access and inheritance, constructors, and inheritance, using super, multilevel hierarchy, when are constructors executed, superclass reference and subclass objects, method overriding, polymorphism, using abstract classes.</p> <p><b>Interfaces:</b> interface fundamentals, creating, implementing, and using interfaces, implementing multiple interfaces.</p>	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Packages:</b> Package fundamentals, packages and member access, importing packages, static import.</p> <p><b>Exception handling:</b> the exception hierarchy, exception handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, catching subclass exceptions, nested try, throw, throws, finally, Java's built-in exceptions, creating your own exception subclasses.</p>	

<b>Unit –V</b>	<b>Contact Hours = 8 Hours</b>
<b>The Java Collections Framework:</b> overview, the collections interfaces, the collections classes, accessing a collection via an Iterator. <b>Java Lambda Expressions:</b> Syntax (0 parameter, 1 parameter, multiple parameters), Using Lambda expressions, examples	

#### Flipped Classroom Details

Unit No.	I	II	III	IV	V
No. for Flipped Classroom Sessions	2	2	2	2	2

#### List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	2	2-dimensional array.
		String handling.
2	2	Class and its member methods.
		Parameterized Methods and Constructors
3	2	<b>Inheritance and interfaces.</b>
		Method Overloading and overriding
4	2	Packages.
		Customized exception handling.
5	2	<b>Collection classes and interfaces.</b>
		<b>Lambda expressions.</b>

Unit No.	Self-Study Topics
1	String class

Books	
<b>Text Books:</b>	
1.	Herbert Schildt & Dale Skrien, "Java Fundamentals A Comprehensive Introduction", 7th Edition onwards, Tata McGraw Hill, 2007.
2.	E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.
<b>Reference Books:</b>	
1.	Kathy Sierra & Bert Bates, "Head First Java", O'Reilly, 2 <sup>nd</sup> Edition and onwards.
2.	Y. Daniel Liang: Introduction to JAVA Programming, 7 <sup>th</sup> Edition, Pearson Education, 2007.
<b>E-resources:</b>	
1.	<a href="https://www.w3schools.com/java">https://www.w3schools.com/java</a>
2.	<a href="https://freecodecamp.org">https://freecodecamp.org</a>

3.	<a href="https://www.tutorialspoint.com/java8">https://www.tutorialspoint.com/java8</a>
4.	<a href="https://www.javatpoint.com">https://www.javatpoint.com</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs ( if present)		

Course Outcome (COs)				
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create				
At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	<b>Explain</b> classes, objects, members of a class and relationships among them needed for a specific problem.	Un	1,2,3,9,10,12	1,3
2.	<b>Apply</b> OOP principles (encapsulation, inheritance, polymorphism etc.) and proper program structure to write application programs.	Ap	1,2,3,5,9,10,12	1,2,3
3.	<b>Develop</b> skills in writing programs using exception handling techniques.	Ap	1,2,3,5,9,10,12	1,2,3
4.	<b>Make use of</b> the type hierarchy in the Collections Framework and Lambda expressions.	Ap	1,3,9,10,12	1,3
5.	<b>Experiment with</b> the concept of packages and interfaces.	Ap	1,3,9,10,12	1,3

#### Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **COMPULSORY** will be part of the CIE. **No SEE for Lab.**

THEORY (60 marks)			LAB (40 marks)		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks
<b>IA Test:</b>					
1. No objective part in IA question paper					
2. All questions descriptive					
<b>Conduct of Lab:</b>					
1. Conducting the experiment and journal: 5 marks					
2. Calculations, results, graph, conclusion and Outcome: 5 marks					
3. Viva voce: 5 marks					
<b>Lab test: (Batchwise with 15 students/batch)</b>					
1. Test will be conducted at the end of the semester					
2. Timetable, Batch details and examiners will be declared by Exam section					
3. Conducting the experiment and writing report: 5 marks					
4. Calculations, results, graph and conclusion: 10 marks					
5. Viva voce: 10 marks					

**Eligibility for SEE:**

1. 40% and above (24 marks and above) in theory component
2. 40% and above (16 marks and above) in lab component
3. **Lab test is COMPULSORY**
4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 100 marks of 3 hours duration
2. **Minimum marks required in SEE to pass: 40 out of 100**
3. Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

**Rubrics:**

Levels	Target
<b>1(Low)</b>	60% of the students score Less than 50 % of the total marks.
<b>2(Medium)</b>	60% of the students score 50 – 70 % of the total marks.
<b>3(High)</b>	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (planned)													CO-PSO Mapping(planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	√	√	√						√	√		√	√		√
2	√	√	√		√				√	√		√	√	√	√
3	√	√	√		√				√	√		√	√	√	√
4	√		√						√	√		√	√		√
5	√		√						√	√		√	√		√
Tick mark the CO, PO and PSO mapping															

## WEB TECHNOLOGIES

<b>Course Code</b>	<b>21CS34</b>	<b>Course type</b>	<b>PCC</b>	<b>Credits L-T-P</b>	3 - 0 - 1
<b>Hours/week: L - T- P</b>	3 - 0 - 2			<b>Total credits</b>	4
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0 Hrs; P = 20 Hrs Total = 60 Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course learning objectives</b>	
1.	To learn the basics of web development and develop basic web applications using HTML5, CSS3 and JavaScript
2.	To develop advanced web applications using Tailwind and JavaScript frameworks
3.	To understand and implement the concepts of responsive design and retina ready websites
4.	To deploy applications on AWS and generate static websites
5.	To understand the working of web APIs and use them in building web applications

**Required Knowledge of : Basic Programming knowledge and basics of computer science**

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<p><b>HTML and AWS</b>                  Writing HTML code using Header Tags, Paragraphs, Ordered and Unordered lists, Forms, Links and Tables, Iframes and Images, Text Formatting, Image Maps, Creating an Amazon Web Services , AWS) account and how to deploy a static website to AWS Simple Storage Service ,S3                  Working Encoding URL, Introduction to XHTML, Using HTML5 introduced features, Handling of multiple file upload using multiple attribute, HTML5 Local Storage, HTML5 form validate /novalidate, HTML5 canvas, embedding audio and video in a webpage, Drag and drop, HTML5 web workers and server sent events                  Introduction to Figma, Working with UI- Design , Components , Mobile App design</p>	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<p><b>CSS3</b>                  Styling of HTML elements-text; Links, lists and tables; Different ways to write CSS e.g. external, internal, inline; Creating Navigation Bars; Writing Media Rules; Hide visibility of an element; CSS Image Sprites and Gradients; CSS Pseudo Classes and Pseudo Elements                  CSS3 Text Effects using different text fonts; Creating 2D and 3D transformations; Applying animations and transitions to HTML elements; CSS3 resize UI and multiple columns feature.</p>	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Tailwind CSS and JavaScript</b>                  What is Tailwind CSS? advantages of tailwind CSS, comparison of tailwind CSS and bootstrap, getting started with tailwind, colors, element sizing, flexbox and grid, padding and margins, styling text, typography, borders and shadows.</p>	

Java Script datatypes; Variables and arrays; Creating loops and writing if-else decision-making statements; Defining and calling JavaScript functions on events; Manipulating DOM elements

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<b>Twitter Bootstrap</b> Getting started with Twitter Bootstrap 3; Bootstrap features like fixed drop-down menu; Carousel, text and image grids; Custom Thumbnails; Bootstrap modal; Using Font Awesome Icons Building a real-world website using Twitter; Bootstrap 3 features like bootstrap fixed dropdown menu; Carousel; Bootstrap modal; Font awesome icons; custom Thumbnails; Text and Image grids; Accordions; Signin/Signup form and Jumbotron	

<b>Unit – V</b>	<b>Contact Hours = 8 Hours</b>
<b>Web APIs, Ajax</b> Bootstrap ScrollSpy AJAX XML; Http Request object; Making an AJAX call and retrieving the response; Working with Google APIs Adding social plugins on your web page provided by LinkedIn, Facebook, Quora and Twitter, Web APIs, Introduction to CI/CD, Using git- commands and concepts, hosting a static website on GitHub Pages	

#### Flipped Classroom Details

Unit No.	I	II	III	IV	V
<b>No. for Flipped Classroom Sessions</b>	2	2	2	2	2

#### List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	2	Figma, HTML5, and AWS
2	2	CSS transformations, UI and multi column features
3	2	Tailwind and JavaScript
4	2	Twitter Bootstrap, Jumbotron
5	2	Git and AJAX

Unit No.	Self-Study Topics
1	HTML Basics
2	CSS Basics
3	JavaScript Basics

#### Books

Text Books:	
1.	Robert Sebesta, Programming the World wide web, 6 <sup>th</sup> Edition
2.	Jennifer Robbins, Learning Web Design, 5 <sup>th</sup> Edition, 2018
3.	Noel Rappin, Modern CSS with Tailwind: flexible styling without the fuss, programmatic bookshelf, 2021
Reference Books:	

1.	DarioCalonaci, Designing user interfaces, BB publications, 2021
2.	David Cochran, Twitter Bootstrap Web development-How to, packt publishing, 2012
<b>E-resources , NPTEL/SWAYAM.. Any Other)- mention links</b>	
1.	Responsive Web Design <a href="https://www.freecodecamp.org/learn/2022/responsive-web-design/">https://www.freecodecamp.org/learn/2022/responsive-web-design/</a>
2.	Front End Development Libraries <a href="https://www.freecodecamp.org/learn/front-end-development-libraries">https://www.freecodecamp.org/learn/front-end-development-libraries</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Enquiry Based Learning		

Course Outcome (COs)				
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create				
At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	<b>Explain</b> the basic concepts of frontend web development using HTML5, CSS3 and other libraries	Un	1	1
2.	<b>Understand</b> the real world problem and <b>Create</b> a wireframe model of the application	Cr	1, 3, 5, 9, 10, 12	1,2,3
3.	<b>Make use of</b> the concepts learnt and integrate them to build real world applications	Ap	1, 3, 5, 9, 10, 12	1,2,3
4.	<b>Develop</b> and Deploy the application on hosting services	Ap	5	2

#### Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab.**

THEORY (60 marks)			LAB (40 marks)		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks
<b>IA Test:</b>					
1. No objective part in IA question paper					
2. All questions descriptive					
<b>Conduct of Lab:</b>					
1. Conducting the experiment and journal: 5 marks					
2. Calculations, results, graph, conclusion and Outcome: 5 marks					
3. Viva voce: 5 marks					
<b>Lab test: (Batchwise with 15 students/batch)</b>					
1. Test will be conducted at the end of the semester					
2. Timetable, Batch details and examiners will be declared by Exam section					

3. Conducting the experiment and writing report: 5 marks
4. Calculations, results, graph and conclusion: 10 marks
5. Viva voce: 10 marks

**Eligibility for SEE:**

1. 40% and above (24 marks and above) in theory component
2. 40% and above (16 marks and above) in lab component
3. **Lab test is COMPULSORY**
4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 100 marks of 3 hours' duration.
2. **Minimum marks required in SEE to pass: 40 out of 100**
3. Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

Rubrics:Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	✓		✓		✓				✓	✓		✓	✓		
2	✓		✓		✓				✓	✓		✓	✓	✓	✓
3	✓		✓		✓				✓	✓		✓	✓	✓	✓
4	✓		✓		✓				✓	✓		✓		✓	
Tick mark the CO, PO and PSO mapping															



## CONSTITUTION OF INDIA

<b>Course Code</b>	<b>21CS36</b>	<b>Course type</b>	<b>HSMS</b>	<b>Credits L-T-P</b>	1 – 0 – 0
<b>Hours/week: L - T- P</b>	1 – 0 – 0			<b>Total credits</b>	1
<b>Total Contact Hours</b>	L = 15 Hrs; T = 0 Hrs; P = 0 Hrs Total = 15 Hrs			<b>CIE Marks</b>	50
<b>Flipped Classes content</b>	5 Hours			<b>SEE Marks</b>	50 (2 Hours)

<b>Course learning objectives</b>	
1.	To enable the student to understand the importance of the constitution
2.	To understand the structure of executive, legislature, and judiciary and fundamental rights and duties
3.	To understand the central and state relation: administrative
4.	To understand the autonomous nature of constitutional bodies like Supreme Court and high court and election commission of India

**Pre-requisites : NIL**

<b>Unit – I</b>	<b>Contact Hours = 3 Hours</b>
Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution – Sources and constitutional history, Features – Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.	

<b>Unit – II</b>	<b>Contact Hours = 3 Hours</b>
Union Government and its Administration Structure of the Indian Union: Federalism, Centre - State relationship, President: Role, power and position, LokSabha , RajyaSabha, Prime Minister and Council of ministers, Cabinet and Central Secretariat, The Supreme Court and High Court: Powers and Functions.	

<b>Unit – III</b>	<b>Contact Hours = 3 Hours</b>
State Government and its Administration: Governor – Role and Position Chief Minister and Council of ministers, State Cabinet, State Legislature State Secretariat: Organisation, Structure and Functions.	

<b>Unit – IV</b>	<b>Contact Hours = 3 Hours</b>
Local Administration – District’s Administration Head – Role and Importance, Municipalities – Mayor and role of Elected Representative – CEO of Municipal Corporation Panchayati Raj: Functions, Panchayati Raj Institution: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy – (Different departments), Village level – Role of Elected and Appointed officials – Importance of grass root democracy.	

<b>Unit – V</b>	<b>Contact Hours = 3 Hours</b>
Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission, Functions of Commissions for the welfare of SC/ST/OBC and women.	

#### Flipped Classroom Details

Unit No.	I	II	III	IV	V
<b>No. for Flipped Classroom Sessions</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

Books	
	<b>Text Books:</b>
1.	Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd., New Delhi
2.	SubashKashyap, Indian Constitution, National Book Trust
3.	H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
	E-resources (NPTEL/SWAYAM.. Any Other)- mention links
1.	Prof. Sudhir Krishnaswamy, NOC:Constitutional Studies, <a href="https://nptel.ac.in/courses/129106003">https://nptel.ac.in/courses/129106003</a>
2.	By Prof. Sairam Bhat, Prof. M. K. Ramesh , Constitution of India and Environmental Governance: Administrative and Adjudicatory Process, <a href="https://onlinecourses.nptel.ac.in/noc20_lw02/preview">https://onlinecourses.nptel.ac.in/noc20_lw02/preview</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Online Quizzes (Scheduled)
3.	Flipped Classes	3.	Assignments
		4.	Semester End Examination

Course Outcome (COs)					
At the end of the course, the student will be able to (Highlight the <b>action verb</b> representing the learning level.)					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create			Learning Level	PO(s)	PSO(s)
1.	Discuss the significance of Indian Constitution and the structure of Central and State Government		Un	6, 12	3
2.	Exercise the fundamental rights in proper sense and identify responsibilities in national building.		Ap	6, 12	3

**Scheme of Continuous Internal Evaluation (CIE):**

Components	Addition of two IA tests	Addition of two Assignments	Total Marks
Marks	15+15 = 30	10+10 =20	50
<b>Writing the IA test is Compulsory</b>			
<b>Minimum marks required to be eligible for SEE: 20 out of 50</b>			

**Scheme of Semester End Examination (SEE):**

- It will be conducted for 50 marks of 2 hours duration.
- Minimum marks required in SEE to pass: 20 out of 50**
- Question paper contains questions from each unit each carrying 10 marks. Students have to answer one full question from each unit.

Rubrics: Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (Planned)													CO-PSO Mapping (Planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1						√						√			√
2						√						√			√
Tick mark the CO, PO and PSO mapping															

## SOCIAL CONNECT AND RESPONSIBILITY

<b>Course Code</b>	<b>21CS37</b>	<b>Course type</b>	<b>UHV</b>	<b>Credits L-T-P</b>	1 - 0 - 0
<b>Hours/week: L - T- P</b>	1 - 0 - 0			<b>Total credits</b>	1
<b>Total Contact Hours</b>	15 Hours of engagement			<b>CIE Marks</b>	50
<b>Flipped Classes content</b>	--			<b>SEE Marks</b>	50

<b>Course learning objectives</b>	
1.	Bridging the gap between theory and practice through community engagement
2.	Interaction with the community for identification and solution to real life problems faced by the community
3.	Catalyzing acquisition of values and responsibilities for public service to make better citizens

<b>Required Knowledge of:</b> Interpersonal skills, Communication skills
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<b>Activities to be planned and conducted by the Department Associations are:</b>	
<b>1.</b>	<b>Linking learning with the community through Knowledge Sharing:</b> In this the students can apply their knowledge and skills to improve the lives of the people. The knowledge available with the students can be shared to the school students of the local community. It can be in the form of engaging the classes, developing projects which can used by the students and teachers, training sessions on MS word, Excel, PPT for students and teachers etc.
<b>2.</b>	<b>Creating Awareness about health and hygiene:</b> The students can arrange talks on Importance of cleanliness, health, and hygiene by taking help of Doctors, Public Health Organizations, NGOs etc.
<b>3.</b>	<b>Including the Practitioners as teachers:</b> Arrange the invited talks by experts in agriculture for the farmers in the local community to create awareness about Organic farming, new methods of agriculture such as hydroponics, vertical farming etc.
<b>4.</b>	<b>Environmental Sustainability:</b> Students can take initiatives to educate the local community regarding protecting our environment through tree plantations, preserving water bodies etc.
<b>5.</b>	<b>Social Innovations for Rural development</b>

<b>Course Outcome (COs)</b>						
<b>Learning Levels:</b>						
<b>Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create</b>						
At the end of the course, the student will be able to				<b>Learning Level</b>	<b>PO(s)</b>	<b>PSO(s)</b>
1.	Demonstrate the knowledge about the culture and societal realities			Un	6, 12	3
2.	Develop sense of responsibility and bond with the local community			Ap	6, 12	3
3.	Make use of the knowledge gained towards significant contributions to the local community and the Society at large			Ap	6, 12	3
4	Identify opportunities for contribution to the Socio-economic development			Ap	6, 12	3

**Scheme of Continuous Internal Evaluation (CIE):**

<ul style="list-style-type: none"> <li>• Students must maintain the diary of the activities conducted.</li> <li>• The activities can be conducted in groups/batches.</li> <li>• Faculty members can design the evaluation system.</li> </ul>	50 marks
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**Scheme of Semester End Examination (SEE):**

<ul style="list-style-type: none"> <li>• Students must prepare the report of the learnings and the outcomes.</li> <li>• Presentations can be conducted for the SEE.</li> <li>• Department can form a team of two faculty members as evaluators. NGOs, Officials from Govt./ Semi-Govt. organizations could be included in the evaluation process.</li> </ul>	Report	Presentation	Total
	20	30	50

**Rubrics:**

Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (Planned)													CO-PSO Mapping (Planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1						√						√			√
2						√						√			√
3						√						√			√
4						√						√			√
Tick mark the CO, PO and PSO mapping															

Third Semester  
**BRIDGE COURSE MATHEMATICS-I**  
 (Common to all Branches)  
 (A Bridge course for Lateral Entry students of III Sem. B. E.)

<b>Course Code</b>	<b>21DMATCS31</b>	<b>Course type</b>	<b>BS</b>	<b>Credits L-T-P</b>	0 – 0 - 0
<b>Hours/week: L - T- P</b>	3– 0 – 0			<b>Total credits</b>	0
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0 Hrs; P = 0 Hrs Total = 40 Hrs			<b>CIE Marks</b>	100
				<b>SEE Marks</b>	0

<b>Course learning objectives</b>	
1.	Get acquainted with different applications of Calculus.
2.	Understand the basic concepts of partial differentiation.
3.	Get familiar with Laplace transforms and various properties associated with it.
4.	Learn to find the inverse Laplace Transforms of all the functions discussed earlier.
5.	Get familiar with various topics in Linear Algebra.

**Pre-requisites** :Basic Trigonometry, Calculus ,Algebra

<b>Unit – I: Calculus</b>	<b>Contact Hours = 8 Hours</b>
Introduction to limits, continuity and differentiation: Polar Curves, angle between radius vector and tangent, angle between polar curves, Radius of curvature (Cartesian and polar form only).	

<b>Unit – II: Partial Differentiation:</b>	<b>Contact Hours = 8 Hours</b>
Definition and simple problems. Total Differentiation-Problems. Partial Differentiation of Composite functions – Problems. Maxima and minima of function of two variables. Lagrange’s method of Undetermined multipliers. Jacobians.	

<b>Unit-III: Laplace Transforms</b>	<b>Contact Hours = 8 Hours</b>
Definition. Laplace Transforms of elementary functions. Properties. Laplace Transforms of $e^{at}f(t), t^n f(t), \int_0^t f(t)dt, \frac{f(t)}{t}$ (without proof), Periodic functions (with proof).	

<b>Unit-IV: Inverse Laplace Transforms</b>	<b>Contact Hours = 8 Hours</b>
Inverse Laplace Transforms-Problems, Convolution Theorem -Problems. Laplace transform of the derivative. Solution of Linear Differential Equation using Laplace Transforms, Applications- L-C-R series circuit.	

<b>Unit – V: Linear Algebra-I</b>	<b>Contact Hours = 8 Hours</b>
Rank of a matrix by elementary transformation, consistency of system of linear equations-Gauss Jordan method and Gauss-Seidal method. Eigen value and Eigen vectors – Rayleigh’s Power method.	

Books	
	<b>Text Books:</b>
1.	B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42 <sup>nd</sup> Edition, 2012.
2.	Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9 <sup>th</sup> Edition, 2006.
3.	B. V.Ramana- Higher Engineering Mathematics, Tata McGraw-Hill Education Private Limited, Tenth reprint 2010 and onwards.
	<b>Reference Books:</b>
1.	Peter V. O’ Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7 <sup>th</sup> Edition, 2011.
2.	Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4 <sup>th</sup> Edition, 2010.

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Tests (OBT)
3.	Online Classes	3.	Course Seminar
		4.	Semester End Examination

Course Outcome (COs)					
At the end of the course, the student will be able to (Highlight the <b>action verb</b> representing the learning level.)					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create			Learning Level	PO(s)	PSO(s)
1.	<b>Review</b> basic concepts of Calculus.		Un	1	1
2.	<b>Understand</b> multivariable Calculus.		Un	1	1
3.	<b>Understand</b> LaplaceTransforms and its properties.		Un	1	1
4.	<b>Understand</b> Inverse LaplaceTransforms and its properties.		Un	1	1
5.	<b>Understand</b> basic Linear Algebra.		Un	1	1

#### Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OBAs \Math tools	Course Seminar	Total Marks
Marks	25+25 = 50	4*5 marks=20	10+10 =20	10	100
<b>OBA - Open Book Assignment</b> <b>Minimum score for passing : 40 OUT OF 100</b>					

#### Rubrics:

Levels	Target
<b>1 (Low)</b>	<b>60% of the students score Less than 50 % of the total marks.</b>
<b>2 (Medium)</b>	<b>60% of the students score 50 – 70 % of the total marks.</b>
<b>3 (High)</b>	<b>60% of the students score More than 70 % of the total marks.</b>

CO-PO Mapping (Planned)													CO-PSO Mapping(Planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	√										√	√	√		
2	√										√	√	√		
3	√										√	√	√		
4	√										√	√	√		
5	√										√	√	√		





# 4<sup>th</sup> Semester Detailed Syllabi



## FUNDAMENTALS OF STATISTICS AND PROBABILITY FOR DATA SCIENCE

<b>Course Code:</b>	<b>21MATCS41</b>	<b>Course type</b>	<b>BSC</b>	<b>Credits L-T-P</b>	3 – 0– 0
<b>Hours/week: L-T-P</b>	3 – 0 – 0			<b>Total credits</b>	3
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0Hrs;P = 0 Hrs Total = 40 Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course learning objectives</b>	
At the end of the course students should be able to	
1.	Fit a suitable curve for the data using regression.
2.	Get knowledge about various probability distributions involving discrete /continuous random variable.
3.	Get familiar with various sampling distributions and estimation of various parameters.
4.	Get acquainted with various hypothesis testing techniques.
5.	Understand Joint discrete PDF and various stochastic processes.

**Pre-requisites :** Basic statistics, Basic probability.

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<b>Correlation and Regression:</b> Karl Pearson coefficient of correlation, Regression: Lines of regression Problems. Multiple correlation and regression. Partial correlation and regression.	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<b>Random Vector:</b> Discrete and Continuous Random Vector, (DRV,CRV) Probability Distribution Functions (PDF) and Cumulative Distribution Functions(CDF), Expectations, Mean, Variance. Binomial, Poisson, Exponential and Normal Distributions. Practical examples.	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<b>Hypothesis Testing :</b> Null and alternate hypothesis, Critical region, Sampling, Sampling errors, Level of significance and confidence limits ,Testing hypothesis of mean, Testing hypothesis of variance, Testing hypothesis of proportion.	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<b>Sampling distribution:</b> Sampling distribution, Sampling distribution of means, Test of significance for small and large samples. 't' and 'chi square' distributions, F- distribution. Practical examples.	

<b>Unit –V</b>	<b>Contact Hours = 8 Hours</b>
<b>Joint PDF and Stochastic Process:</b> Discrete Multivariable Joint PDF, Multivariable Conditional Joint PDF, Expectations (Mean, Variance and Covariance). Definition and classification of stochastic processes. Discrete state and discrete parameter stochastic process, Unique fixed probability vector, Regular Stochastic Matrix, Transition probability, Markov chain.	

### Flipped Classroom Details

Unit No.	I	II	III	IV	V
No. for Flipped Classroom Sessions	2	2	2	2	2

Books	
<b>Text Books:</b>	
1.	B. S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42 <sup>nd</sup> Edition, 2012 and onwards.
2.	B.V.Ramana –Engineering Mathematics, Tata Mcgraw Hill Publishing Company Limited 2004 and onwards.
<b>Reference Books:</b>	
1.	Fundamentals of Mathematical Statistics by S.C.Gupta and V.K.Kapoor., Sultan Chand and Sons, 2009 and onwards.
2.	Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9 <sup>th</sup> Edition, 2006 and onwards.
<b>E-resource's (NPTEL/SWAYAM... Any Other)- mention links</b>	
1.	<a href="https://archive.nptel.ac.in/courses/111/102/111102111/">https://archive.nptel.ac.in/courses/111/102/111102111/</a> ( Prob and Stochastic)
2.	<a href="https://archive.nptel.ac.in/courses/111/104/111104147/">https://archive.nptel.ac.in/courses/111/104/111104147/</a> ( Sampling and Linear regression)

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Online Quizzes (Surprise and Scheduled)
3.	Flipped Classes	3.	Open Book Tests (OBT)/Matlab
4.	Online classes	4.	Course Seminar
		5.	Semester End Examination

Course Outcome (COs)					
At the end of the course, the student will be able to					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create			Learning Level	PO(s)	PSO(s)
1.	To <b>UNDERSTAND</b> correlation and regression .		Un	1	1
2.	To <b>UNDERSTAND</b> the concept of random variable and various probability distributions connected with discrete and continuous random variable.		Un	1	1
3.	To <b>APPLY</b> methods to test a hypothesis.		Ap	1	1
4.	To <b>APPLY</b> the concepts related to sampling distribution to practical problems.		Ap	1	1
5.	To <b>UNDERSTAND</b> the joint discrete probability distributions and Markov chain.		Un	1	1

**Scheme of Continuous Internal Evaluation (CIE):**

Components	Addition of two IA tests	Online Quiz	Addition of two OBAs/Math tools	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100
<b>OBA- Open Book Assignment</b>					
<b>Minimum score to be eligible for CIE: 40 OUT OF 100</b>					

<b>Scheme of Semester End Examination (SEE):</b>	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	<b>Minimum marks required in SEE to pass: 40 out of 100</b>
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

**Rubrics:**

Levels	Target
1(Low)	60% of the students score Less than 50 % of the total marks.
2(Medium)	60% of the students score 50 – 70 % of the total marks.
3(High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (Planned)													CO-PSO Mapping(Planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	√										√	√	√		
2	√										√	√	√		
3	√										√	√	√		
4	√										√	√	√		
5	√										√	√	√		
<b>Tick mark the CO, PO and PSO mapping</b>															

## DATABASE MANAGEMENT SYSTEMS

<b>Course Code</b>	<b>21CS42</b>	<b>Course Type</b>	<b>PCC</b>	<b>Credits L-T-P</b>	3 – 0 – 1
<b>Hours/week: L - T- P</b>	3 – 0 – 2			<b>Total credits</b>	4
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0 Hrs; P = 20 Hrs Total = 60 Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course learning objectives</b>	
1.	To discuss the concept of databases, ER Modeling and Schema mapping
2.	To gain the knowledge Relational model concepts and constraints and explore the various relational operations.
3.	To introduce a formal database design approach through various normal forms and study the importance of concurrent transactions and control algorithms.
4.	To understand the application of different query languages and query optimizations.

**Pre-requisites : - Basics of Programming Knowledge.**

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Introduction:</b> Introduction to database, Characteristics of Database approach, Advantages of using DBMS approach, Three-schema architecture and data independence, <b>Entity-Relationship Model:</b> Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationships, Relationship types, Roles and Structural Constraints; Weak Entity Types. ER-Relational Mapping Rules.</p>	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Relational Model :</b> Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION.</p>	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Database Design:</b> Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form.</p> <p><b>Transaction Processing Concepts:</b> Introduction to Transaction processing, Transaction and System concepts, Desirable properties of Transactions and issues with concurrent transactions. 2PL and TSO algorithms</p>	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
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**SQL: SQL** Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries; Nested and Correlated Queries, IN, ALL, EXIST operators. Insert, Delete and Update statements in SQL. Introduction to Query Optimization techniques; SQL Web Programming using PHP

<b>Unit – V</b>	<b>Contact Hours = 8 Hours</b>
PL/SQL: PL/SQL Block Structure, PL/SQL Variables, PL/SQL Function, PL/SQL Procedure, PL/SQL IF Statement, PL/SQL Loop Statement: PL/SQL WHILE Loop Statement, PL/SQL FOR Loop Statement. Introduction to Cursors and Triggers.; Overview of NoSQL, Apache Hive as an HDFS, HBase	

#### Flipped Classroom Details

Unit No.	I	II	III	IV	V
<b>No. for Flipped Classroom Sessions</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>

#### List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	2	Entity-Relationship Model, ER-Relational Mapping Rules
2	1	Relational Operations
3	1	Normalization
4	2	DDL,DML, Web Programming
5	2	PL/SQL Programs, Cursors, Triggers

Unit No.	Self-Study Topics
1	Various users of DBMS, Classification of DBMS
4	Database and Java, Python connectivity

#### Books

Text Books:	
1.	Elmasri and Navathe: Fundamentals of Database Systems, Addison-Wesley, 6 <sup>th</sup> edition and above.
Reference Books:	
1.	Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, McGraw-Hill, 2 <sup>nd</sup> edition and above.
E-resources (NPTEL/SWAYAM.. Any Other)- mention links	
1.	Database Management Systems – NPTEL - <a href="https://onlinecourses.nptel.ac.in/noc22_cs51/preview">https://onlinecourses.nptel.ac.in/noc22_cs51/preview</a>
2.	Database Management Courses- <a href="https://www.udemy.com/topic/database-management/">https://www.udemy.com/topic/database-management/</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Online Quizzes (Surprise and Scheduled)

3.	Flipped Classes	3.	Open Book Tests (OBT)
4.	Online classes	4.	Course Seminar
5.	Enquiry Based Learning	5.	Semester End Examination

<b>Course Outcome (COs)</b>				
At the end of the course, the student will be able to (Highlight the <b>action verb</b> representing the learning level.)				
<b>Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr – Create</b>		<b>Learning Level</b>	<b>PO(s)</b>	<b>PSO(s)</b>
1.	<b>Analyze</b> the given database applications using E-R diagrams and apply the normalization to produce schema diagrams and relations.	Ap	1,2,3,4,5,9,10	1,2,3
2.	<b>Explain</b> the relational operators , SQL concepts and transaction processing.	Un	1,2,3,10	1,2,3
3.	<b>Apply</b> SQL , PL/SQL and NoSQL languages to design different Database applications.	Ap	1,2,3,4,5,10,12	1,2,3

#### **Scheme of Continuous Internal Evaluation (CIE):**

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test (**COMPULSORY**) will be part of the CIE. **No SEE for Lab.**

<b>THEORY (60 marks)</b>			<b>LAB (40 marks)</b>		<b>Total</b>
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks
<b>IA Test:</b>					
1. No objective part in IA question paper					
2. All questions descriptive					
<b>Conduct of Lab:</b>					
1. Conducting the experiment and journal: 5 marks					
2. Calculations, results, graph, conclusion and Outcome: 5 marks					
3. Viva voce: 5 marks					
<b>Lab test: (Batchwise with 15 students/batch)</b>					
1. Test will be conducted at the end of the semester					
2. Timetable, Batch details and examiners will be declared by Exam section					
3. Conducting the experiment and writing report: 5 marks					
4. Calculations, results, graph and conclusion: 10 marks					
5. Viva voce: 10 marks					
<b>Eligibility for SEE:</b>					
1. 40% and above (24 marks and above) in theory component					
2. 40% and above (16 marks and above) in lab component					
3. <b>Lab test is COMPULSORY</b>					
4. Not eligible in any one of the two components will make the student <b>Not Eligible</b> for SEE					





## PYTHON PROGRAMMING

<b>Course Code</b>	<b>21CS43</b>	<b>Course type</b>	<b>PCC</b>	<b>Credits L-T-P</b>	3 - 0 - 1
<b>Hours/week: L - T- P</b>	3 - 0 - 2			<b>Total credits</b>	4
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0 Hrs; P = 20 Hrs Total = 60 Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course learning objectives</b>	
1.	Gain knowledge about basic Python language syntax and semantics to write Python programs using the procedure oriented programming paradigm.
2.	Appreciate the usage of high level data constructs provided by Python and work with file and exception handling mechanisms.
3.	Write Python applications using the object-oriented programming paradigm.
4.	Become acquainted with the development of database and GUI applications and usage of various packages.

**Required Knowledge of :** Procedure Oriented and Object Oriented Programming Languages

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Python Fundamentals:</b>  <b>An Introduction to Python programming:</b> Introduction to Python, IDLE to develop programs;  <b>How to write your first programs:</b> Basic coding skills, data types and variables, numeric data, string data, five of the Python functions;  <b>Control statements:</b> Boolean expressions, selection structure, iteration structure;  <b>Define and use Functions and Modules:</b> define and use functions, more skills for defining and using functions and modules, create and use modules, standard modules                      Text Book 1 – Chapters 1,2,3,4</p>	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Higher Data Constructs:</b>  <b>Lists and tuples:</b> Basic skills for working with lists, list of lists, more skills for working with lists, tuples;  <b>Dictionaries:</b> get started with dictionaries, more skills for working with dictionaries;  <b>Strings:</b> Basic skills for working with strings, split and join strings;  <b>Dates and times:</b> get started with dates and times                      Text Book 1 – Chapters 6,12,10,11</p>	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Files, Exception Handling, Database Programming</b>  <b>File I/O:</b> An introduction to file I/O, test files, CSV files, binary files;  <b>Exception Handling:</b> handle a single exception, handle multiple exceptions, Two more skills;  <b>Work with a database:</b> An introduction to relational databases, SQL statements for data manipulation, SQLite Manager to work with a database, use Python to work with a database                      Text Book 1 – Chapters 7,8,17</p>	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<b>Object Oriented Programming:</b> <b>Define and use your own classes:</b> An introduction to classes and objects, define a class, object composition, encapsulation; <b>Inheritance:</b> Inheritance, override object methods; <b>Design an object oriented program:</b> Techniques for object-oriented design Text Book 1 – Chapters 14,15,16	

<b>Unit – V</b>	<b>Contact Hours = 8 Hours</b>
<b>Packages:</b> <b>How to build a GUI Program:</b> Create a GUI that handles an event, more skills for working with components; <b>Numpy Basics:</b> Arrays and Vectorized Computation: Creating ndarrays, Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Indexing with slices, Boolean Indexing, Transposing Arrays and Swapping Axes; <b>Getting started with Pandas:</b> Introduction to Pandas Data Structures, Summarizing and Computing Descriptive Statistics, Handling missing data; <b>Plotting and Visualization:</b> A Brief matplotlib API Primer, Plotting Functions in pandas Text Book 1 – Chapters 18 Text Book 2 – Chapters 4,5,7,8	

#### Flipped Classroom Details

Unit No.	I	II	III	IV	V
<b>No. for Flipped Classroom Sessions</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>

#### List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
2	2	Functions and lists
		Functions and dictionaries
3	2	File I/O and exception handling mechanisms
		Implement a Python program to work with a database
4	2	Object composition and encapsulation
		Inheritance and polymorphism
5	2	GUI application
		NumPy, Pandas and Matplotlib packages

Unit No.	Self-Study Topics
1	Test and debug a program
2	Work with numbers, recursion and algorithms
5	Numpy – Data Processing using Arrays

#### Books

Text Books:	
1.	Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

2.	Wes McKinney, Python for Data Analysis, O'Reilly, 1 <sup>st</sup> Edition, 2012
<b>Reference Books:</b>	
1.	SciPy and NumPy, O`Reilly, 1 <sup>st</sup> Edition, 2012
2.	Mark Lutz, Programming Python, O`Reilly, 4 <sup>th</sup> Edition, 2010
<b>E-resources (NPTEL/SWAYAM.. Any Other)- mention links</b>	
1.	The joy of computing using python - <a href="https://onlinecourses.nptel.ac.in/noc21_cs32/preview">https://onlinecourses.nptel.ac.in/noc21_cs32/preview</a>
2.	Programming in python- <a href="https://onlinecourses.swayam2.ac.in/cec22_cs20/preview">https://onlinecourses.swayam2.ac.in/cec22_cs20/preview</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Enquiry Based Learning		

Course Outcome (COs)				
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr – Create				
At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	<b>Illustrate</b> basic principles of Python programming and <b>Demonstrate</b> programs using the procedure oriented programming paradigm.	<b>Ap</b>	1,3	1
2.	<b>Develop</b> Python programs for file operations, exception handling, GUI, database operations and <b>Make use of</b> different packages for computing and manipulation.	<b>Ap</b>	1,2,3,5,9,10,12	1,2,3
3.	<b>Explain</b> the concepts of object-oriented programming paradigm and <b>Apply</b> the same to develop programs.	<b>Ap</b>	1,2,3,5,9,10,12	1,2,3

#### Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab.**

THEORY (60 marks)			LAB (40 marks)		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks
<b>IA Test:</b>					
1. No objective part in IA question paper					
2. All questions descriptive					
<b>Conduct of Lab:</b>					
1. Conducting the experiment and journal: 5 marks					

2. Calculations, results, graph, conclusion and Outcome: 5 marks 3. Viva voce: 5 marks
<b>Lab test: (Batchwise with 15 students/batch)</b> 1. Test will be conducted at the end of the semester 2. Timetable, Batch details and examiners will be declared by Exam section 3. Conducting the experiment and writing report: 5 marks 4. Calculations, results, graph and conclusion: 10 marks 5. Viva voce: 10 marks
<b>Eligibility for SEE:</b> 1. 40% and above (24 marks and above) in theory component 2. 40% and above (16 marks and above) in lab component 3. <b>Lab test is COMPULSORY</b> 4. Not eligible in any one of the two components will make the student <b>Not Eligible</b> for SEE

<b>Scheme of Semester End Examination (SEE):</b>	
1.	It will be conducted for 100 marks of 3 hours' duration.
2.	<b>Minimum marks required in SEE to pass: 40 out of 100</b>
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

Rubrics:Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	√		√										√		
2	√	√	√		√				√	√		√	√	√	√
3	√	√	√		√				√	√		√	√	√	√
Tick mark the CO, PO and PSO mapping															

## SOFTWARE ENGINEERING AND DESIGN

<b>Course Code</b>	<b>21CS44</b>	<b>Course type</b>	<b>PCC</b>	<b>Credits L-T-P</b>	3 - 0 - 1
<b>Hours/week: L - T- P</b>	3 - 0 - 2			<b>Total credits</b>	4
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0 Hrs; P = 20 Hrs Total = 60 Hrs			<b>CIE Marks</b>	100
<b>Flipped Classes content</b>	10 Hours			<b>SEE Marks</b>	100

<b>Course learning objectives</b>	
1.	Contrast use of Software Engineering and associated processes using standard models.
2.	Identify the software functions and associated component to design architectural framework.
3.	Decide the separation of concern and design relevant processes for the required operations.
4.	Prepare test cards to measure project performance accomplishing specified requirements.
5.	Evaluate software quality based on industry perspectives and relevant versions.

**Required Knowledge of :** Basics of any programming language, software types, functions and steps of software development

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Introduction:</b> Professional software development, Software engineering ethics, Case studies.</p> <p><b>Software Processes:</b> Software Process models: The Waterfall model – A Case study, Incremental development, Reuse-oriented software engineering, Process activities: Software specification, Software design and implementation, Software validation, Coping with Change: Prototyping, Incremental Delivery, Boehm’s Spiral Model.</p> <p>Text Book 1: Chapters -1, Chapter-2</p>	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Requirements Engineering:</b> Functional and non-functional requirements: Functional requirements. Non-functional requirements, Introduction to Requirements specification.</p> <p><b>Agile Software Development:</b> Agile methods- Plan driven and Agile Development, Introduction to Extreme Programming.</p> <p>Text Book 1: Chapters -3, Chapter-4</p>	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Design and Implementation:</b> Object-oriented design using UML: System Context and Interaction, Architectural design, Object Class identification, design Models, Interface Specification, Design Patterns, Implementation issues, Open Source development.</p> <p>Text Book 1: Chapters -7</p>	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Software Testing:</b> Development Testing: Unit Testing, Choosing Unit Test Cases, Component Testing, System Testing, Test Driven Development, Release Testing: Requirements Based Testing, Scenario Testing, Performance Testing, User Testing. A Demo of Selenium.</p> <p>Text Book 1: Chapter-8</p>	

<b>Unit – V</b>	<b>Contact Hours = 8 Hours</b>
<p><b>Quality Management:</b> Introduction, Software quality, Software standards: The ISO 9001 standard framework, Reviews and inspection.</p> <p><b>Configuration management:</b> Introduction to Change management, Version management, System building, Release management.</p> <p>Text Book 1: Chapters -24, Chapter-25                  Ref. Book 2: Chapters -8</p>	

**Flipped Classroom Details**

Unit No.	I	II	III	IV	V
<b>No. of hrs. for Flipped Classroom Sessions</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>

**List of Experiments**

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	1	Software Processes & process flow diagram using online open source design tool.
2	2	Requirements Engineering: Requirement collection, listing of important functions and analysis. Tools Used for Story card Preparation and estimation of task
3	3	Software Design & Development listing the actors with relevance and listing of use-cases summarizing the purpose. Design sequence diagram any one of the function identified with all suitable constructs. Draw an Activity diagram for any software design tools.
4	3	Software Testing-Unit Testing with example & Prepare software Test Document compare test results. Testing based on system testing, Integration tests & automation using the tool.
5	1	Project work: use case of any Common Software Application listing all the functional & non-functional requirements, Show the suitable process model with justification along with mode of data transaction using ER diagram. Design test cases & prototype model by using FIGMA.

Unit No.	Self-Study Topics
I	Identification of requirements for any common software in use by business domain and the advantages.
II	Classification of functional and non-functional requirements of any software used in business domain. Software Architectural patterns, implementation and uses.
III	Object oriented software and UML: Business use-case Design and Activity diagrams
IV	Software testing ISO 9001 series – Guidelines applicable to software industry
V	Software Quality & Performance: Git-Hub based topics with ref. link: <a href="https://github.com/ICTU/quality-time">https://github.com/ICTU/quality-time</a>

Books	
	<b>Text Books:</b>
1.	Ian Sommerville: Software Engineering, Pearson Education, 9th Edition onwards
	<b>Reference Books:</b>
1.	Roger .S. Pressman: Software Engineering-A Practitioners approach, 8th Edition and above, Tata McGraw Hill
2.	Paul C. Jorgensen: Software Testing Craftsman’s Approach, 4 <sup>th</sup> Edition CRC Press, Taylor Francis Group
3.	Rajib Mall, Fundamentals of Software Engineering , 4thEdition onwards PHI Learning Pvt. Ltd.
4.	Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India, 2009 onwards Resources
	<b>E-resources (NPTEL/SWAYAM.. Any Other)- mention links</b>
1.	<b>NPTEL:</b> <a href="https://nptel.ac.in/courses/106105182">https://nptel.ac.in/courses/106105182</a>
2.	<b>SWAYAM:</b> <a href="https://onlinecourses.swayam2.ac.in/cec20_cs07/preview">https://onlinecourses.swayam2.ac.in/cec20_cs07/preview</a>
3.	<b>IIT Chennai:</b> <a href="https://onlinedegree.iitm.ac.in/course_pages/BSCCS3001.html">https://onlinedegree.iitm.ac.in/course_pages/BSCCS3001.html</a>

Course delivery methods		Assessment methods		
1.	Chalk and Talk	1.	IA tests	
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project	
3.	Flipped Classes	3.	Lab Test	
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination	
5.	Enquiry Based Learning			
Course Outcome (COs)				
<b>Learning Levels:</b> (Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr – Create)				
At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	<b>Define</b> the professional practice for software development and understand the ethical responsibilities of Software Engineer.	Re	1	1
2.	<b>Explain</b> the requirements for associated processes, feasibility and decide the suitable model of software.	Un	2	1, 2
3.	<b>Choose</b> software design accumulating information and the functional components for the development.	Ap	2, 3, 5	2, 3
4.	<b>Apply</b> the software testing methods.to check the accuracy based on the analysis of contextual requirement.	Ap	3, 4, 5	2, 3
5.	<b>Analyze</b> software that matches with industry needs and adapt the changes based on demand for the continuous quality improvement.	An	4	3

**Scheme of Continuous Internal Evaluation (CIE):**

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test (**COMPULSORY**) will be part of the CIE. **No SEE for Lab.**

THEORY (60 marks)			LAB (40 marks)		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks
<b>IA Test:</b>					
1. No objective part in IA question paper					
2. All questions descriptive					
<b>Conduct of Lab:</b>					
1. Conducting the experiment and journal: 5 marks					
2. Calculations, results, graph, conclusion and Outcome: 5 marks					
3. Viva voce: 5 marks					
<b>Lab test: (Batch-wise with 15 students/batch)</b>					
1. Test will be conducted at the end of the semester					
2. Timetable, Batch details and examiners will be declared by Exam section					
3. Conducting the experiment and writing report: 5 marks					
4. Calculations, results, graph and conclusion: 10 marks					
5. Viva voce: 10 marks					
<b>Eligibility for SEE:</b>					
1. 40% and above (24 marks and above) in theory component					
2. 40% and above (16 marks and above) in lab component					
3. <b>Lab test is COMPULSORY</b>					
4. Not eligible in any one of the two components will make the student <b>Not Eligible</b> for SEE					

**Scheme of Semester End Examination (SEE):**

1.	It will be conducted for 100 marks of 3 hours' duration.
2.	<b>Minimum marks required in SEE to pass: 40 out of 100</b>
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

Rubrics: Levels	Target
<b>1 (Low)</b>	<b>60% of the students score Less than 50 % of the total marks.</b>
<b>2 (Medium)</b>	<b>60% of the students score between 50 – 70 % of the total marks.</b>
<b>3 (High)</b>	<b>60% of the students score More than 70 % of the total marks.</b>



CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	√												√		
2		√											√	√	
3		√	√		√								√	√	
4		√		√	√									√	√
5			√	√	√										√
Tick mark the CO, PO and PSO mapping															



## HEALTH AND WELLNESS

<b>Course Code</b>	<b>21CS45</b>	<b>Course type</b>	<b>Theory</b>	<b>Credits L-T-P</b>	2 – 0 - 0
<b>Hours/week: L - T- P</b>	2 – 0 – 0			<b>Total credits</b>	2
<b>Total Contact Hours</b>	L = 25 Hrs; T = 0 Hrs; P = 0 Hrs Total = 25 Hrs			<b>CIE Marks</b>	50
<b>Flipped Classes content</b>				<b>SEE Marks</b>	50

<b>Course learning objectives</b>	
1.	To understand and practice yoga and postures.
2.	To know about health and wellness & its balance for positive mindset.
3.	To build the healthy lifestyles for good health for their better future.
4.	To create a healthy and caring relationships to meet the requirements of good/social/positive life.
5.	To learn about avoiding risks and harmful habits inside and outside the campus.
6.	To prevent and fight against harmful diseases for good health through positive mindset.

<b>Unit – I Foundations of Yoga</b>	<b>Contact Hours = 5 Hours</b>
<p>Introduction to Yoga, Yogasanas ( The yogic postures)            Sitting postures- Vajrasana, Swastikasana, Ardhapadmasana,            Standing postures-Tadasana, Vrikshasana, Utkatasana            Supine postures- Niralamba Bhujangasana, Ardhashalabhasana, Makarasana, Shavasana.            Guidelines for Pranayama, Surya Namaskar and meditation.            Activity- Yoga session for students</p>	

<b>Unit – II Good Health &amp; It's balance for positive mindset</b>	<b>Contact Hours = 4 Hours</b>
<p>Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health &amp; Behavior, Health &amp; Society, Health &amp; family, Health &amp; Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.</p>	

<b>Unit – III Building of healthy lifestyles for better future</b>	<b>Contact Hours = 4 Hours</b>
<p>Developing healthy diet for good health, Food &amp; health, Nutritional guidelines for good health, Obesity &amp; overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.</p>	

<b>Unit – IV Creation of Healthy and caring relationships</b>	<b>Contact Hours = 4 Hours</b>
<p>Building communication skills, Friends and friendship - Education, the value of relationship and communication skills, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behavior through social engineering.</p>	

<b>Unit – V Avoiding risks and harmful habits</b>	<b>Contact Hours = 4 Hours</b>
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Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops, Types of addictions, influencing factors of addictions, Differences between addictive people and non addictive people & their behaviors. Effects of addictions Such as..., how to recovery from addictions.

<b>Unit – VI Preventing &amp; fighting against diseases for good health</b>	<b>Contact Hours = 4 Hours</b>
How to protect from different types of infections, How to reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.	

<b>Books</b>	
	<b>Text Books:</b>
1.	“Scientific Foundations of Health” – Study Material Prepared by Dr. L Thimmesha, Published in VTU - University Website.
2.	“Yoga: A Healthy Way of Living” by NCERT (National Council of Educational Research and Training)
3.	“Scientific Foundations of Health”, (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.
4.	Health Psychology - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.
	<b>Reference Books:</b>
1.	Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O’Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
2.	HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.

<b>Course delivery methods</b>		<b>Assessment methods</b>	
1.	✓ Chalk and Talk	1.	✓ IA tests
2.	✓ PPT and Videos	2.	Online Quizzes (Surprise and Scheduled)
3.	✓ Yoga session	3.	Open Book Tests (OBT)
4.	Flipped Classes	4.	✓ Course Survey/ activity
5.	Online classes	5.	✓ Semester End Examination

<b>Course Outcome (COs)</b>			
<b>Learning Levels:</b> (Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr – Create) (Highlight the <b>action verb</b> representing the learning level.)			
At the end of the course, the student will be able to:		<b>Learning Level</b>	<b>PO(s)</b>
1.	<b>Apply</b> Yogic practices for improving Health and wellness.	Ap	6,12
2.	<b>Develop</b> healthy lifestyle and build caring relationships for good health and better social life.	Ap	6,12

3.	<b>Explain</b> risks and harmful habits inside and outside the campus for their bright future.	Un	6,12
4.	<b>Explain</b> the need to fight against harmful diseases for good health through positive mindset.	Un	6,12

**Scheme of Continuous Internal Evaluation (CIE):**

Components	Addition of two IA tests	Course Survey/ Activity	Total Marks
Marks	20+20 = 40	10	50
<b>Minimum score to be eligible for SEE: 20 OUT OF 50</b>			

Course activity includes conducting survey or activities related to general health awareness, community health issues, industrial health issues etc. in groups. Students have to conduct the above listed activities, gather data, give possible solutions/outcomes and present it in the form of a report for evaluation.

**Scheme of Semester End Examination (SEE):**

1.	It will be conducted for 50 marks of 2 hours' duration.
2.	Score should be $\geq 35\%$ ,however overall score of CIE + SEE should be $\geq 40\%$
3.	Question paper will be of MCQ type with questions from all units.

Rubrics: Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (Planned)												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1						✓						✓
2						✓						✓
3						✓						✓
4						✓						✓
<b>Tick mark the CO and PO mapping</b>												

## ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

Samskrutika Kannada (Kannada for Administration) is for students who speak, read and write Kannada.

Course Code	21CSS46	Course type	HSMS	Credits L-T-P	0- 1 - 0
Hours/week: L - T- P	0 - 2 - 0			Total credits	1
Total Contact Hours	L = 20 Hrs; T = 0 Hrs; P = 0 Hrs Total = 20 Hrs			CIE Marks	50
Flipped Classes content	---			SEE Marks	50 (2 Hours)

### ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
3. ತಾಂತ್ರಿಕ ವೃತ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
4. ಕನ್ನಡ ಶಬ್ದಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಳಕೆ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು.

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

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

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

### ಘಟಕ -1 ಲೇಖನಗಳು

Contact Hours = 4 Hours

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಘಟಕ -2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ	Contact Hours = 4 Hours
1. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ, 2. ಕೀರ್ತನೆಗಳು : ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸಿದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು 3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ	

ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ	Contact Hours = 4 Hours
1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಅಯ್ದು ಕೆಲವು ಭಾಗಗಳು 2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ 3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು	

ಘಟಕ -4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	Contact Hours = 4 Hours
1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್ 2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ	

ಘಟಕ -5 ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ	Contact Hours = 4 Hours
1. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ 2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ	

<b>ಪಠ್ಯಪುಸ್ತಕ</b>	
1.	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.
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Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Assignments
		3.	Semester End Examination

<b>Course Outcome (COs)</b>				
At the end of the course, the student will be able to (Highlight the <b>action verb</b> representing the learning level.)				
<b>Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create</b>			<b>Learning Level</b>	<b>PO(s)</b>
1	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ. <b>Explain</b> the history and culture of Karnataka	Un	10	
2	<b>Explain</b> the contributions made to Kannada literature	Un	10	

**Scheme of Continuous Internal Evaluation (CIE):**

Components	Addition of two IA tests	Addition of two Assignments	Total Marks
Maximum Marks	15+15 = 30	10+10 =20	50
1. Writing the IA tests is compulsory 2. <b>Minimum marks required to be eligible for SEE: 20 out of 50</b>			

**Scheme of Semester End Examination (SEE):**

1.	It will be conducted for 50 marks of 2 hours duration.
2.	<b>Minimum marks required in SEE to pass: 20 out of 50</b>
3.	Question paper will have choices.

Rubrics:Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (Planned)													CO-PSO Mapping (Planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1										✓					
2										✓					
Tick mark the CO, PO and PSO mapping															

## ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)

Balake Kannada (Kannada for communication) is for non-Kannada speaking, reading, and writing students

Course Code	21CSB46	Course type	HSMS	Credits L-T-P	0- 1 - 0
Hours/week: L - T- P	0 - 2 - 0			Total credits	1
Total Contact Hours	L = 20 Hrs; T = 0 Hrs; P = 0 Hrs Total = 20 Hrs			CIE Marks	50
Flipped Classes content	---			SEE Marks	50 (2 Hours)

### ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು (Course Learning Objectives):

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

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

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

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.

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



<b>Unit - II</b>	<b>Contact Hours = 4 Hours</b>
<p>1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - <b>Possessive forms of nouns, dubitive question and Relative nouns</b></p> <p>2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು <b>Qualitative, Quantitative and Colour Adjectives, Numerals</b></p> <p>3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು - ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ) <b>Predictive Forms, Locative Case</b></p>	

<b>Unit - III</b>	<b>Contact Hours = 4 Hours</b>
<p>ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು - <b>Dative Cases, and Numerals</b></p> <p>ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು - <b>Ordinal numerals and Plural markers</b></p> <p>ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು <b>Defective / Negative Verbs and Colour Adjectives</b></p>	

<b>Unit - IV</b>	<b>Contact Hours = 4 Hours</b>
<p>ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಆರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು <b>Permission, Commands, encouraging and Urging words (Imperative words and sentences)</b></p> <p>ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು <b>Accusative Cases and Potential Forms used in General Communication</b></p> <p>“ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು - <b>Helping Verbs</b></p> <p>“iru and iralla”, Corresponding Future and Negation Verbs</p> <p>ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು <b>ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ- Comparative, Relationship, Identification and Negation Words</b></p>	

<b>Unit - V</b>	<b>Contact Hours = 4 Hours</b>
<p>1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು - <b>ifferent types of forms of Tense, Time and Verbs</b></p> <p>2. ದ್, -ತ್, -ತು, -ಇತು, - ಆಗಿ, - ಅಲ್ಲ, - ಗೆ, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - <b>Formation of Past, Future and Present Tense Sentences with Verb Forms</b></p> <p>3. <b>Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು - Kannada Words in Conversation</b></p>	

<b>ಪಠ್ಯಪುಸ್ತಕ</b>	
1.	ಬಳಕೆ ಕನ್ನಡ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Assignments
		3.	Semester End Examination

Course Outcome (COs)			
At the end of the course, the student will be able to (Highlight the <b>action verb</b> representing the learning level.)			
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create		Learning Level	PO(s)
1.	<b>Make use of</b> Kannada language to Communicate (converse) in their daily life with kannada speakers.	Ap	10
2.	<b>Apply</b> Kannada language constructs to read and write as per requirement.	Ap	10

#### Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two Assignments	Total Marks
Maximum Marks	15+15 = 30	10+10 =20	50
1. Writing the IA tests is compulsory 2. <b>Minimum marks required to be eligible for SEE: 20 out of 50</b>			

#### Scheme of Semester End Examination (SEE):

1.	It will be conducted for 50 marks of 2 hours' duration.
2.	<b>Minimum marks required in SEE to pass: 20 out of 50</b>
3.	Question paper will have choices.

Rubrics:Levels	Target
<b>1 (Low)</b>	<b>60% of the students score Less than 50 % of the total marks.</b>
<b>2 (Medium)</b>	<b>60% of the students score 50 – 70 % of the total marks.</b>
<b>3 (High)</b>	<b>60% of the students score More than 70 % of the total marks.</b>

CO-PO Mapping (Planned)												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1										✓		
2										✓		
Tick mark the CO and PO mapping												

## UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS

<b>Course Code</b>	<b>21CS47</b>	<b>Course type</b>	<b>UHV</b>	<b>Credits L-T-P</b>	<b>1 – 0 - 0</b>
<b>Hours/week: L - T- P</b>	1 – 0 – 0			<b>Total credits</b>	<b>1</b>
<b>Total Contact Hours</b>	L = 20 Hrs; T = 0 Hrs; P = 0 Hrs Total = 20 Hrs			<b>CIE Marks</b>	<b>50</b>
<b>Flipped Classes content</b>	--			<b>SEE Marks</b>	<b>50</b>

<b>Course learning objectives</b>	
1.	To provide understanding of basic human values
2.	To implement the human values in Engineering profession.

**Knowledge required : English Language, Social Studies**

<b>Unit – I Human Values</b>	<b>6 Hours</b>
Objectives, Morals , Values, Ethics, Integrity, Work ethics, Service learning, Virtues, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage ,Valuing time, Cooperation, Commitment, Empathy, Self-confidence, Challenges in the work place, Spirituality.	

<b>Unit – II Professional Ethics</b>	<b>8 Hours</b>
Engineering Ethics: Overview, senses of engineering ethics, variety of moral issues, types of enquiries, moral dilemma, moral autonomy, moral development (theories), consensus and controversy, profession, models of professional roles, responsibility. Theories about right action (ethical theories), self-control, self-interest, customs, religion, self-respect, case studies (Choice of the Theory), engineering as experimentation, engineers as responsible experimenters.	

<b>Unit – III Professional Ethics</b>	<b>6 Hours</b>
Codes of ethics, Environmental ethics, Computer ethics, Engineers as managers, Ethics and code of business conduct in MNC	

**Illustrative case studies (3 cases related to Human value and 3 cases related Professional Ethics)**

<b>Books</b>	
1.	Nagarazan R.S., Professional Ethics and Human Values, New Age International Publishers Pvt.Ltd. 2006

Course Outcome (COs)		
At the end of the course, the student will be able to:		Bloom's Level
1.	Identify and practice the human values	L2
2.	Understand and implement ethics in Engineering profession.	L1, L3

Program Outcome of this course (POs)		PO No.
1.	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	6
2.	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	8

Course delivery methods		Assessment methods	
1.	Lecture	1.	I. A. test
2.	Presentation	2.	SEE
3.	Expert talks		

#### Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests
Maximum Marks: 50	25+25 = 50
<b>Minimum score to be eligible for SEE: 20 OUT OF 50</b>	

#### Scheme of Semester End Examination (SEE):

1.	SEE question paper for 50 marks having descriptive type questions will be conducted for two hours duration.
2.	<b>Minimum marks required in SEE to pass: 20 out of 50</b>
3.	Choice in each unit.

Rubrics:Levels	Target
<b>1 (Low)</b>	<b>60% of the students score Less than 50 % of the total marks.</b>
<b>2 (Medium)</b>	<b>60% of the students score 50 – 70 % of the total marks.</b>
<b>3 (High)</b>	<b>60% of the students score More than 70 % of the total marks.</b>

CO-PO Mapping (Planned)													CO-PSO Mapping (Planned)		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1						✓									
2								✓							
Tick mark the CO, PO and PSO mapping															

Fourth Semester  
**BRIDGE COURSE MATHEMATICS-II**  
 (Common to all Branches)  
 (A Bridge course for Lateral Entry students of IV Sem. B. E.)

<b>Course Code</b>	<b>21DMATCS41</b>	<b>Course type</b>	<b>BSC</b>	<b>Credits L-T-P</b>	0 – 0 - 0
<b>Hours/week: L - T- P</b>	3– 0 – 0			<b>Total credits</b>	0
<b>Total Contact Hours</b>	L = 40 Hrs; T = 0 Hrs; P = 0 Hrs Total = 40 Hrs			<b>CIE Marks</b>	100
				<b>SEE Marks</b>	0

<b>Course learning objectives</b>	
1.	Learn differential equations of first and second order and their applications to second order.
2.	Get familiar with concepts of beta, gamma functions and multiple integrals.
3.	Learn advanced concepts of Linear Algebra
4.	Learn and use various concepts in vector differentiation
5.	Learn and use various concepts in vector integration.

**Pre-requisites** : Basic Trigonometry, Calculus, Algebra.

<b>Unit – I: Differential Equations:</b>	<b>Contact Hours = 8 Hours</b>
Bernoulli and Exact (excluding reducible). Orthogonal trajectory. Linear differential equations of higher order with constant coefficients. Problems on second order only. Applications to- vibration of a spring, Electric circuits and bending of beams.	

<b>Unit-II: Multiple Integrals</b>	<b>Contact Hours = 8 Hours</b>
Introduction to integration Beta, Gamma functions .Double integral, Change of order, change of variables. Application to area, Triple integral (based on limits given). Application to find volume.	

<b>Unit –III: Linear Algebra II</b>	<b>Contact Hours = 8 Hours</b>
Diagonalization of a square matrix, Orthogonal matrix Quadratic form and reduction to Canonical forms by Orthogonal Transformation. Linear Transformation. Regular transformation: Identity, stretching along an axis, reflection with respect to axis, Rotation Shear, projection. (planar illustration).	

<b>Unit-IV: Vector Differentiation</b>	<b>Contact Hours = 8 Hours</b>
Scalar and Vector point function, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields, scalar potential and its applications (Directional Derivative, Angle between surfaces). Vector identities- $div(\phi A)$ , $curl(\phi A)$ , $curl(grad\phi)$ , $div(curlA)$ .	

<b>Unit –V: Vector Integration</b>	<b>Contact Hours =8 Hours</b>
Line Integral, Surface Integral, Volume Integral, Green’s Theorem, Stoke’s Theorem, Gauss Divergence Theorem (all theorems statement only) and problems.	

Books	
<b>Text Books:</b>	
1.	B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42 <sup>nd</sup> Edition, 2012.
2.	Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9 <sup>th</sup> Edition, 2006.
3.	B. V. Ramana- Higher Engineering Mathematics, Tata McGraw-Hill Education Private Limited, Tenth reprint 2010 and onwards.
<b>Reference Books:</b>	
1.	Peter V. O’ Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7 <sup>th</sup> Edition, 2011.
2.	Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4 <sup>th</sup> Edition, 2010.

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Tests (OBT)
3.	Online Classes	3.	Course Seminar
		4.	Semester End Examination

Course Outcome (COs)					
At the end of the course, the student will be able to (Highlight the <b>action verb</b> representing the learning level.)					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create			Learning Level	PO(s)	PSO(s)
1.	<b>Apply</b> Differential equations to solve physical phenomena.		<b>Ap</b>	1	1
2.	<b>Understand</b> the concept of Beta, Gamma functions and Multiple Integrals.		<b>Re</b>	1	1
3.	<b>Understand</b> the concept of diagonalization of matrices, Transformations and relevant concepts.		<b>Un</b>	1	1
4.	<b>Use</b> the various terminologies connected with vector/scalar functions		<b>Ap</b>	1	1
5.	<b>Understand</b> the applications of vector Integration.		<b>Un, Ap</b>	1	1

**Scheme of Continuous Internal Evaluation (CIE):**

Components	Addition of two IA tests	Online Quiz	Addition of two OBAs/Math tools	Course Seminar	Total Marks
Marks	25+25 = 50	4*5 marks=20	10+10 =20	10	100
<b>OBA - Open Book Assignment</b> <b>Minimum score for passing : 40 OUT OF 100</b>					

**Rubrics:**

Levels	Target
1(Low)	60% of the students score Less than 50 % of the total marks.
2(Medium)	60% of the students score 50 – 70 % of the total marks.
3(High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (Planned)													CO-PSO Mapping(Planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	√										√	√	√		
2	√										√	√	√		
3	√										√	√	√		
4	√										√	√	√		
5	√										√	√	√		
Tick mark the CO, PO and PSO mapping															

# **Ability Enhancement Courses (AEC)**





**ABILITY ENHANCEMENT COURSE (AEC)  
DESIGN THINKING**

<b>Course Code</b>	<b>21AECCS381/481</b>	<b>Course type</b>	<b>AEC</b>	<b>Credits L-T-P</b>	<b>0 - 0 - 1</b>
<b>Hours/week: L - T - P</b>	0 - 0 - 2			<b>Total credits</b>	<b>1</b>
<b>Total Contact Hours</b>	15			<b>CIE Marks</b>	<b>50</b>
				<b>SEE Marks</b>	<b>50</b>

<b>Course learning objectives</b>	
1.	Describe and explain what Design Thinking is and how to incorporate it in problem solving.
2.	Manage the requirements gathering process to determine customer needs.
3.	Ideate and adopt MVP's and prototypes to quickly get feedback and iterate on designs.

<b>Unit – I</b>	<b>Contact Hours = 3 Hours</b>
Break the Ice and Introduction to Design Thinking.	

<b>Unit – II</b>	<b>Contact Hours = 3 Hours</b>
Empathize (search for rich stories)	

<b>Unit – III</b>	<b>Contact Hours = 3 Hours</b>
Define (user need and insights – their POV)	

<b>Unit – IV</b>	<b>Contact Hours = 3 Hours</b>
Ideate (ideas, ideas, ideas)	

<b>Unit – V</b>	<b>Contact Hours = 3 Hours</b>
Prototype (build to learn); Test the prototype.	

**List of Experiments**

<b>Unit No.</b>	<b>No. of Experiments</b>	<b>Topic(s) related to Experiment</b>
I, II,III,IV & V	<b>1</b>	Group-based Project: Application of design thinking throughout the various phases of process including empathize, define, ideate, prototype, test, and implement.

**Books**

<b>Text Books:</b>	
1.	Michael Lewrick, Patrick Link, Larry Leifer 2018, <i>The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems</i> , First Ed., John Wiley & Sons [ISBN: 9781119467472]

2.	Michael Lewrick, Patrick Link, Larry Leifer 2020, <i>The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods</i> , First Ed., John Wiley & Sons New York, United States [ISBN: 9781119629191]
<b>Reference Books:</b>	
1.	Dubberly, Hugh 2008, <i>How do you design? A Compendium of Models</i> , First Ed., Dubberly Design Office [ <a href="http://www.dubberly.com/articles/how-do-you-design.html">www.dubberly.com/articles/how-do-you-design.html</a> ]
2.	Tim Brown 2009, <i>Change by Design - How Design Thinking Transforms Organizations and Inspires Innovation</i> , First Ed., HarperCollins [ISBN: 9780061766084]
<b>E-resources (NPTEL/SWAYAM. Any Other)- mention links</b>	
1.	<a href="http://www.ds.school.stanford.edu/resources/">http://www.ds.school.stanford.edu/resources/</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	PPT & demos
2.	PPT and Videos	2.	Semester End Examination
3.	Hands on DIY group activities		

Course Outcome (COs)					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create					
At the end of the course, the student will be able to			Learning Level	PO(s)	PSO(s)
1.	<b>Explain</b> the various stages involved in the process of design thinking.		Un	1	1
2.	<b>Identify</b> the problem statement and formulate objectives		Ap	2	1
3.	<b>Experiment</b> and brainstorm to generate ideas/ alternatives to address the problem identified.		Ap	2	1
4.	<b>Assess</b> the alternatives to the problem at hand in order to arrive at the optimal alternative and build.		Ev	3,4,5	1
5.	<b>Examine</b> the optimal alternative for various test cases.		An	4	1

#### Scheme of Continuous Internal Evaluation (CIE):

Phase 1 CIE – 25M

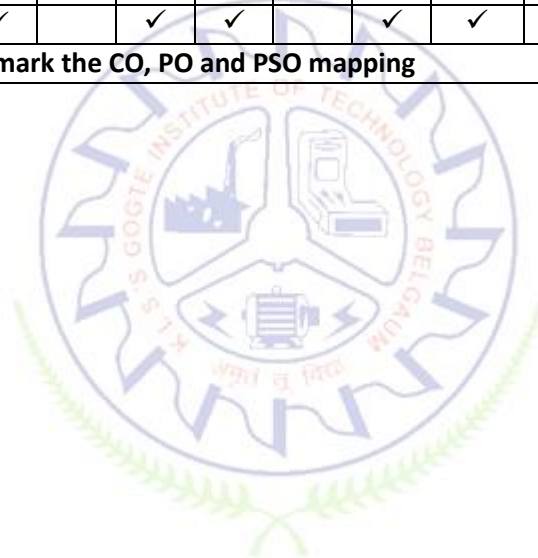
Phase 2 CIE – 25M

Total CIE 50 M

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 50 marks of 2 hours' duration.
2.	<b>Split-up of marks</b> Write-up - 10M PPT - 15M Demonstration - 25M
2.	<b>Minimum marks required in SEE to pass: 20 out of 50</b>

Rubrics:Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	✓												✓		
2		✓				✓	✓		✓	✓		✓	✓	✓	✓
3		✓				✓	✓		✓	✓		✓	✓	✓	✓
4			✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓
5				✓		✓	✓		✓	✓		✓	✓	✓	✓
<b>Tick mark the CO, PO and PSO mapping</b>															



**ABILITY ENHANCEMENT COURSE (AEC)**  
**INTRODUCTION TO EMBEDDED SYSTEMS AND IOT- A HANDS-ON APPROACH**

<b>Course Code</b>	<b>21AECCS382/482</b>	<b>Course type</b>	<b>AEC</b>	<b>Credits L-T-P</b>	<b>0 - 0 - 1</b>
<b>Hours/week: L - T- P</b>	<b>0 - 0 - 2</b>			<b>Total credits</b>	<b>1</b>
<b>Total Contact Hours</b>	<b>15</b>			<b>CIE Marks</b>	<b>50</b>
				<b>SEE Marks</b>	<b>50</b>

<b>Course learning objectives</b>	
1.	Introduce digital circuits, minimization techniques and data converters.
2.	Understand the architecture of Microcontroller.
3.	Programming Microcontroller for simple applications.
4.	Interfacing sensors and peripherals with the Microcontroller.

**Required Knowledge of : Basic Electronics**

<b>Unit – I</b>	<b>Contact Hours = 5 Hours</b>
<b>Introduction to Digital Circuits:</b> Introduction to Number System, Boolean Algebra, Gates: Basic gates (AND, OR, NOT), Universal gates (NAND, NOR), K- Map (up to 4-variables), Combinational Circuits, Sequential Circuits, ADC, DAC.	

<b>Unit – II</b>	<b>Contact Hours = 5 Hours</b>
<b>Programming 8051 Microcontroller using Embedded 'C':</b> Introduction, simple I/O programming, time delay, timer/ counter programming, serial port programming.	

<b>Unit – III</b>	<b>Contact Hours = 5 Hours</b>
<b>Peripheral Interfacing:</b> Interfacing ADC, DAC, sensors, LCD with 8051 Microcontroller. Programming Arduino UNO for simple applications.	

**List of Experiments**

<b>Unit No.</b>	<b>No. of Experiments</b>	<b>Topic(s) related to Experiment</b>
1	5	Truth table verification of basic gates and universal gates, designing adder, subtractor, multiplexer and decoder.
2	5	Simple I/O programming, delay, timer/ counter, serial port, peripheral interfacing with 8051 Microcontroller.
3	5	Simple I/O programming, various sensors interfacing with Arduino UNO.

<b>Books</b>	
<b>Text Books:</b>	
1.	R.P.Jain , Modern Digital Electronics, Tata McGraw Hill , 4th Edition, ISBN 978-0-07-06691-16

2.	Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay: The 8051 Microcontroller and Embedded Systems Using Assembly and C, Pearson Prentice Hall, 1st edition and above.
3.	James Fiore, Embedded Controllers Using C and Arduino, Mohawk Valley Community College; eBook (Creative Commons Licensed)
<b>Reference Books:</b>	
1.	John Yarbrough, Digital Logic applications and Design, Cengage Learning, ISBN – 13: 978-81-315-0058-3.
2.	Kenneth Ayala, The 8051Microcontroller, Cengage Learning, 2nd edition and above.
3.	Julien Bayle, C Programming for Arduino, Packt Publishing (May 17, 2013).
<b>E-resources (NPTEL/SWAYAM.. Any Other)- mention links</b>	
1.	Digital Circuits, by Prof. Santanu Chattopadhyay <a href="https://swayam.gov.in/nd1_noc19_ee51/preview">https://swayam.gov.in/nd1_noc19_ee51/preview</a>
2.	<a href="https://www.udemy.com/course/embedded-c-for-8051-microcontroller/">https://www.udemy.com/course/embedded-c-for-8051-microcontroller/</a>
3.	<a href="https://www.udemy.com/course/arduino-programming-and-interfacing/">https://www.udemy.com/course/arduino-programming-and-interfacing/</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs ( if present)		

Course Outcome (COs)					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create					
At the end of the course, the student will be able to			Learning Level	PO(s)	PSO(s)
1.	Design digital circuits (combinational and sequential) using minimization techniques and suitable integrated circuits.		3	2,3	1,2
2.	Program microcontroller for simple I/O, timer/ counter and serial port.		3	2,3,5	1,2
3.	Interface sensors and peripherals with the Microcontroller.		3	2,3,5	1,2

#### Scheme of Continuous Internal Evaluation (CIE):

Phase 1 CIE – 25M

Phase 2 CIE – 25M

Total CIE 50 M

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 50 marks of 2 hours' duration.
2.	<b>Split-up of marks</b> Write-up - 10M PPT - 15M Demonstration - 25M
2.	<b>Minimum marks required in SEE to pass: 20 out of 50</b>

Rubrics:Levels	Target
1 (Low)	60% of the students score Less than 50 % of the total marks.
2 (Medium)	60% of the students score 50 – 70 % of the total marks.
3 (High)	60% of the students score More than 70 % of the total marks.

CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1		✓	✓										✓	✓	
2		✓	✓		✓								✓	✓	
3		✓	✓		✓								✓	✓	
Tick mark the CO, PO and PSO mapping															



**ABILITY ENHANCEMENT COURSE (AEC)  
DATA VISUALIZATION TOOLS AND TECHNIQUES**

<b>Course Code</b>	<b>21AECCS383/483</b>	<b>Course Type</b>	<b>AEC</b>	<b>Credits L-T-P</b>	0 - 0 - 1
<b>Hours/week: L - T- P</b>	0 - 0 - 2			<b>Total credits</b>	1
<b>Total Contact Hours</b>	15			<b>CIE Marks</b>	50
				<b>SEE Marks</b>	50

<b>Course learning objectives</b>	
1.	Understand the fundamental concepts of data visualization
2.	Understand different types of data visualization tools
3.	Apply the knowledge of tableau to solve real time problems
4.	Understand the concepts of Power Bi

**Required Knowledge of :** Basics of Programming language

<b>Unit – I</b>	<b>Contact Hours = 8 Hours</b>
Introduction to Data Visualization: What makes Data Visualization Effective? History of Data Visualization, Importance of Data Visualization Why Use Data Visualization? Tables, Pro and Cons of Data Visualization, Acquiring and Visualizing Data, Applications of Data Visualization, Keys factors of Data Visualization.	

<b>Unit – II</b>	<b>Contact Hours = 8 Hours</b>
<b>EXCEL</b> Introduction, Interface, Tabs and Ribbons, Document Windows, Navigation Tips, Office Button and Save. Entering, Editing and Formatting Data: Entering Data, Fonts, Fills, and Alignment, Cut, Copy, and Paste, Paste Special, Undo and Redo, Moving, Finding, and Replacing a Value. Finding out mean, median and mode in Excel. Bar charts, pie charts, combination charts, Band charts Gantt chart, Waterfall chart	

<b>Unit – III</b>	<b>Contact Hours = 8 Hours</b>
<b>POWER BI</b> <b>Introduction, Installation Steps, Architecture, Supported Data Sources, Comparison with Other BI Tools, Data Modelling, Dashboard Options, Visualization Options, Excel Integration</b>	

<b>Unit – IV</b>	<b>Contact Hours = 8 Hours</b>
<b>Tableau:</b> Introduction to tableau, Getting started with tableau, Exploring basic Tableau, deep drive into tableau ,visualization.	

<b>Unit – V</b>	<b>Contact Hours = 8 Hours</b>
<b>WEKA and R:</b> Introduction to WEKA, Installation, loading data, Exploring file formats, visualization. Introduction to R programming tool, Installation, programming with R, Visualizing charts and graphs using R.	

#### List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
2	3	Plotting of different charts in excel
2	2	Working on Power BI
2	3	Programming with R
5	3	Programming with WEKA
5	2	Working with Tableau

#### Books

Text Books:	
1.	Tillman Davias, The Book of R first course in programming and statistics, William Pollock, 2016.
2.	Joshua Milligan, Learning Tableau 2019 , Packt Publishing, 3rd Edition 2019
3.	Alberto Ferari, Introducing Microsoft Power BI, Microsoft Press, 2016
4.	Curtis D. Frye , Microsoft Step by Step Excel 2010, Microsoft Press,

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs ( if present)		

#### Course Outcome (COs)

##### Learning Levels:

**Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create**

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	To understand the basics of data visualization tools and techniques	L1,L2	PO1,PO12	1
2.	Explain the usage of excel as a data visualization tool	L2,L3,L4	PO3,PO5,PO9,PO12	1,2,3
3.	To understand the rich features of Power BI and Tableau for visualizing data .	L2,L3,L4	PO3,PO5,PO9,PO12	1,2,3
4.	Explore R and WEKA for data visualization.	L2,L3,L4	PO3,PO5,PO9,PO12	1,2,3



**Scheme of Continuous Internal Evaluation (CIE):**

Phase 1 CIE – 25M

Phase 2 CIE – 25M

Total CIE 50 M

<b>Scheme of Semester End Examination (SEE):</b>	
1.	It will be conducted for 50 marks of 2 hours' duration.
2.	<b>Split-up of marks</b> Write-up - 10M PPT - 15M Demonstration - 25M
2.	<b>Minimum marks required in SEE to pass: 20 out of 50</b>

<b>Rubrics:Levels</b>	<b>Target</b>
<b>1 (Low)</b>	60% of the students score Less than 50 % of the total marks.
<b>2 (Medium)</b>	60% of the students score 50 – 70 % of the total marks.
<b>3 (High)</b>	60% of the students score More than 70 % of the total marks.

<b>CO-PO Mapping (planned)</b>													<b>CO-PSO Mapping (planned)</b>		
<b>CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>
1	✓											✓	✓		
2			✓		✓				✓			✓	✓	✓	✓
3			✓		✓				✓			✓	✓	✓	✓
4			✓		✓				✓			✓	✓	✓	✓
<b>Tick mark the CO, PO and PSO mapping</b>															

**ABILITY ENHANCEMENT COURSE (AEC)  
SOFTWARE TOOLS AND TECHNOLOGIES**

<b>Course Code</b>	<b>21AECCS384/484</b>	<b>Course type</b>	<b>AEC</b>	<b>Credits L-T-P</b>	<b>0 - 0 - 1</b>
<b>Hours/week: L - T- P</b>	0 - 0 - 2			<b>Total credits</b>	<b>1</b>
<b>Total Contact Hours</b>	15			<b>CIE Marks</b>	<b>50</b>
				<b>SEE Marks</b>	<b>50</b>

<b>Course learning objectives</b>	
1.	To make familiar with the modern tool usage
2.	To improve the verbal and written communication skills
3.	Explain the importance of problem solving and usage of various program design tools
4.	To get familiar with creation of professional accounts and usage of google drives

**Required Knowledge of : MS Office, programming knowledge**

<b>Unit – I</b>	<b>Contact Hours = 5 Hours</b>
<b>MS Word</b> - Quick styles, Template usage, Graphics use, Auto correction, Auto formatting, Translate documents, Compare documents, Document security, Set watermark, Report writing	
<b>MS PowerPoint</b> - Presentation skills	

<b>Unit – II</b>	<b>Contact Hours = 5 Hours</b>
<b>MS Excel</b> - Filling, Logical functions, Functions and formulae, Sort and filters, Charts, Shortcuts	
<b>MS Access</b> - Orientation to access, Working with table data, Querying a database	

<b>Unit – III</b>	<b>Contact Hours = 5 Hours</b>
<b>Building logic to improve programming skills</b> - Decision making and branching constructs, Looping statements	
<b>Introduction to LinkedIn, GitHub, Kaggle, Google form, Google classroom, Google sheet, usage of google drive</b>	

**List of Experiments**

<b>Unit No.</b>	<b>No. of Experiments</b>	<b>Topic(s) related to Experiment</b>
1	4	How to Create and Print Envelopes in Word
		How to Create a Contents Page in Word
		How to Mail Merge in Word
		How to Print Labels in Word
		Use the inbuilt functions in Microsoft Excel to calculate basic statistics from a list of data.
		Use MS Excel Pivot Tables to filter your data and generate statistics.

2	4	Use Microsoft Excel 2007 to create simple calculations those can be quickly copied to other cells.
		Use Tables in Microsoft Excel 2007 to filter large amounts of data to retrieve specific information.
3	2	Write a program using decision making and branching constructs
		Write a program using decision making and looping statements

Unit No.	Self-Study Topics
1	MS Word – Basics, MS PowerPoint - Basics
2	MS Excel – Basics, MS Access - Basics
3	Programming language - Basics

Books	
	<b>Text Books:</b>
1.	The Art of Computer Programming by Donald E. Knuth.
2.	How to Solve it by Computer by R. G. Dromey
	<b>E-resources (NPTEL/SWAYAM.. Any Other)- mention links</b>
1.	HackerEarth.com
2.	LeetCode.com

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs ( if present)		

Course Outcome (COs)					
<b>Learning Levels:</b>					
<b>Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create</b>					
At the end of the course, the student will be able to			<b>Learning Level</b>	<b>PO(s)</b>	<b>PSO(s)</b>
1.	Get acquainted with the modern tool usage		Re, Un	1, 5	1
2.	Improve the verbal and written communication skills		Re, Un	1, 12	2
3.	Familiar with the importance of problem solving and usage of various program design tools		Ap, Ev	2, 3	1
4.	Get familiar with creation of professional accounts and usage of google drives		Cr	1, 12	3

**Scheme of Continuous Internal Evaluation (CIE):**

**Phase 1 CIE – 25M**

**Phase 2 CIE – 25M**

**Total CIE 50 M**

<b>Scheme of Semester End Examination (SEE):</b>	
1.	It will be conducted for 50 marks of 2 hours' duration.
2.	<b>Split-up of marks</b> Write-up - 10M PPT - 15M Demonstration - 25M
2.	<b>Minimum marks required in SEE to pass: 20 out of 50</b>

<b>Rubrics:Levels</b>	<b>Target</b>
<b>1 (Low)</b>	60% of the students score Less than 50 % of the total marks.
<b>2 (Medium)</b>	60% of the students score 50 – 70 % of the total marks.
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<b>CO-PO Mapping (planned)</b>													<b>CO-PSO Mapping (planned)</b>		
<b>CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>
1	✓				✓								✓		
2	✓									✓		✓		✓	✓
3		✓	✓										✓		
4	✓					✓						✓			✓
<b>Tick mark the CO, PO and PSO mapping</b>															

**ABILITY ENHANCEMENT COURSE (AEC)  
MULTIMEDIA AND ANIMATION**

<b>Course Code</b>	<b>21AECCS385/485</b>	<b>Course type</b>	<b>AEC</b>	<b>Credits L-T-P</b>	<b>0 - 0- 1</b>
<b>Hours/week: L-T-P</b>	0 - 0 – 2			<b>Total credits</b>	<b>1</b>
<b>Total Contact Hours</b>	15			<b>CIE Marks</b>	<b>50</b>
				<b>SEE Marks</b>	<b>50</b>

<b>Course learning objectives</b>	
1.	To explore Multimedia features and applications.
2.	To apply various animation techniques to enhance visual effects of the image.

**Required Knowledge of :** Basics of Computers

<b>Unit – I</b>	<b>Contact Hours = 5 Hours</b>
<b>Introduction to multimedia systems</b> Multimedia Building blocks Text, Audio, Image, Animation, Video, Image Data Types. Multimedia Image and Graphics Resolution, Size and Compression, File formats. Multimedia Hardware Interfaces, I/O Devices, Storage, Communication Devices.	

<b>Unit – II</b>	<b>Contact Hours = 5 Hours</b>
<b>Animation</b> Fundamentals of Animation, Basic Principles of Animation. About Macromedia Flash and General overview - Stage and Work area of Flash, Scenes and Objects, Using frames and key frames, Working with time line. Using layers - to create a layer, to show or hide a layer or folder, to view the contents of the layer. Creating/Importing Object, Texturing, Lighting & Rendering, Adding Sound effects, Saving and Exporting.	

<b>Unit – III</b>	<b>Contact Hours = 5 Hours</b>
<b>Practice on Creation of Animations</b> Working with the timeline, using keyframes, blank keyframes and frames, Creating motion tweens, Creating shape tweens, Animation of one shape morphing into another, Masking. Practice on Basic Action Script Using Script Assist, Adding actions to a frame, Creating and using Button symbols.	

**List of Experiments**

<b>Unit No.</b>	<b>No. of Experiments</b>	<b>Topic(s) related to Experiment</b>
2	1	Animating Carrom striker using two or three layers
	2	Animate the ball to bounce twice and roll, adding sound effects.

	<b>3</b>	Importing object and animate the object using key frames.
3	<b>1</b>	Creating motion tweens
	<b>2</b>	Performing button action by writing script
	<b>3</b>	Masking

Unit No.	Self-Study Topics
1.	Significant features & Applications of multimedia systems.
2.	Installation and configuration of macromedia flash.
3.	Image and Text Masking.

Books	
	<b>Text Books:</b>
1.	The Animator's Survival Kit / Richard Williams
2.	Animation For Beginners / Morr Meroz
	<b>Reference Books:</b>
1.	The Illusion of Life / Frank Thomas and Ollie Johnston
	<b>E-resources (NPTEL/SWAYAM.. Any Other)- mention links</b>
1.	<a href="https://www.animatron.com/blog/12-basic-principles-of-animation/">https://www.animatron.com/blog/12-basic-principles-of-animation/</a>
2.	<a href="https://www.creativebloq.com/advice/understand-the-12-principles-of-animation">https://www.creativebloq.com/advice/understand-the-12-principles-of-animation</a>

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	Evaluation - I
2.	PPT and Videos	2.	Evaluation - II
3.	Practice session/Demonstrations in Labs	3.	Semester End Examination

Course Outcome (COs)					
Learning Levels: Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create					
At the end of the course, the student will be able to			Learning Level	PO(s)	PSO(s)
1.	<b>Identify</b> basic Multimedia features and applications.		1	1	1
2.	Animate geometrical objects by <b>applying</b> different animation principles.		3	1,3	2,3
3.	<b>Create</b> Graphics Animation and sound effect by using Flash.		4	1,3,5	2,3

#### Scheme of Continuous Internal Evaluation (CIE):

Phase 1 CIE – 25M

Phase 2 CIE – 25M

Total CIE 50 M

Scheme of Semester End Examination (SEE):	
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CO-PO Mapping (planned)													CO-PSO Mapping(planned)		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	✓												✓		
2	✓		✓											✓	✓
3	✓		✓		✓									✓	✓
Tick mark the CO, PO and PSO mapping															