

# **B.E. IN COMPUTER SCIENCE & ENGINEERING (AI&ML)**

SCHEME OF TEACHING AND EVALUATION 2022 OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS) (2022 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2023 - 24)

# III SEMESTER

					3)	Teac	hing H	[ours /	Week		Exan	nination	1	
Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	<b>Theory Lecture</b>	H Tutorial	Hractical / Drawing	& Self -Study	Duration in hours	CIA Marks	SEE Marks	Total Marks	Credits
1	BSC	MA322T1A	Linear Algebra and Statistics for Machine Learning	BSC	BSC	03	00	00	00	3	50	50	100	3
2	IPCC	AM322I2A	Digital Logic Design and Computer Organization	AIML	CSE	03	00	02	00	3	50	50	100	4
3	IPCC	CS322I3C	Object Oriented Programming Concepts	CSE and Allied	CSE	03	00	02	00	3	50	50	100	4
4	PCC	CS322T4C	Data Structures and Applications	CSE and Allied	CSE	03	00	00	00	3	50	50	100	3
5	PCCL	CS322L5C	Data Structures Laboratory with C	CSE and Allied	CSE	00	00	02	00	3	50	50	100	1
6	ESC/ETC/PLC	AM322T6Ax/ CS322T6Cx	(See table below)	CSE and Allied	CSE	03	00	00	00	3	50	50	100	3
7	UHV	HU32287X	UHV -1:Social Connect and Responsibilities	BSC	BSC	01	00	00	00	1	50	50	100	1
8	AEC / SEC	CS32298Cx	Ability Enhancement Course III / Skill Enhancement Course III	CSE and Allied	CSE	01	00	00	00	1	50	50	100	1
		N322N10X	National Service Scheme (NSS)	NSS	/							s to any		
9	MC	P322N10X	Physical Education (PE) (Sports and Athletics)	PED Yog	/	00	00	02	00	(as p	er the	be con choice 1 activi	of the	0
		Y322N10X	Yoga	10g	a						rried ou			
											400	400	800	20

ESC/ETC/PLC														
AM	AM322T6AA     Web Technology and its application     CS322T6CC     Unix Shell Programming													
CS	3322T6CB	Mobile Application Development         CS322T6CD         Ethical Hacking												
			ABILITY ENHANCEMENT COURSE III / SKI	ILL ENHA	ANCEME	NT C	OURS	E III						
CS	S32298CA	Data Analytics	using Excel	CS	532298CC		MERN	N						
CS	S32298CB	UI/UX Design		CS	532298CD		Comp	etitive P	rogran	nming	g using	C++		
		COURSE P	RESCRIBED TO LATERAL ENTRY DIPLOMA HOLD	ERS ADM	ITTED T(	) III S	EMES	TER B.F	E. PRO	GRA	MS			
1	1         Additional Mathematics I         BSC         BSC         02         00         01         3         50         50         100         0												0	
Note:	late: BSC: Basic Science Course IPCC: Integrated Professional Core Course PCC: Professional Core Course I aboratory AEC: Ability													

Note: BSC: Basic Science Course, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, PCCL: Professional Core Course, AEC: Ability Enhancement Courses. UHV: Universal Human Value Course, SEC: Skill Enhancement Course, ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course, MC: Mandatory Course

L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting Board.

**Integrated Professional Core Course (IPCC):** Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory part of the IPCC shall be evaluated both by CIA and SEE. The practical part shall be evaluated by only CIA (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

National Service Scheme (NSS)/ Physical Education (PE)/ Yoga: All the students have to register for any one of the courses namely NSS/ PE/ Yoga with the concerned coordinator of the course during the first week of the III semester. Activities shall be carried out between the III semester and VI semester (for Four Semesters). The events shall be appropriately scheduled and the same shall be reflected in the Institute Academic and Activity Calendar. The course will be evaluated only for the CIA marks and will not have SEE component. The students who successfully complete the registered course will be awarded with "PP" grade and the students not completing the same will be awarded with "NP" grade. The marks and the grade obtained by the student will be included in the SIXTH semester grade card. The course will not be considered for the SGPA and CGPA calculations and Vertical Progression, however, completion of the course is mandatory for the award of the Degree.

#### Non-Credit Mandatory Courses (NCMC):

#### (A) Additional Mathematics I:

- 1) This course is prescribed in the III semester to the to the lateral entry Diploma holders admitted to the second year of the B.E., programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Assessment (CIA). These courses are slated for both CIA and SEE.
- 2) Additional Mathematics I shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.
- 3) Successful completion of the courses Additional Mathematics I shall be indicated with Pass (PP) grade in the grade card. Non-completion of the courses will lead to the award of Not Pass (NP) Grade.
- 4) In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIA marks and 40% of the prescribed SEE marks, shall be deemed to have secured an NP grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s.

(B) National Service Scheme (NSS)/Physical Education (Sport and Athletics) (PED)/ Yoga:

- 1) Securing 40% or more in CIA, 40% or more marks in SEE and 40% or more in the sum total of CIA + SEE leads to successful completion of the registered course.
- 2) In case, students fail to secure 40 % marks in SEE, they have to appear for SEE during the subsequent examinations and obtain the minimum requirement.
- 3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum requirements as mentioned in (B).1, they shall be awarded with NP Grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s.
- 4) Successful completion of the course shall be indicated with a PP Grade in the grade card.
- 5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

# **BoS SPECIFIED NPTEL COURSES**

#### (APPLICABLE ONLY TO THE STUDENTS WHO FAIL IN A COURSE MORE THAN FOUR TIMES)

Course Code	Course Name	Alternative NPTEL Courses*
Α		
*subjected to ch	ange depending on the courses offered by the NPTEL	

Note:

• The student has to provide the evidences for registering to the course, assignment submission, attending the examination and the certificate provided by NPTEL indicating the clearance of the Course by the candidate.

• Only on submitting the valid documents, the student will be awarded with the credits mentioned against the course(s)



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### **IV SEMESTER**

					3)	Teac	hing H	lours /	Week		Exam	nination	1	
Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	Theory Lecture	H Tutorial	Hractical / Drawing	so Self -Study	Duration in hours	CIA Marks	SEE Marks	Total Marks	Credits
1	IPCC	AM422I1A	Principles of Artificial Intelligence	AIML/CSE (DS)	CSE	03	00	02	00	3	50	50	100	4
2	IPCC	AM422I2A	Computer Network and Its Applications	AIML	CSE	03	00	02	00	3	50	50	100	4
3	PCC	AM422T3A	Principles of Operating Systems	AIML	CSE	03	00	00	00	3	50	50	100	3
4	PCC	CS422T4C	Design and Analysis of Algorithms	CSE and Allied	CSE	03	00	00	00	3	50	50	100	3
5	PCCL	CS422L5C	Design and Analysis of Algorithms Laboratory	CSE and Allied	CSE	00	00	02	00	3	50	50	100	1
6	ESC/ETC/PLC	MA422T6Ax/ MA422T6Cx	Mathematics Course specific to the program	BSC	BSC	03	00	00	00	3	50	50	100	3
7	AEC / SEC	CS42297Cx/ AM42297Ax	Ability Enhancement Course IV / Skill Enhancement Course IV	CSE and Allied	CSE	01	00	00	00	1	50	50	100	1
8	BSC	HI422T8X	Biology for Engineers	BSC	BSC	02	00	00	00	2	50	50	100	2
9	UHV	HU42289X	UHV -2: Understanding Harmony and Ethical Human Conduct	BSC	BSC	01	00	00	00	1	50	50	100	1
		N322N10X	National Service Scheme (NSS)	NSS	/					Activ	rition to	be carr	iad out	
10	MC	P322N10X	Physical Education (PE) (Sports and Athletics)	PED Yoga	/	00	00	02	00	by 1		udent i		0
		Y322N10X	Yoga	1050						legis		Juise		
											450	450	900	22

		ESC/ETC/I	PLC									
MA4	22T6AA	Mathematics for AIML	MA4	422T6C0	2	Optimization '	Techı	niques				
MA4	22T6CB	Regression Statistical Computing	MA4	422T6CI	)	Metric Space	S					
		ABILITY ENHANCEMENT COURSE IV / SI	ILL ENHANCEMENT COURSE									
CS42	2297CA	GitHub : AI-Powered Developer Platform	CS4	2297CC		Data Visualiz	zation	n using l	R			
CS42	2297CB	Dev Ops	AM4	AM42297AD			Struc	ctures an	nd Algo	orithms		
COURSE PRESCRIBED TO LATERAL ENTRY DIPLOMA HOLDERS ADMITTED TO III SEMESTER B.E. PROGRAMS												
1		Additional Mathematics II	BSC	BSC	02	00 00	01	1 3	50	50	100	0
L – Lect PSB: Pa	ture, <b>T</b> – Tu per Setting I											
		onal Core Course (IPCC): Refers to Professional Theory Core Course		with Pra	ctical (	or the same c		e crear	t for if	τι car	1 be 04 a	naus
evaluated	d by only CL	hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory p (A (no SEE). However, questions from the practical part of IPCC shall be cheme (NSS)/ Physical Education (PE)/ Yoga: All the students have	ncluded in the	e SEE qu	estion	uated both by paper.	V CIA	A and SE	EE. The	e practic	•	all be
evaluated National coordinat appropria compone grade. Th	d by only CL I Service So tor of the co ately schedui ent. The stud ne marks and		ncluded in the to register for at between the Calendar. The th "PP" grade r grade card. 7	e SEE qu r any or e III sem e course v e and the	estion the of the ester and will be studen	uated both by paper. ne courses na nd VI semeste evaluated only nts not complete	r CIA mely or (for y for eting	A and SE NSS/ I r Four S the CIA ; the sam	EE. The PE/ Yog emester marks ne will	ga with rs). The and wil be awar	the con- events sl l not hav ded with	all be erned all be e SEE "NP"
evaluated National coordina: appropria compone grade. Th and Verti	d by only CL I Service So tor of the co ately schedul ent. The stud he marks and ical Progress	A (no SEE). However, questions from the practical part of IPCC shall be <b>cheme (NSS)/ Physical Education (PE)/ Yoga:</b> All the students have burse during the first week of the III semester. Activities shall be carried o led and the same shall be reflected in the Institute Academic and Activity dents who successfully complete the registered course will be awarded w d the grade obtained by the student will be included in the SIXTH semester.	ncluded in the to register for at between the Calendar. The th "PP" grade r grade card. 7	e SEE qu r any or e III sem e course v e and the	estion the of the ester and will be studen	uated both by paper. ne courses na nd VI semeste evaluated only nts not complete	r CIA mely or (for y for eting	A and SE NSS/ I r Four S the CIA ; the sam	EE. The PE/ Yog emester marks ne will	ga with rs). The and wil be awar	the con- events sl l not hav ded with	all be erned all be e SEE "NP"
evaluated National coordinaa appropria compone grade. Th and Verti	d by only CL I Service So tor of the co ately schedul ent. The stud he marks and ical Progress	A (no SEE). However, questions from the practical part of IPCC shall be cheme (NSS)/ Physical Education (PE)/ Yoga: All the students have burse during the first week of the III semester. Activities shall be carried o led and the same shall be reflected in the Institute Academic and Activity dents who successfully complete the registered course will be awarded w d the grade obtained by the student will be included in the SIXTH semester sion, however, completion of the course is mandatory for the award of the I tory Courses (NCMC):	ncluded in the to register for at between the Calendar. The th "PP" grade r grade card. 7	e SEE qu r any or e III sem e course v e and the	estion the of the ester and will be studen	uated both by paper. ne courses na nd VI semeste evaluated only nts not complete	r CIA mely or (for y for eting	A and SE NSS/ I r Four S the CIA ; the sam	EE. The PE/ Yog emester marks ne will	ga with rs). The and wil be awar	the con- events sl l not hav ded with	all be erned all be e SEE "NP"
evaluated National coordina: appropria compone grade. Th and Verti Non–Cro (A) Addi	d by only CL I Service So tor of the co ately schedu ent. The stud he marks and ical Progress edit Manda itional Math This cours	A (no SEE). However, questions from the practical part of IPCC shall be cheme (NSS)/ Physical Education (PE)/ Yoga: All the students have burse during the first week of the III semester. Activities shall be carried o led and the same shall be reflected in the Institute Academic and Activity dents who successfully complete the registered course will be awarded w d the grade obtained by the student will be included in the SIXTH semester sion, however, completion of the course is mandatory for the award of the I story Courses (NCMC): hematics I: se is prescribed in the III semester to the to the lateral entry Diploma hold e respective semesters to complete all the formalities of the course and	ncluded in the to register for at between the Calendar. The th "PP" grade r grade card. " Degree.	e SEE qu r any or e III sem e course v e and the The cours to the se	estion period the of the ester and will be estudent rise will cond ye	uated both by paper. ne courses na nd VI semeste evaluated only nts not comple not be consid	v CIA mely er (for y for eting lered	A and SE r NSS/ I r Four S the CIA the sam for the S	EE. The PE/ Yog emester marks ne will SGPA a They s	ga with ga with rs). The and wil be awar and CGH	the con- events sl l not hav ded with PA calcul	all be erned all be e SEE "NP" ations
evaluated National coordina: appropria compone grade. Th and Verti Non–Cro (A) Addi	d by only CL I Service So tor of the co ately schedul ent. The stud he marks and ical Progress edit Mandat itional Math This cours during the both CIA a Additional	A (no SEE). However, questions from the practical part of IPCC shall be cheme (NSS)/ Physical Education (PE)/ Yoga: All the students have burse during the first week of the III semester. Activities shall be carried o led and the same shall be reflected in the Institute Academic and Activity dents who successfully complete the registered course will be awarded w d the grade obtained by the student will be included in the SIXTH semester sion, however, completion of the course is mandatory for the award of the I story Courses (NCMC): hematics I: se is prescribed in the III semester to the to the lateral entry Diploma hold e respective semesters to complete all the formalities of the course and	ncluded in the to register for at between the Calendar. The th "PP" grade r grade card. 7 Degree.	e SEE qu r any or e III sem e course v e and the The course to the se to the se	estion period of the ester and will be estudent	uated both by paper. he courses na nd VI semeste evaluated only not sonot comple not be consid ear of the B.E nternal Asses	CIA mely er (for y for eting lered	A and SE NSS/ I r Four S the CIA the sam for the S ograms.	EE. The PE/ Yog emester marks ne will SGPA a They s	ga with rs). The and wil be awar and CGI hall atte	the con- events sl l not hav ded with PA calcul end the c s are slat	all be erned all be e SEE "NP" ations lasses ed for
evaluated National coordina: appropria compone grade. Th and Verti Non–Cro (A) Addi 1)	d by only CL I Service So tor of the co ately schedul ent. The stud he marks and ical Progress edit Mandat itional Math This cours during the both CIA a Additional mandatory Successful	A (no SEE). However, questions from the practical part of IPCC shall be cheme (NSS)/ Physical Education (PE)/ Yoga: All the students have burse during the first week of the III semester. Activities shall be carried o led and the same shall be reflected in the Institute Academic and Activity dents who successfully complete the registered course will be awarded w d the grade obtained by the student will be included in the SIXTH semester sion, however, completion of the course is mandatory for the award of the I tory Courses (NCMC): hematics I: se is prescribed in the III semester to the to the lateral entry Diploma hole e respective semesters to complete all the formalities of the course and and SEE. 1 Mathematics I shall not be considered for vertical progression as well	ncluded in the to register for at between the Calendar. The th "PP" grade r grade card. " Degree. lers admitted to appear for th as for the cal	e SEE qu r any or e III sem e course v e and the The court to the se ne Contin Iculation	estion period of the ester and will be estudent estudente estudent estudent estudent estudent estudent estudent	uated both by paper. The courses na ad VI semeste evaluated only this not comple not be consid ear of the B.E nternal Asses PA and CGP	CIA mely er (for y for eting lered E., pro ssmen PA, bu	A and SE NSS/ H r Four S the CIA the Sam for the S ograms. nt (CIA) ut comp	E. The PE/ Yog emester marks ne will SGPA a They s . These oletion o	a practic ga with rs). The and wil be awar and CGH hall atte	the con- events sl l not hav ded with PA calcul end the c s are slat	all be erned all be e SEE "NP" ations lasses ed for all be

National Service Scheme (NSS)/Physical Education (Sport and Athletics) (PED)/ Yoga:

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- 2) In case, students fail to secure 40 % marks in SEE, they have to appear for SEE during the subsequent examinations and obtain the minimum requirement.
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# **BoS SPECIFIED NPTEL COURSES**

#### (APPLICABLE ONLY TO THE STUDENTS WHO FAIL IN A COURSE MORE THAN FOUR TIMES)

Course Code	Course Name	Alternative NPTEL Courses*
А		
*subjected to ch	ange depending on the courses offered by the NPTEL	

Note:

- The student has to provide the evidences for registering to the course, assignment submission, attending the examination and the certificate provided by NPTEL indicating the clearance of the Course by the candidate.
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# V SEMESTER

					3)	Teac	hing H	lours /	Week		Exan	ination	l	
Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	ー Theory Lecture	H Tutorial	Hractical / Drawing	& Self -Study	Duration in hours	CIA Marks	SEE Marks	Total Marks	Credits
1	IPCC	AM522I1A	Machine Learning	AIML	CSE	03	00	02	00	3	50	50	100	4
2	IPCC	AM522I2A	Advanced RISC Machines	AIML	CSE	03	00	02	00	3	50	50	100	4
3	PCC	CS522T3C	Automata Theory and Computability	CSE and Allied	CSE	03	00	00	00	3	50	50	100	3
4	PCC	CS522T4C	Database Management Systems	CSE and Allied	CSE	03	00	00	00	3	50	50	100	3
5	PCCL	CS522L5C	Database Management Systems Laboratory	CSE and Allied	CSE	00	00	02	00	3	50	50	100	1
6	PEC	AM52216Ax	Professional Elective I	AIML	CSE	03	00	00	00	3	50	50	100	3
7	PROJ	AM522P7A	Mini-Project Work	AIML	CSE	00	00	04	00	3	50		50	2
8	AEC	AM52298A	Research Methodology and IPR	AIML	CSE	01	00	00	00	1	50	50	100	1
9	MC	AM522T9A	Environmental Studies	BSC	BSC	01	00	00	00	1	50	50	100	1
		N322N10X	National Service Scheme (NSS)	NSS	/					A _4:-		1		
10	MC	P322N10X	Physical Education (PE) (Sports and Athletics)	NSS / PED /		00	00	02	00	by 1	the stu	be carr ident i		0
		Y322N10X	Yoga	Yoga						regist	tered co	ourse		
											450	400	850	22

#### **PROFESSIONAL ELECTIVE COURSES**

AM52216AA	Distributed Computing	AM52216AC	Industrial Internet of Things
AM52216AB	Data Mining and Data Warehousing	AM52216AD	Social Network Analysis

Note: HSMC: Humanities Science & Management Course, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, PCCL: Professional Core Course, Laboratory, AEC: Ability Enhancement Courses, PEC: Professional Elective Course, MC: Mandatory Course, PROJ: Project Work

L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting Board.

**Integrated Professional Core Course (IPCC):** Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory part of the IPCC shall be evaluated both by CIA and SEE. The practical part shall be evaluated by only CIA (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

National Service Scheme (NSS)/ Physical Education (PE)/ Yoga: All the students have to register for any one of the courses namely NSS/ PE/ Yoga with the concerned coordinator of the course during the first week of the III semester. Activities shall be carried out between the III semester and VI semester (for Four Semesters). The events shall be appropriately scheduled and the same shall be reflected in the Institute Academic and Activity Calendar. The course will be evaluated only for the CIA marks and will not have SEE component. The students who successfully complete the registered course will be awarded with "PP" grade and the students not completing the same will be awarded with "NP" grade. The marks and the grade obtained by the student will be included in the SIXTH semester grade card. The course will not be considered for the SGPA and CGPA calculations and Vertical Progression, however, completion of the course is mandatory for the award of the Degree.

#### Non-Credit Mandatory Courses (NCMC):

National Service Scheme (NSS)/Physical Education (Sport and Athletics) (PED)/ Yoga:

- 1) Securing 40% or more in CIA, 40% or more marks in SEE and 40% or more in the sum total of CIA + SEE leads to successful completion of the registered course.
- 2) In case, students fail to secure 40 % marks in SEE, they have to appear for SEE during the subsequent examinations and obtain the minimum requirement.
- 3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum requirements as mentioned in (B).1, they shall be awarded with NP Grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s.
- 4) Successful completion of the course shall be indicated with a PP Grade in the grade card.
- 5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.



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# VI SEMESTER

					3)	Teac	hing H	lours / V	Veek		Exan	nination	l	
Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	Theory Lecture	H Tutorial	Hractical / Drawing	🕫 Self -Study	<b>Duration in hours</b>	CIA Marks	SEE Marks	<b>Fotal Marks</b>	Credits
1	HSMC	CS622T1C	Software Engineering and Project Management	CSE and Allied	CSE	03	00	00	00	3	50	50	100	3
2	IPCC	AM622I2A	Computer Vision and Applications	AIML	CSE	03	00	02	00	3	50	50	100	4
3	PCC	AM622T3A	Advanced AI and ML	AIML	CSE	03	00	00	00	3	50	50	100	3
4	PEC	AM62214Ax	Professional Elective Course	AIML	CSE	03	00	00	00	3	50	50	100	3
5	OEC	AM62225Xx	Open Elective Course	AIML	CSE	03	00	00	00	3	50	50	100	3
6	PROJ	AM622P6A	Project Work Phase I	AIML	CSE	00	00	08	00	3	100		100	4
7	PCCL	AM622L7A	Advanced AI and ML Laboratory	AIML	CSE	00	00	02	00	3	50	50	100	1
8	AEC / SEC	AM62299Ax	Ability Enhancement Course V / Skill Enhancement Course V	AIML	CSE	01	00	00	00	1	50	50	100	1
		N322N10X	National Service Scheme (NSS)		ed during	the int	erveni	no nerio	d of II	Land				
9	MC	P322N10X	Physical Education (PE) (Sports and Athletics)	<ul> <li>Completed during the intervening period of III and</li> <li>VI Semester</li> </ul>					1 4114	50		50	0	
		Y322N10X	Yoga											
														22

ABILITY ENHANCEMENT COURSE V/ SKILL ENHANCEMENT COURSE V											
AM62299AA	3-D Animation using Blender	AM62299AC	Algorithmic Game Theory								
AM62299AB	Docker	AM62299AD	Network Security								
	PROFESSIONAL ELECT	IVE COURSE									
AM62214AA	Augmented Reality and Virtual Reality	AM62214AC	Cloud Computing and Applications								
AM62214AB	NO SQL Database	AM62214AD	Data Science and Big Data Analytics								
	OPEN ELECTIVE O	COURSE									
AM62225XA	Introduction to Data Structures	Mobile Application Development									
AM62225XB	Introduction of AI	AM62225XD	Fundamentals of Operating Systems								

Note: BSC: Basic Science Course, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, PCCL: Professional Core Course Laboratory, AEC: Ability Enhancement Courses. UHV: Universal Human Value Course, SEC: Skill Enhancement Course, ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course

L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting Board.

**Integrated Professional Core Course (IPCC):** Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory part of the IPCC shall be evaluated both by CIA and SEE. The practical part shall be evaluated by only CIA (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

**Professional Elective Course (PEC):** A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

**Open Elective Courses (OEC):** Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor.

Selection of an Open Elective shall not be allowed if,

- i. The candidate has studied the same course during the previous semesters of the program.
- ii. The syllabus content of open electives is similar to that of the Departmental core courses or Professional Elective courses.
- iii. A similar course, under any category, is prescribed in the higher semesters of the program.
- iv. In case, if any department is interested in offering courses from streams such as Law, Business (MBA), Medicine, Arts, Commerce etc. need to get the necessary approval from the respective Board of Studies and the Academic Council.
- v. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.

Non-Credit Mandatory Courses (NCMC):

#### National Service Scheme/Physical Education (Sport and Athletics)/ Yoga:

- 1) Securing 40% or more in CIA, 40% or more marks in SEE and 40% or more in the sum total of CIA + SEE leads to successful completion of the registered course.
- 2) In case, students fail to secure 40 % marks in SEE, they have to appear for SEE during the subsequent examinations and obtain the minimum requirement.
- 3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum requirements as mentioned in (B).1, they shall be awarded with NP Grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s.
- 4) Successful completion of the course shall be indicated with a PP Grade in the grade card.
- 5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

**Project Work Phase I:** Students have to discuss with their mentors/guides and with their help has to complete the Literature Review, define the problem statement for the Project Work, and submit appropriate report. The guidelines and the evaluation process will be defined by the Board of Studies in line with the requirements of VTU and approved by the Academic Council of SCEM.



# **B.E. IN COMPUTER SCIENCE & ENGINEERING (AI&ML)**

SCHEME OF TEACHING AND EVALUATION 2022 OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS) (2022 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2025 - 26)

#### VII SEMESTER

			VII SENIESI											
					3)	Teac	ching H	lours /	Week		Exan	ination	l	
Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	Theory Lecture	H Tutorial	Hractical / Drawing	🕫 Self -Study	Duration in hours	CIA Marks	SEE Marks	Total Marks	Credits
1	IPCC	AM722I1A	Natural Language Processing	AIML	CSE	03	00	02	00	3	50	50	100	4
2	PCC	AM722T2A	Neural Networks and Deep Learning	AIML	CSE	03	00	00	00	3	50	50	100	3
3	PEC	AM72213Ax	Professional Elective Course	AIML	CSE	03	00	00	00	3	50	50	100	3
4	OEC	AM72224Ax	Open Elective Course	AIML	CSE	03	00	00	00	3	50	50	100	3
5	PCCL	AM722L5A	Neural Networks and Deep Learning Laboratory	AIML	CSE	00	00	02	00	3	50	50	100	1
6	PROJ	AM722P6A	Project Work Phase II	AIML	CSE	00	00	16	00	03	100	100	200	8
														22
			PROFESSIONAL ELECT	TIVE COU	RSE									
A	M72213A	Block Chain Te	echnology	AM72213C Robotic Process Automation										
A	M72213B	Business Intelli	gence	AM72213D Pattern Recognition										
			<b>OPEN ELECTIVE</b>	CTIVE COURSE										
AN	/172224AA	Introduction to	Machine Learning	AM72224AC Introduction to Data Science										
AN	//72224AB	Introduction to	Bigdata	AM72224AD Python Data Structures										

Note: PCC: Professional Core Course, PEC-Professional Elective Course. OEC: Open Elective Course, PROJ: Project Work

L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting department.

**Professional Elective Course (PEC):** A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

**Open Elective Courses (OEC):** Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor.

Selection of an Open Elective shall not be allowed if,

- i. The candidate has studied the same course during the previous semesters of the program.
- ii. The syllabus content of open electives is similar to that of the Departmental core courses or Professional Elective courses.
- iii. A similar course, under any category, is prescribed in the higher semesters of the program.
- iv. In case, if any department is interested in offering courses from streams such as Law, Business (MBA), Medicine, Arts, Commerce etc. need to get the necessary approval from the respective Board of Studies and the Academic Council.
- v. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.

#### **Project Work:**

The objective of the Project Work is to

- i. Encourage independent learning and the innovative attitude of the students
- ii. Develop interactive attitude, communication skills, Organization, Time Management and Presentation Skills.
- iii. Impart Flexibility and Adaptability
- iv. Inspire Team working
- v. Expand Intellectual capacity, credibility, judgement and intuition
- vi. Adhere to Punctuality, setting and meeting deadlines
- vii. Install responsibilities to oneself and others
- viii. Train students to present the topic of Project work without any fear, face the audience confidently, enhance communication skills, involve in group discussions to present and exchange ideas.

The CIA and SEE evaluation procedure for the Project work will be as provided by the Board of Studies in line with VTU Regulations and approved by the Academic Council of



# **B.E. IN COMPUTER SCIENCE & ENGINEERING (AI&ML)**

SCHEME OF TEACHING AND EVALUATION 2022 OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS) (2022 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2025 – 26)

#### VIII SEMESTER

	1			1									
				Teac	hing H	lours /	Week		Exan	ination	1		
SI. No.	Course	Course Code	Course Title	TeachingDepartment(TD)andQuestionPaperSettingBoard (PSB)	Theory Lecture	Tutorial	Practical / Drawing	Self -Study	ration in hours	A Marks	E Marks	Total Marks	Credits
					L	Т	Р	S	Du	CIA	SEE	Tot	Cro
1	INT	AM82231A	Internship (14-20 Weeks) [Research Internship/ Rural Internship/ Industry Internship]	AIML	00	00	20	00	3	100	100	200	10
2	SEM	AM822S2A	Research oriented Technical Seminar	AIML	00	00	04	00	3	100		100	2
													12
Note: I	NT. Internship												

Note: INT: Internship

L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting department.

#### Research Internship/Industry Internship/Rural Internship

- Research Internship: This is intended to offer the flavor of current research happening in the Research fields. It helps students to get familiarize with the field and imparts the skill required for carrying out research.
- Industry Internship: An extended period of work experience undertaken by the students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate the organizations, perspectives and cultures. Dealing with contingencies helps the students recognize, appreciate and adapt to the organizational realities by tempering their knowledge with practical constraints.
- Rural Internship: A long term goal, as proposed under the AICTE rural internship programme, shall be counted as rural internship activity.
- The student may take up Interdisciplinary Research Internship or Industry Internship.
- The Faculty Mentor need to monitor the student's internship progress and interact with them to guide them for the successful completion of the internship requirements
- The students are permitted to carry out internship anywhere in India or Abroad. However, the institute will not bear any expenses incurred with respect to the internship.

**Research Oriented Technical Seminar:** In order to make the student aware of the technological and research application in various domains of the society, a comprehensive presentation need to be provided with all the supporting evidences for the claims in the presentation.

- The objective of the Technical Seminar is to inculcate self-learning, present the seminar topic confidently, enhance communication skill, involve in group discussion for exchange of ideas.
- Each student, under the guidance of a Faculty, shall choose a topic, preferably a recent topic in their interested specializations.
- The student has to
  - i. Carry out a detailed Literature survey, systematically organize the content
  - ii. Prepare the report as per their own intuition, without cut-paste activities.
  - iii. Use tools for writing equations, drawings etc. and gain proficiency of the tools used.
  - iv. Present the topics effectively through appropriate digital media.
  - v. Answer the queries posed and involve in healthy debates/discussions
  - vi. Submit a report in an error-free and professional way
  - vii. Present the findings of the seminar in the reputed Conferences/Journals for possible publications (desirable).

The evaluation procedure for the Research oriented Technical Seminar will be as provided by the Board of Studies and approved by the Academic Council of SCEM.



LINEAR ALGEBRA AND ST	CATISTICS FO	R MACHINE LEARNING									
(Effective from the Academic Year 2023 - 2024)											
II	III SEMESTER										
Course Code	MA322T1A	CIA Marks	50								
Number of Contact Hours/Week (L:T:P:S)	3:0:0:1	SEE Marks	50								
Total Hours of Pedagogy40 LExam Hours3 Hours											
	CREDITS – 3										

## **COURSE PREREQUISITES:**

Basics of Linear algebra and Statistics.

# **COURSE OBJECTIVES:**

- Enable the students to understand the advance concepts of linear algebra
- Understand the concept of probability and enable the students to predict the outcome of simple experiments
- Enable the students to use various tests of significance in engineering problems

# **TEACHING - LEARNING STRATEGY:**

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

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses

# COURSE CONTENTS

# MODULE - I

Linear Algebra: Vector spaces, Linear independence and dependence of vectors, Basis and dimension,<br/>Singular Values, Singular vector, Singular value decomposition.LU decomposition Introduction, Cholesky<br/>decomposition. Applications of Linear Algebra8 Hours

MODULE - II	
Probability Distribution Functions: Random variables (discrete and continuous), Probability mass/density	8 Hours
functions, Binomial, Poisson distributions-problems. Exponential and Normal distributions-problems.	
MODULE - III	
Curve Fitting: Curve fitting by the method of least squares- fitting the curves of the form	8 Hours
y = ax + b, $y = axb$ , and $y = ax2 + bx + c$ .	0 110 115
Correlation-Karl Pearson's coefficient of correlation regression analysis-lines of regression.	
MODULE - IV	
Sampling and Testing Hypothesis: Null hypothesis, Alternate hypothesis, Type-1 &II error, -Only	8 Hours
Definitions.	0 110015
Test of significance for small samples: student's t-distribution, Chi-square distribution as a test of	
goodness of fit. Test of significance for large samples – Test of hypothesis for proportions and means.	
	1

#### MODULE – V

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SAHYADRI	

Stochas Process. function	Estim				•		ic matr		nsition F		•			8 H	ours
						COUR			MES						
Upon c CO No.	omple	etion of	f this co	ourse, ti		ents wil rse Out			otion					Bloom's Taxonomy Level	
CO1	Appl	y conce	pts of L	linear al	gebra to	solve re	lated p	roblems	of Machi	ne lear	ning			CL3	
CO2		Utilize Discrete and Continuous random variables and Probability distribution functions to analyze the probability models in engineering field										is to	CL	3	
CO3		pute co tical da		n coeffi	cient ar	nd Lines	of re	gression	to fit a	ı Math	ematical	l model	for	CL	3
CO4	popu	lation.	-						Samplin	-				CL	3
CO5			nced esti probabil		tems.			-	stochast	ic proce	esses, de	emonstra	ating	CL	3
CO No.	CO-PO-PSO MAPPING Programme Outcomes (PO)										rogramme Specific Outcome (PSO)				
	1	2	3	4	5	6	7	8	9	10	11	12	1	$\frac{130}{2}$	3
CO1	3								1			1			
CO2	2	3	1	1		1				1		1			ļ
<u>CO3</u>	2	3	1	1	1				1			1			<b></b>
CO4 CO5	22	3	1	1					1	1		1			
			 l (High		2	: Mode	rate ()	Mediur		1	1	1 : <b>Poor</b>		v)	
method						Students	learni	ing will	TEGY be asse		sing Di	rect an			
<u>No.</u>		tinuot			sessme			100	0				50		
		ntinuo		mal Ev	aluatior	n (CIE)		60	%				30		
2		<u> </u>	ments	amina	tion (S	EE)		40 <b>100</b>					20 50		
4	Sell			annia		LE) ASSESS	MEN			<u> </u>		•	50		
	С	ontinu	Inte In	ternal		ment (C			11110	So	mester	· End F	Tyam	(SEE)	
Contin						(60%)		Assign	ment/ s (40%)	(5	0%)		JAUIII		
]	[		II		Ι	II									
		Sylla	bus Co	overage	9		Syl	labus (	Coverag	ge	Sy	llabus	Cove	erage	
	%		30%		30	)%		100					0%		
•	ЛТ	1					1	٦.7	т						

MI

MI

MI



MII	MII		MII	MII
	MIII		MIII	MIII
		MIV	MIV	MIV
		MV	MV	MV

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

#### ASSIGNMENT TYPES WITH WEIGHTAGES

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

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

#### **SEE QUESTION PAPER PATTERN:**

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

# TEXT BOOKS:

- 1. V.K Kapoor and S.C Gupta "Mathematical Statistics" 11th edition, S. Chand Publications
- 2. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- 3. C Ray Wylie, Louis C Barrett: "Advanced Engineering Mathematics", 6th Edition,
- 4. B.V Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill,
- 5. Dr. K. Chandrashekar: " Complex analysis, Probability and Statistical Methods" Sudha Publications, 2021

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

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



DIGITAL LOGIC DESIG				
	m the Academic Year III SEMESTER	2023 - 2024)		
Course Code	AM322I2A	CIA Marks	50	
Number of Contact Hours/Week (L: T: P: S)	3:0:2:0	SEE Marks	50	
Total Hours of Pedagogy	40L + 20P	Exam Hours	03	
	CREDITS – 4			
COURSE PREREQUISITES:				
• Basic logic design principles and various fur	nction of digital com	puter.		
COURSE OBJECTIVES:				
This course will enable students to:				
This course will chable students to.				
• Illustrate combinational digital circuit	ts.			
• Demonstrate the use of flipflops and a	apply for registers			
• Explain the basic sub systems of a con				
• Describe memory hierarchy and conce	1	•		
• Describe arithmetic and logical operation				
• Demonstrate different ways of comm	U			
Illustrate organization of a simple property of a simple provide the second secon	ocessor and other	computing systems using instruct	tion level	
parallelism. TEACHING - LEARNING STRATEGY:				
Following are some sample strategies that can be	incorporate for the	Course Delivery		
• Chalk and Talk Method/Blended Mode Me				
• Power Point Presentation				
• Expert Talk/Webinar/Seminar				
Video Streaming/Self-Study/Simulations				
• Peer-to-Peer Activities				
<ul> <li>Activity/Problem Based Learning</li> </ul>				
• Case Studies				
<ul> <li>MOOC/NPTEL Courses</li> </ul>				
• Any other innovative initiatives with respe				
CO	URSE CONTEN	18		
Combinational Logic design: Karnaugh Map,	MODULE - I	complete and incomplete Roolean	0	
		• •	8 Hours	
expressions using K-Map, Multiplexers, Three sta	lie duffers, Decoders	s and Encoders, Programmable Logic		
devices.				
	MODULE - II		[	
Sequential Logic Design: Flip-Flops and its App	olications: Master S	ave Flip-Flops, Edge-Triggered Flip-	8 Hours	
Flops, Registers, Counters, Design of Synchronous	Counters.			
	MODULE - III			
Basic Structure of Computers: Basic Operation	nal Concepts, Bus	Structures, Performance – Processor	8 Hours	
Clock, Basic Performance Equation, Clock Rate, Pe				
Memory System: Basic Concepts, Semiconductor	RAM Memories, R	ead Only Memories, Speed, Size, and		
Cost, Cache Memories – Mapping Functions, Repla				
		renormance considerations.		

# **MODULE - IV**

	SAHYADRI SAHYADRI SAHYADRI SAHYADRI SAHYADRI SAHYADRI SAHYADRI SAHYADRI SAHYADRI SAHYADRI SAHYADRI An Autonomous Institution MANGALURU		
Arithm	etic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed	Number	<sup>rs,</sup> 8 Hours
Design	of Fast Adders, Multiplication of Positive Numbers.		0 110 01 5
-	Putput Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Direct	t Memo	ry
Access,	Buses, Interface Circuits.		
Rocia D	<b>MODULE - V</b> <b>Processing Unit</b> : Some Fundamental Concepts, Execution of a Complete Instruction, H	lord wir	ad a
	Micro programmed Control.	laru-witt	ed 8 Hours
	e Instructions and Addressing Modes: Memory Location and Addresses, Instruction on Sequencing, Addressing Modes.	tions ar	ıd
	COURSE OUTCOMES		I
Upon co	ompletion of this course, the students will be able to:		
CO No.	Course Outcome Description		Bloom's Taxonomy Level
CO1	Utilize the concepts of combinational logic design principles for the given pr statement and design digital circuits		CL4
CO2	Utilize the understanding/concepts of sequential logic design principles for the given present statement and design digital circuits	roblem	CL4
CO3	Understanding the concepts of computer modules and construct memory subsystem		CL4
CO4 CO5	Create the model of ALU and gain the basic knowledge on I/O		CL4 CL3
0.05	Explain the functions of basic processing unit and the instructions associated with it. LABORATORY COMPONENTS		
	LADORATORI COMI UNENIS	<u> </u>	Bloom's
Exp. No.	Experiment Description	CO No.	Taxonomy Level
1.	Design and implement Half adder, Half subtractor, Full adder and Full Subtractor using basic gates.	CO1	CL4
2.	Given a 4-variable logic expression, simplify it using appropriate technique and realize the simplified logic expression using 8:1 multiplexer IC.	CO1	CL4
3.	Design and implement code converter I) Binary to Gray (II) Gray to Binary Code.	CO1	CL4
4.	Design and implement a mod-n (n<8) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working.	CO2	CL4
5.	Design and implement an asynchronous counter using decade counter IC to count up from 0 to n (n<=9) and demonstrate on 7-segment display.	CO2	CL4
6.	Synthesis of Combinational Multipliers to multiply two 4-bit binary numbers.	CO3	CL4
7.	Design and simulate Booth's Multiplier to multiply two signed integers.	CO4	CL4
8.	Design and realization of 16-bit ALU (Arithmetic Logic Unit).	CO4	CL4
9.	Design and simulate 4x4 RAM.	CO5	CL4
	CO-PO-PSO MAPPING		
CO No.	Programme Outcomes (PO)		rogramme Specific Outcome (PSO)
	1 2 3 4 5 6 7 8 9 10 11 12	: 1	· · · ·



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							MANGALORO					
CO1	3	3	3	2	2			1	1			
CO2	3	3	3	2	2			1	1 1			
CO3	3	3	2	1	2			1	1			
CO4	3	3	2	1	2			1	1			
CO5	3	3	2	1	2			1	1 1 1			
3	: Subs	tantial	(High)			2: Modera	ate (Medium)		1: Poor (L	.0W)		
Assessm	nent wi	ll be bot	h CIA ar	nd SEE.			ENT STRATEGY	Direct and	l Indirect meth	ods:		
Sl. No.			sessmen			•	Weightage (%)	Max. Marks				
1			Internal				100 %	50				
	Continuous Internal Evaluat Practical Session (Laborator						60 %	30				
-					-	-	40 %		20			
2	Seme	ester En	d Exam	ination	(SEE)		100 %		50			
			Con	tinuou			SMENT MAPPING	Samo	stor Fnd Fvo	m (SEE) (50%)		
							. , , , ,	Seme	ster Enu Exa	III (SEE) (50%)		
				ntinuo		ernal (60%)	Practical Sessions (40%)					
Course	e Outc	omes	I	I		III						
			_	vllabus	-		Syllabus Coverage		Syllabus C	overage		
			40%	30		30%	100%		1009	0		
	CO1		Х				Х		Х			
	CO2		Х	X			Х		Х			
	CO3			Х	1		Х		Х			
	CO4					X	Х		Х			
	CO5					Х	Х		Х			
NOTE				•								

# NOTE

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

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

# SEE QUESTION PAPER PATTERN:

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

# **TEXT BOOKS:**

- 1. Charles H Roth and Larry L Kinney, Analog and Digital Electronics, Cengage Learning, 2019. (Chapters: 5, 9, 11, 12)
- 2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002.(Chapters: 1, 2, 4, 5, 6, 7)
- 3. Digital Principles and Design, Donald D. Givone, 1st Edition, 2002, Tata McGraw-Hill Publishers.
- 4. Computer Organization And Architecture Designing For Performance, William Stallings 11th Edition, 2019, Pearson.
- 5. Logic and Computer Design Fundamentals, M. Morris Mano Charles Kime, 4th Edition 2014, Pearson.



- 6. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008
- 7. Digital Design and Computer Architecture, David M Harris, Sarah L Harris, 2nd Edition, 2013, Elsevier Morgan Kaufmann Publishers.

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

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



# **SAHYADRI** COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU

SAHYADRI	MANGALU	RU	
OBJECT ORIENTEI	<b>PROGRAMN</b>	IING CONCEPTS	
	the Academic Year 2	2023 - 2024)	
II	I SEMESTER		
Course Code	CS322I3C	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40L + 20P	Exam Hours	03
	CREDITS - 4		
• Fundamental knowledge of Programmer	ming.		
COURSE OBJECTIVES:			
Learn fundamental Object-Orientee		•	
• Set up Java JDK environment to cro	e e		
• Explore the concepts of Inheritance	e e		
• Create Multi-threaded programs, E	vent handling med	chanisms	
TEACHING - LEARNING STRATEGY:			
Following are some sample strategies that can be inco	rporate for the Cou	irse Delivery	
Chalk and Talk Method/Blended Mode M	lethod	-	
Power Point Presentation			
Expert Talk/Webinar/Seminar			
• Video Streaming/Self-Study/Simulations			
Peer-to-Peer Activities     Activity/Droblem Board Learning			
<ul><li>Activity/Problem Based Learning</li><li>Case Studies</li></ul>			
<ul> <li>Case Studies</li> <li>MOOC/NPTEL Courses</li> </ul>			
<ul> <li>Any other innovative initiatives with resp</li> </ul>	ect to the Course (	contents	
	RSE CONTENT		
	MODULE - I	5	
Introduction to Object Oriented Concepts: A Re	eview of structure	s, Procedure–Oriented Programming	8 Hours
system, Object Oriented Programming System, Com	parison of Object	Oriented Language with C, Console	
I/O, variables and reference variables, Function Protot			
<b>Class and Objects:</b> Introduction, member function		C C	
·	c c	s and functions, objects and arrays,	
Namespaces, Nested classes, Constructors, Destructor	'S.		
	MODULE - II		1
Introduction to Java: Java's magic: the Byte code	e, Java Developme	ent Kit (JDK), The Java Buzzwords,	8 Hours
Object-oriented programming, Simple Java programming	s. Data types, vari	ables and arrays, Operators, Control	
Statements.			
	AODULE - III		
Classes, Inheritance, Exceptions, Packages and	Interfaces: Class	ses: Classes fundamentals; Declaring	8 Hours
objects; Constructors, this keyword, garbage collection	n.		
Inheritance: Inheritance basics, using super, creati	ng multi-level hie	rarchy, method overriding.	
Exception handling: Exception handling in Java	. Packages, Acce	ss Protection, Importing Packages,	
		That are thread of the set of the	<u> </u>
<b>Exception handling:</b> Exception handling in Java Interfaces.	. Packages, Acce	ss Protection, Importing Packages,	<u> 9 Hours</u>

Multi-Threaded Programming: Multi-Threaded Programming: What are threads? How to make the 8 Hours

				SAHY	ADRI	COLLEG	E OF EN An Aut	IGINEER	ADR ING & MA s Instituti .URU		IENT				
classes	thread	able ; E	Extendin	g thread	ls; Imp	lementi	ng runn	able; Sy	nchroni	zation;	Chang	ing sta	ate of the	he	
thread; ]	Bound	ed buff	er probl	ems, rea	ad write	problei	n, prod	ucer cor	isumer p	roblem	ıs.				
						N	10DUI	LE - V							
Event H	Iandli	ng: Tw	o event	handlin	ig mech	anisms;	The de	elegation	n event i	nodel;	Event c	lasses	; Sourc	es	8 Hours
of event	s; Eve	nt lister	ner inter	faces; U	Jsing th	e delega	tion ev	ent mod	el; Adaj	oter cla	sses; In	ner cla	asses.		
Swings	The	origins	of Sw	ing; Tv	vo key	Swing	feature	s; Com	ponents	and C	ontaine	rs; Th	ne Swii	ng	
Package		-		-		-								-	
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Upon co	mplati	on of th	ia gours	, the st	idante u				ILS						
				e, me su	idents w		<i>ne</i> to.							B	loom's
CO No.								Descrip							xonomy Level
CO1	Deve	elop C-	+ prog	grams b	y using	g diffei	rent Ob	oject O	riented	concept	s like	inher	itance,		CL3
COI	polyı	norphis	m, neste	d classe	s, Const	ructors,	Destruc	ctors.							
CO2	Anal	yze and	unders	tand the	basic (	Object C	riented	concept	s using	Java wi	ith the l	help o	f Data		CL3
CO2	types	s, variab	les and a	arrays, C	Operator	s, Contr	ol State	ments.							
CO3	Inspe	ect inher	ritances,	excepti	ons, pac	kages co	oncepts	and exce	eption ha	ndling	using JA	AVA.			CL3
CO4	Utiliz	ze the co	oncept o	f Threac	ling and	multi-tl	nread pr	ogramm	ing in re	al time	applica	tions.			CL3
CO5	Illust	rate JA	VA Eve	nt handl	ing mec	hanism	and sim	ple appl	cations	using sv	vings.				CL3
	•				LAI	BORAT	ORY O	COMPO	ONENT	S					
Exp. No.					Expe	riment	Descrij	ption					CO No.	Та	Bloom's axonomy Level
1.	Cons	tructors		ting a c					ots of otation of				CO1		CL3
2.	Deve opera overl	clop a ations contained.	C++ Pr on integ	ogram er and	floating	g point	number	rs using	perform the co	ncepts	of func	ction	CO1		CL3
3.			Program nd initia				ation of	f Java cl	asses, oł	ojects, c	onstruc	tors,	CO2		CL3
4.								-	ng a Java	-			CO2		CL3
5.	-			-			-		ance, po				CO3		CL3
6.			iva Prog Java Pa		reate Ja	va packa	age and	illustrat	e the pro	cess of	importi	ng a	CO3		CL3
7.	Imple	ement a		Program	to dem	nonstrate	e of Bo	unded b	uffer pr	oblems	using	Java	CO4		CL3
8.	Imple	ement a	Java Pr	ogram to	o demon	stration	of prod	ucer-coi	isumer p	roblem	8		CO4		CL3
9.	Deve	elop a Ja	va prog	ram to s	imulate	Key E	vent and	l Mouse	Event				CO5		CL3
10.	Deve	elop a Ja	va prog	ram to d	emonstr	ate the j	ava swi	ngs					CO5		CL3
						CO-PO	D-PSO	MAPP	ING						
CO No.					Progr	amme	Outcon	nes (PO	)					Spe	ramme ecific ne (PSO)
	1	2	3	4	5	6	7	8	9	10	11	12		1	2
CO1	3	2	3	2	2							3			



# COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU

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CO2	3	2	3	2	2					3			
CO3	3	3	3	2	2					3		1	
CO4	3	3	3	2	2					3			
CO5	3	3	3	2	2					3		-	
3	: Subs	stantial	(High)	I		2: Moder	rate (Medium	ı)		1: Poor	(Low)		
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-					ation (CI			) %			30		
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					A	ASSESS	MENT DET	AILS					
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			, Objec	t Orient	ed Prog	amming	with C++ , 2	nd Ed, Oxfe	ord Unive	rsity Pres	s,2006.		
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- Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.
- 3. Sourav Sahay, Object Oriented Programming with C++, 2nd Ed, Oxford University Press,2006
- 4. E Balagurusamy, Programming with Java, McGraw Hill, 6th Edition, 2019.
- 5. Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education, 2008, ISBN:9788131720806.

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

- 1. https://onlinecourses.nptel.ac.in/noc22\_cs102/
- 2. https://www.geeksforgeeks.org



#### SAHYADRI COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU

# DATA STRUCTURES AND ITS APPLICATIONS

(Effective from the Academic Year 2023 - 2024)

**III SEMESTER** 

III SEIVIES I EK							
Course Code	CS322T4C	CIA Marks	50				
Number of Contact Hours/Week (L: T: P: S)	3:0:0:0	SEE Marks	50				
Total Hours of Pedagogy	40L	Exam Hours	03				
CREDITS – 3							

# **COURSE PREREQUISITES:**

• Knowledge of Mathematics and C Programming

# COURSE OBJECTIVES:

This course will enable students to:

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

### TEACHING - LEARNING STRATEGY:

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

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

# **COURSE CONTENTS**

#### **MODULE - I**

Introduction to Data Structures : Classifications, Data structure Operations, Demonstration of Sparse	8 Hours
Matrices with arrays, Strings : Operations and Pattern Matching Algorithms.	
Stack : Concepts and Operations, Array Representation of Stacks, Stacks using Dynamic Arrays.	
<b>Applications of Stack :</b> Infix to Postfix Conversion, Evaluation of Postfix expression, Recursion : Ackermann function.	
MODULE - II	
Queues : Introduction to Queues, Array and Linked Representation of Queues, Operations on queues,	8 Hours
Circular queues Operations, Circular queues using Dynamic arrays, Dequeues, Priority Queues.	
Applications of Queues : Job Scheduling.	
MODULE - III	
Linked List : Introduction to Linked Lists, Representation of linked lists in Memory, Dynamic Memory	8 Hours
allocation functions, Singly Linked list Operations : Traversing, Searching, Insertion and Deletion, Header	
linked lists, Doubly Linked lists Operations, Circular linked lists, Linked Stacks and Queues.	
Applications of Linked Lists : Polynomials, Sparse matrix representation.	
MODULE - IV	
Trees : Terminologies, Binary Trees, Properties of Binary trees, Array and linked representation of Binary	8 Hours



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Trees, B	inary T	Free Tra	wersals,	Thread	led binar	y trees, B	inary S	Search T	rees : D	efinitio	n, Inser	tion, Del	etion,	
Traversa	l, Sear	ching, A	AVL tree	e, B-Tre	ee.									
Applicat	tion of	Trees	• Evalua	tion of	Arithmet	tic Expres	sion							
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Upon co	mpleti	on of th	is course	e, the st	udents w	vill be able	e to:							
CO No.					Cou	rse Outo	come 1	Descrip	tion					Bloom's Taxonomy Level
CO1			the fund problem			edge of va	arious t	ypes of	data stru	ictures	and app	ly stack	data	CL3
CO2	Appl	y the co	oncept of	queues	s, circula	r queue fo	or solvi	ng vario	us prob	lems.				CL3
CO3			operation nd doub			ertion, dele	etion a	nd searc	hing on	singly	linked l	ists, circ	ular	CL3
CO4		e use o ession.	of tree	data st	tructure	with diff	erent	traversa	l metho	ods to	evaluat	e arithm	netic	CL3
CO5	Illust	rate the	concept	of gra	ohs with	applicatio	ons and	the usag	ge of ha	shing te	chnique	s.		CL3
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No. CO1 CO2 CO3	3 3 3	3 3 3	3 3 3	4	5 1 1 1	1 1		<b>8</b> 2 2 2 2	<b>9</b> 2 2 2 2	10	11	3 3 3	<b>S</b> Outc 1 3 3 3	pecific ome (PSO) 2 3 3 3
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No.           CO1           CO2           CO3           CO4           CO5           3           Assessm           Sl. No.           1           2	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 stantial Il be bo As inuous Continu Assignn ester En Contin	3         3         3         3         3         (High)         th CIA a         ssessmen         Interna         ous Internations         nd Exan         nuous Internations	nd SEE nt Desc Il Asses nal Eva nination nternal	5 1 1 1 1 1 5 A Construction ( Assessing (CIE) ( CIE) ( CIE	6 2: Moder SSESSM ts learning CIA) (CIE) ASSESSI nent (CIA	7 rate (M IENT g will b WENT ) (50%	8           2           2           2           2           2           2           2           2           2           2           2           2           2           2           2           2           100           60 °           40 °           100           F DETA           6)           Assignment           ctivities	9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	g Direct	t and Inc	3 3 3 3 3 1: Poor direct me Max. 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	S         Outco         1         3         3         3         3         3         3         3         3         3         3         30         20         50         30         20         50         30         20         50         30         20         50         30         20         50         30         20         50         30	pecific ome (PSO) 2 3 3 3 3 3 3 5 50%)
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No.           CO1           CO2           CO3           CO4           CO5           3           Assessm           Sl. No.           1           2           Cont           I           I           I           I           I           I           I           I           I	3 3 3 3 3 3 3 3 3 3 3 3 5: Subs ent will Cont Cont Cont Cont Cont Cont Cont Cont	3 3 3 3 stantial Il be bo As inuous Continu Assignn ester En Contin	3         3         3         3         3         (High)         th CIA a         ssessmen         Interna         ous Internations         nd Exan         nuous Internations	nd SEE nt Desc Il Asses nal Eva nination nternal	5           1	6 2: Moder SSESSM ts learning CIA) (CIE) ASSESSI nent (CIA 50%)	7 rate (M IENT g will b WENT ) (50%	8           2           2           2           2           2           2           2           2           2           2           2           2           2           2           2           2           100           60 °           40 °           100           F DETA           6)           Assignment           ctivities	9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	g Direct	t and Inc	3 3 3 3 1: Poor direct me Max. 5 End Exa	S         Outco         1         3         3         3         3         3         3         3         3         3         3         30         20         50         30         20         50         30         20         50         30         20         50         30         20         50         30         20         50         30	pecific ome (PSO) 2 3 3 3 3 3 3 5 50%)

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MII	MII		MII	MII
	MIII		MIII	MIII
		MIV	MIV	MIV
		MV	MV	MV

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

ASSIGNMENT TYPES WITH WEIGHTAGES								
Assignment Description	Max. Weightage (%)	Max. Marks						
Written Assignments	25 %	05						
Quiz	10 %	02						
Case Studies	25 %	05						
Seminar/Presentation	15 %	03						
Peer - to - Peer Learning	10 %	02						
Activity Based Learning	50 %	10						
Project Based Learning	50 %	10						
Field Work + Report	50 %	10						
Industry Visit + Report	50 %	10						
NPTEL/MOOC Courses – Registration and Assignment Submissions	50 %	10						
NPTEL Certification	75 %	15						
Any other Innovative Assignments (CL4 and above)	50 %	10						
	Assignment DescriptionWritten AssignmentsQuizCase StudiesSeminar/PresentationPeer - to - Peer LearningActivity Based LearningProject Based LearningField Work + ReportIndustry Visit + ReportNPTEL/MOOC Courses – Registration and AssignmentSubmissionsNPTEL Certification	Assignment DescriptionMax. Weightage (%)Written Assignments25 %Quiz10 %Case Studies25 %Seminar/Presentation15 %Peer - to - Peer Learning10 %Activity Based Learning50 %Project Based Learning50 %Field Work + Report50 %Industry Visit + Report50 %NPTEL/MOOC Courses - Registration and Assignment Submissions50 %NPTEL Certification75 %Any other Innovative Assignments (CL4 and above)50 %						

*Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands* **SEE QUESTION PAPER PATTERN:** 

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

#### **TEXT BOOKS:**

- 1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
- 2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.
- 3. Gilberg and Forouzan, Data Structures : A Pseudo-code approach with C, 2nd Ed, Cengage Learning, 2014.
- 4. Jean Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013.
- 5. A M Tenenbaum, Data Structures using C, PHI, 1989.
- 6. Robert Kruse, Data Structures and Program Design in C,2nd Ed, PHI,1996.

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

- 1. https://www.youtube.com/watch?v=3Xo6P\_V-qns&t=201s
- 2. https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html
- 3. https://nptel.ac.in/courses/106/102/106102064
- 4. https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html
- 5. https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html
- 6. https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
- 7. https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/index.html



# DATA STRUCTURES LABORATORY WITH C

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& MANAGEMENT

#### (Effective from the Academic Year 2023 - 2024)

III SEMESTER

	III SEWIESTER					
Course Code	CS322L5C	CIA Marks	50			
Number of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50			
Total Hours of Pedagogy	20P	Exam Hours	03			
CREDITS – 1						

#### **COURSE PREREQUISITES:**

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

#### **COURSE OBJECTIVES:**

This course will enable students :

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

#### **TEACHING - LEARNING STRATEGY:**

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

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

# LIST OF EXPERIMENTS

Exp. No.	Description
1	<ul> <li>Design and Implement a program in C on Frequency Histogram, which builds a frequency array for data values in the range 1 to n and then prints their histogram. The program should,</li> <li>a. Read, Store and Print the data in an array.</li> <li>b. Analyse the data in the array, one element at a time. Add 1 to the corresponding element in a frequency array based on the data value.</li> <li>c. Print a histogram using asterisks for each occurrence of an element.</li> </ul>

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	Design and Implement a program in C for the following Stack Applications,
2	a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, $\%$ , ^
	b. Conversion of Arithmetic Expressions
	Design and Implement a program in C for the following operations on QUEUES,
	a. Categorize the numbers (Range 1 to 100) without losing the original ordering as mentioned below:
	Group 1: Less than 10
3	Group 2: Between 10 and 19
	Group 3: Between 20 and 29
	Group 4: Between 30 and 99
	b. Sort the categorized data using any sorting algorithm
	Design and Implement a menu driven Program in C for the following operations on Circular QUEUE of
	Characters,
	a. Insert an Element on to Circular QUEUE
4	b. Delete an Element from Circular QUEUE
	c. Demonstrate Overflow and Underflow situations on Circular QUEUE
	d. Display the status of Circular QUEUE
	Design and Implement a menu driven program in C for the following operations on Doubly Linked List
	(DLL) of Student Data with the fields: USN, Name, Department, Marks, Ph.No,
	a. Create a DLL of N Students Data by using end insertion.
5	b. Display the status of DLL and count the number of nodes in it
	c. Perform Insertion and Deletion at End of DLL
	d. Perform Insertion and Deletion at Front of DLL
	e. Display the total and average marks for each student
	Design and Implement a program in C for the following operations on Singly Circular Linked List (SCLL)
	with header nodes,
6	a. Represent and Evaluate a Polynomial $P(x,y,z) = 6x^2y^2z - 4yz^5 + 3x^3yz + 2xy^5z - 2xyz^3$ .
	b. Find the sum of two polynomials $POLY1(x,y,z)$ and $POLY2(x,y,z)$ and store the result in $POLYSUM(x,y,z)$ .
	Design and Implement a program in C that reads a list of names and telephone numbers to inserts them into
	a Binary Search Tree for the following operations,
7	a. Search the list for a specified name.
	b. Insert a new name.

	:	SAHYADRI		OF ENGINEERING An Autonomous In MANGALUR	stitution	NT				
	c. Delete an exist	ting name.								
	d. Traverse using	g Inorder, Pre	order and P	ostorder.						
	A company has se	ven top office	ers working	for it. They are e	each fluent in a	tleast one lan	guage according to			
	the following samp	ple table,								
		Officer	Hindi	Malayalam	Kannada	Telugu	]			
		01	-	-	Y	-				
		02	-	-	Y	Y				
		03	-	-	-	Y				
		04	-	Y	-	Y				
0		05	Y	Y	-	-				
8		06	Y	-	Y	-				
		07	-	Y	-	-				
	Design and Implen	nent a progra	m in C for t	he following ope	rations on Grap	ohs (G),				
	<ul><li>a. Create a graph using adjacency matrix indicating people who can communicate directly with each other.</li><li>b. Print all the officers which are reachable from a given officer as a starting node in a digraph.</li></ul>									
	Example: An offic			U		e				
	reads it and transm	ins it to anoth	er onicer p	ossibly after trans	station to some	one who has	not read it.			
9	Design and Imple method) and imple collision (if any) u	ement hashir	ng techniqu				K mod m(reminder ace L. Resolve the			

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						COUI	RSE OU	JTCON	IES					
Upon co	mpleti	on of th	is cours	e, the st	udents w	vill be at	ole to:							Bloom's
No.	Course Outcome Description										L	axonomy Level		
CO1	Desi	gn and i	mpleme	ent array	and stac	ck data s	structure	s for a g	iven app	olication	•			CL2
CO2	Desi	gn and i	mpleme	ent queu	e data sti	ructures	for a give	ven appl	ication.					CL2
CO3	Desi	gn and i	mpleme	ent the co	oncepts	of DLL	and SCI	LL.						CL2
CO4	Utiliz	ze the co	oncepts	of trees	and grap	phs to so	olve the 1	real wor	ld proble	ems.				CL2
CO5					ashing t	-	es to ana	alyze the	e collisio	on proble	ems and	l develop	)	CL3
						CO-PO	O-PSO	MAPP	ING					
													Prog	gramme
CO					Progr	amme	Outcom	nes (PO	)				Sp	oecific
No.													Outco	me (PSO)
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2		2			1	1			3	3	3
CO2	3	2	2		2			1	1			3	3	3
CO3	3	2	2		2			1	1			3	3	3
CO4	3	2	2		2			1	1			3	3	3
CO5	3	2	2		2			1	1			3	3	3
	3: Subs	stantial	(High)			2: Mod	erate (N	Aedium	)			1: Poor	(Low)	
Assessn	nent wi	ll be bot	th CIA a	and SEE			MENT			g Direct	and Inc	lirect me	ethods:	
SI.		As	sessme	nt Desc	rintion			Veighta	о <b>ре (%</b> )			Max.	Marks	
No.		11,5	sessine	nt Dese	ipuon			v eignu	ige (70)			тал.	wiai Ko	
1	Cont	tinuous	Interna	al Asses	sment (	CIA)		100	%				50	
	Labo	oratory V	Vork (A	.)				50	%			,	25	
	Labo	oratory 7	Test (B)					30	%				15	
	Oper	n Ended	Experir	nents /N	lini Proj	ects (C)		20	%				10	
2	Sem	ester Er	nd Exar	ninatio	n (SEE)			100	%			4	50	

#### **ASSESSMENT STRATEGY:**

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

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

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

Assessment Mode: The marks will be awarded based on the Continuous Internal Assessment (Weekly

Assessment) (A) and One Laboratory Test (B).

• In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A).

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- A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier. The obtained marks are scaled down to 25 Marks (B)
   The Sum of marks obtained across (A) and (B) will be the Final CIA marks.
- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

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#### **SEE QUESTION PAPER PATTERN:**

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

# **LEARNING RESOURCES:**

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

# **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

- 1. https://www.youtube.com/watch?v=3Xo6P\_V-qns&t=201s
- 2. https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html
- 3. https://nptel.ac.in/courses/106/102/106102064
- 4. https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html
- 5. https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html
- 6. https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
- 7. https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/index.html



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### WEB TECHNOLOGY AND ITS APPLICATION

(Effective from the Academic Year 2023 - 2024)

**III SEMESTER** 

III SEIVIES I EK							
Course Code	AM322T6AA	CIA Marks	50				
Number of Contact Hours/Week (L: T: P: S)	3:0:0:0	SEE Marks	50				
Total Hours of Pedagogy	40L	Exam Hours	03				
CREDITS – 3							
COURSE PREREOUISITES:							

Basic computer skills, HTML and CSS fundamentals, JavaScript fundamentals.

## **COURSE OBJECTIVES:**

- Comprehend the basics of the internet and web terminologies.
- Introduce scripting language concepts for developing client-side applications.
- Practice server-side programming features.
- Familiarize the database applications.
- Know the future generation of web services.

# TEACHING - LEARNING STRATEGY:

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

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

CC	OURSE CONTENTS	
	MODULE – I	

 Internet and World Wide Web: Overview of Internet and the sub network "the Web", History, Web
 8 Hours

 System Architecture, Web Clients and Web Servers, Application Servers. HTTP – Basics of HTTP
 Request and Response, HTTP Methods, headers, content transport (PUSH and PULL),Drawbacks of

 HTTP1.0, Introduction to HTTP1.1, HTTPS, SSL , Generation of Dynamic Web pages, Extension
 MODULE – II

 Client side programming: Web application Design Life cycle, Web page design and production, Web
 8 Hours

 Markup Languages –markup basics, markup purposes,Introductions to HTML and Deficiencies of HTML,
 8 Hours

 Using XHTML – Basic syntax, fundamental elements, URLs –Interpage and Intrapage Linking, Lists,
 Tables, Emmers and Emmer

Tables, Frames and Forms., Document Object Model (DOM), Styling with CSS, Introduction to HTML5 and CSS3, Client side dynamic programming with JavaScript – Basics, Primitives, Loops, Decision

Statements, Screen Output and Keyboard Input, Arrays and Functions, Event Handling, Pattern Matching and Form Validation with Regular Expressions.

**MODULE – III** 

Server side programming: Three Tier Model, PHP –Basics, Form Validation, Emailing Form Data,<br/>Addressing the Stateless Nature of HTTP-Sessions and Session Tracking techniques, jQuery and AJAX.8 Hours



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						N	N AODUL		URU					
Advanc	ed teo	hnolog	ies: XN	/IL – S	Syntax a				ent Strue	cture,	DTDs,	Need f	or	8 Hours
Namesp	paces, XML Schemas, Navigating XML documents with XPath, Displaying XMLdocuments										its	o nours		
with CS	S and 2	XSLT.												
						Ι	MODUL	$\mathbf{E} - \mathbf{V}$						
and Sea	rch Eng xt Gen	gine Op <b>eration</b>	timizatio	on.					ommerce e Internet			C		8 Hours
						COU	RSE OU	ITCON	/IES					
Upon co	ompleti	on of th	is cours	e, the st	udents v			1001						
CO No.	Course Outcome Description									Bloom's Taxonomy Level				
CO1	Describe the components of the Internet and Web; basics of Web clients and servers, and serving content to users over the application layer.									CL2				
CO2	Explain web page design cycle and identify the various client-side programming languages and interfaces.								and	CL2				
CO3	Summarize the server-side interfaces for serving Web based applications.									CL2				
CO4	Use the XML Web standard for promoting automated machine processing.									CL3				
CO5	Discuss the advanced, interactive web-based computing applications and systems.									CL2				
						CO-P	O-PSO	MAPP	ING					
CO No.	Programme Outcomes (PO)										ogramme Specific come (PSO)			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2					2				3		
CO2	3	2	2					2				3		
CO3	3	2	2					2				3		
CO4 CO5	3	2	2		-			2				3		
		3     2     2     3       3: Substantial (High)     2: Moderate (Medium)     1: Poor (Low)						(Low)						
				and SEF		SSESS	SMENT	STRA	TEGY	Direct	t and In			
Sl. No.		nent will be both CIA and SEE. Students learnin Assessment Description					Weightage (%)			Max. Marks				
1	Continuous Internal Assessment (CIA)					100 %			<b>50</b>					
	Continuous Internal Evaluation (CIE)					60 % 40 %			<u> </u>					
2	Assignments40 %Semester End Examination (SEE)100 %								<b>50</b>					
							SSMENT							
		Conti	nuous I	ntornol						Se	mester	End Ex	am (SF	<b>EE) (50%)</b>
Con	Continuous Internal Assessment (CIA Continuous Internal Evaluation (CIE) (60%)						Assignment/ Activities (40%)				2114 124			
Ι Π Π														
1 11 111   III														



	Syllabus Coverage	•	Syllabus Coverage	Syllabus Coverage		
40%	30%	30%	100%	100%		
MI			MI	MI		
MII	MII		MII	MII		
	MIII		MIII	MIII		
		MIV	MIV	MIV		
		MV	MV	MV		

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

#### ASSIGNMENT TYPES WITH WEIGHTAGES

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

# Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands SEE QUESTION PAPER PATTERN:

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

#### **TEXT BOOKS:**

- 1. Web Technologies A Computer Science Perspective Jeffrey C Jackson [Pearson -2009]
- 2. E-commerce, Fundamentals and Applications Henry Chan et al [John Wiley- 2002]
- 3. Thinking on the Web Berners Lee, Godel and Turing, Wiley inter science, 2008.
- 4. Designing systems for Internet commerce G. Winfield Treese [Pearson 2002]
- 5. The Web Warrior Guide to Web Programming –Bai,Farell et.el

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

1. https://www.azdocuments.in/2021/05/web-technology-and-its-applications.html



MOBILE AP	PLICATION D	EVELOPMENT	
	m the Academic Yea		
	III SEMESTER	1	
Course Code	CS322T6CB	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	3:0:0:0	SEE Marks	50 03
Total Hours of Pedagogy	40L	Exam Hours	03
COURSE PREREQUISITES:	CREDITS – 3		
Fundamentals of Java Programming			
COURSE OBJECTIVES:			
• Learn to setup Android application devel	opment environme	ent	
• Illustrate user interfaces for interacting w	vith apps and trigge	ering actions	
• Interpret tasks used in handling multiple	activities		
• Identify options to save persistent application	ation data		
• Appraise the role of security and perform	nance in Android a	pplications	
<b>TEACHING - LEARNING STRATEGY:</b>			
<ul> <li>Chalk and Talk Method/Blended Mode Method</li> <li>Power Point Presentation</li> <li>Expert Talk/Webinar/Seminar</li> <li>Video Streaming/Self-Study/Simulations</li> <li>Peer-to-Peer Activities</li> <li>Activity/Problem Based Learning</li> <li>Case Studies</li> <li>MOOC/NPTEL Courses</li> <li>Any other innovative initiatives with respect</li> </ul>			
	MODULE – I	15	
Getting Started with Android Programming Architecture, obtaining the required tools, launch Activities, Fragments and Intents: Underst fragments.	: What is Androi ing your first andr anding activities,	oid application	8 Hours
Catting to know the Andreid Harry Interface II	MODULE – II	Tomponenta of a Concern Mission 1	0 11
Getting to know the Android User Interface: Ur View Groups, FrameLayout, LinearLayout, Tab Display Orientation: Anchoring Views. Utilizing Bar.	bleLayout, Relative g the Action Bar:	eLayout, ScrollView. Adapting to	8 Hours
Designation I to the fact the Tri Tri	MODULE – III		
<b>Designing User Interface with Views: Using E</b> EditText, Checkbox, ToggleButton, RadioButton at <b>Views:</b> TimePicker View, DatePicker View. Usin	nd RadioGroupViev	ws, ProgressBar View. Using Picker	8 Hours
Using the Spinner View.	g List views to D	ispiay Long Lists. List view view,	
			<u> </u>

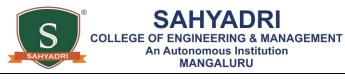
MODULE – IV

Displaying Pictures and Menus with Views: Using Image Views to Display Pictures: ImageView	8 Hours
View, ImageSwitcher, GridView. Using Menus with Views: Creating the Helper Methods, Options	
Menu, Context Menu. Using WebView: WebView.	



						ī	10DUL	$\mathbf{E} - \mathbf{V}$	.0110						
Data Po Program Creating	matica	lly Ret	rieving	and Mo	odifying	er Prefetter the Prefetter	erences: eference	Access Values	. Creat		•		-	8 Ho	ırs
							RSE OU	JTCOM	IES						
Upon co	mpleti	on of th	is course	e, the stu	idents w	vill be at	ole to:							Bloon	1's
CO No.					Cou	rse Ou	tcome	Descrip	otion					Taxon Leve	omy
CO1	Disc	uss the f	eatures,	archited	cture and	l activiti	es of Ar	ndroid A	pplicatio	on D ev	elopmei	nt.		CL2	
CO2	Expl	Explain the role of various components and action bar in Android Application.												CL2	
CO3	Disc	uss the l	pasic vie	ws used	l in Andı	roid app	lication	develop	ment.					CL2	-
CO4	Expl	ain the 1	nethods	involve	d in han	dling in	nages an	d menus	in Andr	oid pla	form.			CL2	-
CO5	Discuss various features available for user data management in Android Application .											CL2			
						CO-PO	D-PSO	MAPP	NG						
CO No.	Programme O						Outcom	nes (PO	)				S	ogramr Specific ome (P	
1100	1	2	3	4	5	6	7	8	9	10	11	12	1		2
CO1	3	2	1		2							1			
CO2	3	2	1		2							1			
CO3	3	2	1		2							1			
CO4	3	2	1		2							1			
CO5	3 3. Sub	2 stantial	1 ( <b>High</b> )		2	2. Mod	erate (N	/odium				1 1: Poor			
		ll be bo			A . Studen	SSESS	MENT ng will l	<b>STRA</b> be assess	<b>FEGY</b> sed using	g Direct		lirect me	ethods:		
1	Con				sment (	CIA)		Weightage (%) 100 %			Max. Marks 50				
	(	Continu	ous Inter		luation (	,		60 %				30			
2		Assignn ester Ei	nents nd Exan	ninatior	(SEE)								20 50		
						ASSES	SMENT			I		•	- •		
		Conti	nuous Ir	nternal	Assessm	nent (Cl	( <b>A</b> ) (50%	<b>/</b> 0)		Se	mester	End Ex	am (SE	E) (50%	6)
Con	tinuou	s Inter	nal Eval	uation	(CIE) (6	<b>60%</b> )		Assign ctivities							
		1	II		Ι	II							~		
	I						I Sv	Syllabus Coverage			Syllabus Coverage				
]		Sylla	ibus Co	verage	30	0%	- Syl		<u> </u>		100%				
40	)%	Sylla		verage	30	)%		100	%				0%	•50	
40 N		Sylla	ibus Co	verage	30	)%			% [			Ν		• <u> </u>	
40 N	<b>)%</b> 1I	Sylla	abus Co 30%	verage	30	)%		100 M	% [ ]			N N	<b>0%</b> MI	* <u>B</u> v	
40 N	<b>)%</b> 1I	Sylla	abus Co 30%	verage		<b>)%</b>		100 M M	% [ ] []			N N	0% MI MII		

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



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

### **SEE QUESTION PAPER PATTERN:**

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

#### **TEXT BOOKS:**

- 1. J. F. DiMarzio, Beginning Android Programming with Android Studio, 4thEdition, 2017.
- 2. John Horton, Android Programming for Beginners, 1stEdition, 2015
- 3. Dawn Griffiths & David Griffiths, Head First Android Development, O"Reilly, 1stEdition, 2015



# UNIX SHELL PROGRAMMING (Effective from the Academic Year 2023 - 2024)

III SEMESTER								
Course Code	CS322T6CC	CIA Marks	50					
Number of Contact Hours/Week (L: T: P: S)	1:0:0:0	SEE Marks	50					
Total Hours of Pedagogy	12	Exam Hours	01					
(	CREDITS – 1							

### **COURSE PREREQUISITES:**

• Basic Knowledge of C Programming.

### **COURSE OBJECTIVES:**

- To help the students to understand effective use of Unix concepts, commands and terminology.
- Identify, access, and evaluate UNIX file system.
- Understand UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Analyse Facility with UNIX Process.

### **TEACHING - LEARNING STRATEGY:**

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

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

### Module - I

**Introduction of UNIX** - Introduction, History, Architecture, Experience the Unix environment, Basic commands ls, cat, cal, date, calendar, who, printf, tty, sty, uname, passwd, echo, tput, and bc.

### Module - II

**UNIX File System-** The file, what's in a filename? The parent-child relationship, pwd, the Home directory, absolute pathnames, using absolute pathnames for a command, cd, mkdir, rmdir, Relative pathnames, The UNIX file system.

### Module - III

**Basic File Attributes** - Is – 1, the –d option, File Permissions, chmod, Security and File Permission, users and groups, security level, changing permission, user masks, changing ownership and group, File Attributes, More file attributes: hard link, symbolic link, umask, find.



#### Module - IV

**Introduction to the Shell Scripting** - Introduction to Shell Scripting, Shell Scripts, read, Command Line Arguments, Exit Status of a Command, The Logical Operators && and ||, exit, if, and case conditions, expr, sleep and wait, while, until, for, \$, @, redirection. The here document, set, trap, Sample Validation and Data Entry Scripts.

Module - V

**Introduction to UNIX System Process:** Mechanism of process creation. Parent and child process. The ps command with its options. Executing a command at a specified point of time: at command. Executing a command periodically: cron command and the crontab file.. Signals.

						COU	RSE OU	JTCON	IES					
Upon co CO No.	mpleti	on of th	is course	e, the stu				Descrip	otion					Bloom's Taxonomy
CO1	Knov	w the ba	sics of I	Jnix cor	cepts ar	nd comm	ands.							Level CL3
CO2					•									CL3
CO3	Evaluate the UNIX file system.         Apply Changes in file system.												CL3	
CO4				nd progi										CL3
CO5				h UNIX		process								CL3
	7 mai	<u>yze i de</u>	illey with		system	•	)-PSO	MAPP	ING					
СО	Programme Outcomes (PO)												5	ogramme Specific
No.	1	2	3	4	5	6	7	8	9	10	11	12	Outcome (PSO)	
CO1	3	2	3	4	3	U	/	o	9	10	11	12	1	
CO2	3	2	3		3							1		
CO3	3	2	3		3							1		
CO4	3	2	3		3							1		
CO5	3 8. Suba	2 stantial	$\frac{3}{(High)}$		3	2. Mod	orato (N	/ /Iedium				1 1: Poor		
				und SEE	A	SSESS	MENT	STRA	-	g Direct			. ,	
Sl. No.		As	sessme	nt Desc	ription		V	Weighta	age (%)			Max.	Marks	5
1	Cont	tinuous	Interna	l Assess	sment (	CIA)		100	%			4	50	
	Labo	ratory V	Vork (A	)				50	%			-	25	
	Labo	ratory T	Cest (B)					30 %				15		
	Open	Ended	Experin	nents /M	lini Proj	ects (C)		20	%			-	10	
	Semester End Examination (SEE)							100 %				50		

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



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

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

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

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

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

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

### SEE QUESTION PAPER PATTERN:

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

### **Text Books:**

- 1. Unix Concepts & Applications 4th Edition, Sumitabha Das, Tata McGraw Hill
- 2. Unix Shell Programming, Yashwant Kanetkar
- 3. Introduction to UNIX by M G Venkatesh Murthy

## **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

- 1. https://www.youtube.com/watch?v=ffYUfAqEamY
- $2. \ https://www.youtube.com/watch?v=Q05NZiYFcD0$
- 3. https://www.youtube.com/watch?v=8GdT53KDIyY
- 4. https://www.youtube.com/watch?app=desktop&v=3Pga3y7rCgo

### Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Real world problem solving using group discussion.
- Real world examples of Linux operating system Utilizations.



SAHYADRI	MANGALU		
ETI	HICAL HACKIN	NG	
(Effective from	m the Academic Year	2023 - 2024)	
]	III SEMESTER		
Course Code	CS322T6CD	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40L	Exam Hours	03
	CREDITS – 3	· · · · ·	
COURSE PREREQUISITES:			
<ul> <li>Fundamental knowledge of Ethical Hacking</li> <li>COURSE OBJECTIVES:</li> </ul>	·		
COURSE OBJECTIVES:			
• To understand the basics of computer based	l vulnerabilities.		
• To explore different foot printing, reconnais	ssance and scanning	methods.	
• To expose the enumeration and vulnerabilit	-		
• To understand hacking options available in	Web and wireless a	pplications.	
• To explore the options for network protection	on.		
• To practice tools to perform ethical hacking	to expose the vulne	prabilities.	
FEACHING - LEARNING STRATEGY:			
Following are some sample strategies that can be ind	-	urse Delivery	
Chalk and Talk Method/Blended Mode Meth     Dayser Departmentation	od		
<ul><li>Power Point Presentation</li><li>Expert Talk/Webinar/Seminar</li></ul>			
<ul> <li>Video Streaming/Self-Study/Simulations</li> </ul>			
<ul> <li>Peer-to-Peer Activities</li> </ul>			
Activity/Problem Based Learning			
• Case Studies			
MOOC/NPTEL Courses			
• Any other innovative initiatives with respect	to the Course conter	nts	
СО	URSE CONTENT	ſS	
	MODULE - I		
			8 Hours
Introduction to Ethical Hacking: Ethical Hackin	g Overview, Role o	of Security and Penetration Testers,	o nour.
Penetration, Testing Methodologies, Laws of the La			
Fransport Layer, The Internet Layer, IP Addressing			
Against Malware Attacks, Intruder Attacks, Address	sing Physical Securi	ty.	
	<b>MODULE - II</b>		
Foot Printing, Reconnaissance and scanning N	-		8 Hour
Search Engines, Web Services, Social Network	-		
Footprinting through Social Engineering, Footprint	-	Scanning Concepts, Port-Scanning	
Γools, Scanning Techniques, Scanning Beyond IDS	and Firewall.		
	MODULE - III	I	
Enumeration and Vulnerability Analysis: Enume	ration Concepts, Ne	tBIOS Enumeration, SNMP, LDAP,	8 Hour
NTP, SMTP and DNS Enumeration, Vulnerabi	•		
Vulnerabilities, Windows OS Vulnerabilities, Tools	s for Identifying Vu	Inerabilities in Windows- Linux OS	
Vulnerabilities, Vulnerabilities of Embedded Oss.			
	MODULE - IV		
System Hacking: Hacking Web Servers, Web Ap		ents, Vulnerabilities, Tools for Web	8 Hours



Wardriving, Wireless Hacking, Tools of the Trade. **MODULE - V** Network Protection Systems: Access Control Lists, Cisco Adaptive Security Appliance Firewall, 8 Hours Configuration and Risk Analysis Tools for Firewalls and Routers, Intrusion Detection and Prevention Systems, Network Based and Host Based IDSs and IPSs, Web Filtering, Security Incident Response Teams, Honeypots. **COURSE OUTCOMES** Upon completion of this course, the students will be able to: Bloom's CO **Course Outcome Description** Taxonomy No. Level CO1 To express knowledge on basics of computer based vulnerabilities CL2 To gain understanding on different foot printing, reconnaissance and scanning methods. CO<sub>2</sub> CL2 CO<sub>3</sub> To demonstrate the enumeration and vulnerability analysis methods. CL3 CL2 CO4 To gain knowledge on hacking options available in Web and wireless applications. To acquire knowledge on the options for network protection. CL2 CO5 **CO-PO-PSO MAPPING** Programme CO **Programme Outcomes (PO)** Specific No. **Outcome (PSO)** 2 4 7 8 9 10 11 12 1 3 5 6 1 2 **CO1** 2 1 1 2 **CO2** 2 1 3 1 2 **CO3** 2 1 3 1 1 **CO4** 2 1 3 1 1 CO5 2 1 1 1 3: Substantial (High) 2: Moderate (Medium) 1: Poor (Low) ASSESSMENT STRATEGY Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods: Weightage (%) Max. Marks Sl. No. **Assessment Description Continuous Internal Assessment (CIA)** 100 % 50 1 Continuous Internal Evaluation (CIE) 60 % 30 20 Assignments 40 % 2 Semester End Examination (SEE) 50 100 % **ASSESSMENT DETAILS** Semester End Exam (SEE) (50%) Continuous Internal Assessment (CIA) (50%) Assignment/ **Continuous Internal Evaluation (CIE) (60%)** Activities (40%) I Π Ш Syllabus Coverage **Syllabus Coverage Syllabus Coverage** 40% 30% 30% 100% 100% MI MI MI MII MII MII MII MIII MIII MIII MIV MIV MIV MV MV MV

MANAGEMENT

An Autonomous Institution MANGALURU

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



Sl. No.	Assignment Description	Max. Weightage (%)	Max. Marks
1	Written Assignments	25 %	05
2	Quiz	10 %	02
3	Case Studies	25 %	05
4	Seminar/Presentation	15 %	03
5	Peer - to - Peer Learning	10 %	02
6	Activity Based Learning	50 %	10
7	Project Based Learning	50 %	10
8	Field Work + Report	50 %	10
9	Industry Visit + Report	50 %	10
10	NPTEL/MOOC Courses – Registration and Assignment Submissions	50 %	10
	NPTEL Certification	75 %	15
11	Any other Innovative Assignments (CL4 and above)	50 %	10
Note: Th	ne assignments mentioned above may be provided appropriately to the	students belonging to diff	erent bands

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

### **TEXT BOOKS:**

- 1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
- 2. The Basics of Hacking and Penetration Testing Patrick Engebretson, SYNGRESS, Elsevier, 2013.
- 3. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, Dafydd Stuttard and Marcus Pinto, 2011.

4. Black Hat Python: Python Programming for Hackers and Pentesters, Justin Seitz, 2014.

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

- 1. https://www.hackthebox.com/
- 2. https://www.hackthissite.org/



# **UHV -1:SOCIAL CONNECT AND RESPONSIBILITIES**

#### (Effective from the Academic Year 2023 - 2024)

III SEMESTER

III SEMESTER							
Course Code	HU32287X	CIA Marks	50				
Number of Contact Hours/Week (L: T: P: S)	1:0:0:0	SEE Marks	50				
Total Hours of Pedagogy	15	Exam Hours	03				
	<b>CREDITS</b> – 1						

### **COURSE PREREQUISITES:**

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

### **COURSE OBJECTIVES:**

This course will enable students to:

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

### **TEACHING - LEARNING STRATEGY:**

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

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies

# COURSE CONTENTS

### **MODULE - I**

 Connectivity with Nature: Importance of plants, Plantation process, Plant Development: Sequence of Plant Development, Factors affecting Plant Development, Practice Problems.
 3 Hours

 Activity: Self-study on selected plant's origin, its usage in daily life and its appearance in folklore and literature.
 4

 MODULE - II
 MODULE - II

 Heritage walk and Regional Crafts: An overview of Heritage, Awareness on Indian Cultural Heritages, Crafts & Heritage, Protective measures for the survival of handicrafts.
 3 Hours

 Activity: Self-study on selected Heritage and its Inheritance.
 3 Hours

 MODULE - III
 3 Hours

 Organic farming and waste management: Introduction of organic farming, study on wet waste
 3 Hours

management, Effects of organic farming on crop productivity.

### **MODULE - IV**

 Water Conservation: Necessity of water conservation, study on water reuse, an overview on rainwater harvesting.
 3 Hours

Activity: Documentary or photo blog presenting the current practices.

**MODULE - V** 



						COUI	SE OI	JTCON	/ES					<u> </u>
Upon co	omplet	ion of t	his cours	se, the	student	ts will be								
CO No.				,		urse Ou			otion					Bloom's Taxonom Level
CO1	To u	nderstar	nd the soc	cial resp	ponsibi	lity of in	dividual	-Adapta	tion and	Plantati	on of T	ree		CL3
CO2	To k	now the	heritage	and ho	listic p	laces - H	eritage	walk and	l crafts c	orner				CL3
CO3	To u	nderstar	nd the im	portanc	e of O	rganic fai	ming ar	nd waste	manage	ment				CL3
CO4	To k	now the	importa	nce and	necess	sity of W	ater Cor	servatio	on					CL3
CO5		To understand diverse food practices of the region.												CL3
						СО-РО	D-PSO	MAPP	ING					
CO No.	Programme O												5	ogramme Specific come (PS
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			1			1	2	1	2			1		
CO2			1			1	1	1	1			1		
CO3			1			1	2	1				1		
<b>CO4</b>			1			1	2	1				1		
CO5						1	1	1				1		
3	S: Subs	stantial	(High)			2: Mod	-		-		1	l: Poor	(Low)	
					1	ASSESS	MENT	STRA	TEGY					
Sl. No.		As	sessmen	t Desc	riptio	n		Weight	age (%)		Max. Marks			5
1	Cont		Internal						%		50			
			ous Inter	nal Eva	luation	(CIE)			%		30			
2		Assignn	nents nd Exam	ination	(SEE	)		40 % 20 100 % 50						
4	Sem			manoi		) D - ASSI	ESSME			r I		•	50	
			Cor	ntinuo		ernal Ass					mester	End E	xam (S	SEE) (50%
<b>C</b>	0-4		Co	ontinu	ous In			Assign	100/0/ 1000/00				()	22)(00)
Course	eOuto	comes	I		I					,				
			S	yllabu	s Cove	erage	Sy	llabus	Coverag	ge	S	yllabus	Cover	age
			40%	30	%	30%		10					0%	
	CO1		MI						<u>II</u>				<u>ИІ</u>	
	CO2		MII		111				II 				111	
	CO3			M	III			M						
	CO4					MIV		<u>M</u>						
	CO5					$\frac{\text{MV}}{\text{SEE}, th}$		Μ	l V				1V	

the assignments.



ASSIGNMENT TYPES WITH WEIGHTAGES									
Sl. No.	Assignment Description	Max. Weightage (%)	Max. Marks						
1	Written Assignments	25 %	05						
2	Case Studies	25 %	05						
3	Seminar/Presentation	25 %	05						
4	Peer - to - Peer Learning	25 %	05						

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

### **SEE Question Paper Pattern:**

- The question paper will have seventy MCQ questions and six main questions.
- Each MCQ questions consisting of 1mark; and main questions of 5 marks.
- Main questions will be asked from all FIVE modules.

### **TEXT BOOKS:**

- 1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
- 2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- 3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- 4. The Story of Stuff (Book).
- 5. The Story of My Experiments with Truth by Mohandas Karamchand Gandhi
- 6. Small is Beautiful E. F Schumacher.

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

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



	SAHYADRI	MANGALUR	U	
	DATA ANA	LYTICS USING	EXCEL	
		the Academic Year 2	023 - 2024)	
		II SEMESTER		50
Nam	Course Code	CS32298CA 0:0:2:0	CIA Marks SEE Marks	50
Nun	hber of Contact Hours/Week (L: T: P: S) Total Hours of Pedagogy	0:0:2:0 20P	Exam Hours	<u>50</u> 03
	0.07	-	Examinours	03
OURS	SE PREREQUISITES:	CREDITS – 1		
	-			
	isic Knowledge of Computers.			
	o Apply analysis techniques to datasets in Ex			
• L	earn how to use Pivot Tables and Pivot Chart	s to streamline your	workflow in Excel	
• U	nderstand and identify the principles of data	analysis		
	ecome adept at using Excel functions and tec	hniques for analysis		
• B	uild presentation ready dashboards in Excel			
	TEACHING	- LEARNING ST	RATEGY:	
	Following are some sample strate	-	rporate for the Course Delivery	
	halk and Talk Method/Blended Mode Metho	d		
	ower Point Presentation			
	xpert Talk/Webinar/Seminar ideo Streaming/Self-Study/Simulations			
	eer-to-Peer Activities			
	ctivity/Problem Based Learning			
	ase Studies			
• A	ny other innovative initiatives with respect to	the Course contents	3	
	LIST (	OF EXPERIME	NTS	
SI.		Description		
No.		Description		
1	Getting Started with Excel: Creation of Aggregate functions.	spread sheets, Inser	tion of rows and columns, Drag &	z Fill, use of
2	Working with Data: Importing data, Data En	ntry & Manipulation	, Sorting & Filtering.	
3	Working with Data: Data Validation, Pivot	Tables & Pivot Char	ts.	
4	Data Analysis Process: Conditional Formatt	ing, What-If Analys	is, Data Tables, Charts & Graphs.	
5	Cleaning Data with Reference Functions: us	se of UPPER and LC	WER, TRIM function, Concatenate.	
6	Cleaning Data Containing Date and Time TIMEVALUE functions.			d DATEDIF
7	Conditional Formatting: formatting, parsing	, and highlighting da	ata in spreadsheets during data analysi	IS.
8	Working with Multiple Sheets: work with managing data, perform complex calculatio	h multiple sheets v	vithin a workbook is crucial for or	
9	Create worksheet with following fields: En Allowance (DA), House Rent Allowance ( appropriate formulas to calculate the above	npno, Ename, Basic (HRA), Income Tax	c Pay (BP), Travelling Allowance (T (IT), Provident Fund (PF), Net Pay	(NP). Use
	Create worksheet on Inventory Management	nt: Sheet should cor	ntain Product code, Product name, Pr	oduct type,
10	MRP, Cost after % of discount, Date of Analyse the data using appropriate chart and	purchase. Use appr		• •
	Create worksheet on Sales analysis of Merc	handise Store: data ory of product, size,		, Gender, age



	Use of formula to segregate different categories and perform a comparative study using pivot tables and different sort of charts.
12	Generation of report & presentation using Autofilter &macro.

				Upon	complet			UTCON e, the st	udents will	be ab	le to:				
CO No.				1	<b>+</b>	irse Ou		-							Bloom's axonomy Level
CO1		Use a	advance	d functi	ons and	product	ivity to	ols to as	sist in dev	elopir	ng work	sheets		CL2	
CO2				Manip	oulate da	ata lists	using O	utline a	nd PivotT	ables					CL3
CO3		Us	e Conso						ts from mu		worksh	eets		CL3	
CO4							-		ven real-w	-					CL3
			дрргу	Wideros				MAPP		ond s					
CO No.	Programme O													Spec	amme cific e (PSO)
1100	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1															
CO2															
CO3 CO4															
C04 C05															
005	3:	Substa	ntial (H	igh)		2: N	Aodera	te (Med	ium)			1	: Por	or (Lo	w)
	Assess	sment w			and SEE			ng will b	be assessed	-	Direct a	and Indi			
Sl. No.					Descri			Weightage (%)						. Mai	rks
1	(	Continu	ous Inte	ernal As tory Wo		it (CIA)		<u>100</u>	% %				<b>50</b> 25		
-									%				15		
	Laboratory Test (B)           Problems solved in Competitive										10				
Programming websites (C)2Semester End Examination (SEE)						100 % 5				50	)				
I										I					
		atory Co ge (50 M		vhere (B)					<b>TEGY:</b> s of the ass	essme	nt patter	n, then (	(A) w	rill hav	ve 100%
	<b>Asses</b> Conti	<b>sment</b> I nuous Ir	<b>Mode:</b> W nternal A	ssessme	ent (Wee	kly Asse	essment,	each of	(50 Marks) 25 marks) be the Fin	of the	students				

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

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

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

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

COLLEGE OF

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

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MANAGEMENT

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

#### **SEE QUESTION PAPER PATTERN:**

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

marks.

### **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

- 1. Berk & Carey Data Analysis with Microsoft® Excel: Updated for Offi ce 2007®, Third Edition, © 2010 Brooks/Cole, Cengage Learning, ISBN-13: 978-0-495-39178-4
- 2. Wayne L. Winston Microsoft Excel 2019: Data Analysis And Business Modeling, PHI, ISBN: 9789389347180
- 3. Aryan Gupta Data Analysis in Excel: The Best Guide. (https://www.simplilearn.com/tutorials/excel-tutorial/dataanalysis-excel)



Number of Contact Hours/Week (L: T: P: S)         0:0:2:0         SEE Marks         50           Total Hours of Pedagogy         20P         Exam Hours         03           CREDITS – 1           COURSE PREREQUISITES:           • Basic Knowledge of creating Graphical User Interface           COURSE OBJECTIVES:           • To to provide students with the knowledge of user- centered design, user -centered methods in design, design on screens.           • Learn about the importance of user experience design in the digital world.         • To enable the students to design theuser centered design in corporate perspective.           • To give exposure to wire framing and Prototyping software in the various UI/UX Design tools.         TEACHING - LEARNING STRATEGY:           Following are some sample strategies that can be incorporate for the Course Delivery           • Chalk and Talk Method/Blended Mode Method         • Power Point Presentation           • Expert Talk/Webinar/Seminar         • Video Streaming/Self-Study/Simulations           • Peer-to-Peer Activities         • Activity/Problem Based Learning           • Case Studies         • MOOC/NPTEL Courses           • Any other innovative initiatives with respect to the Course contents         CO2           1         Demonstrate the Interface connectivity between two different program modules.         CO2          2         Designing a small	(Effective from the Academic Year 2022 - 2023)         III SEMESTER         CS32298CB         CIA Marks         50         20P         Exam Hours         OB         CREDITS – 1         CREDITS – 1         CREDITS – 1         phical User Interface         knowledge of user- centered design, user -centered methods in design, graphic         er experience design in the digital world.         heuser centered design in corporate perspective.         and Prototyping software in the various UI/UX Design tools.         EGY:         at can be incorporate for the Course Delivery         Mode Method       allations         allations         CO         Vith respect to the Course contents         LIST OF EXPERIMENTS         Description         CO2/CO3         op using Figma.         CO2/CO3         op using Figma.         CO2/CO3         op using Adobe XD       CO2/CO3 <th></th> <th></th> <th>MANGALU</th> <th>IRU</th> <th></th>			MANGALU	IRU	
III SEMESTER         Course Code       CS32298CB       C1A Marks       50         Number of Contact Hours/Week (L: T: P: S)       0:0-2:0       SEE Marks       50         Total Hours of Pedagogy       20P       Exam Hours       03         CREDITS - 1         COURSE PREREQUISITES:         Basic Knowledge of creating Graphical User Interface         COURSE OBJECTIVES:         • To to provide students with the knowledge of user- centered design, user -centered methods in design, design on screens.         • Learn about the importance of user experience design in the digital world.         • To enable the students to design theuser centered design in corporate perspective.         • To egive exposure to wire framing and Prototyping software in the various UI/UX Design tools.         TEACIING • LEARNING STRATEGY:         Following are some sample strategies that can be incorporate for the Course Delivery         • Chalk and Talk Method/Blended Mode Method         • Power Point Presentation         • Examing/Self-Study/Simulations         • Peer-to-Peer Activities         • Any other innovative initiatives with respect to the Course contents         • MOOC/NPTEL Courses       • Any other in	III SEMESTER         CS32298CB       CIA Marks       50         20P       Exam Hours       03         CREDITS – 1         Phical User Interface         knowledge of user- centered design, user -centered methods in design, graphic         erexperience design in the digital world.         heuser centered design in corporate perspective.         and Prototyping software in the various UI/UX Design tools.         EGY:         at can be incorporate for the Course Delivery         Mode Method       ulations         ulations         COUrse contents         LIST OF EXPERIMENTS         Description         CO2/CO3         ing Figma.         CO2/CO3         ing Figma.         CO2/CO3         isgn using Adobe XD         co2/CO3         isgn using Adobe XD and include animation between         CO2/CO3         isgn using Adobe XD and include animation between         CO2/CO3         isgn using Adobe XD and include animation between<			UI/UX Design		
Course Code         CS32298CB         CIA Marks         50           Number of Contact Hours/Week (L: T: P: S)         0:0:2:0         SEE Marks         50           Total Hours of Pedagogy         20P         Exam Hours         50           CREDITS - 1         CREDITS - 1         03         02           CREDITS - 1           CREDITS - 03           COURSE OBJECTIVES:           • To to provide students with the knowledge of user- centered design, user -centered methods in design, design on screens.           • Learn about the importance of user experience design in the digital world.           • To give exposure to wire framing and Prototyping software in the various UI/UX Design tools.           FEACHING - LEARNING STRATEGY:           Following are some sample strategies that can be incorporate for the Course Delivery           • Chalk and Talk Method/Blended Mode Method         Power Point Presentation           • Expert Talk/Webinar/Seminar         • Video Streaming/Self-Study/Simulations           •	CS32298CB       CIA Marks       50         P: S)       0:0:2:0       SEE Marks       50         20P       Exam Hours       03         CREDITS – 1       03         phical User Interface       03         knowledge of user- centered design, user -centered methods in design, graphic         er experience design in the digital world.         heuser centered design in corporate perspective.         and Prototyping software in the various UI/UX Design tools.         EGY:         at can be incorporate for the Course Delivery         Mode Method         ulations         vith respect to the Course contents         LIST OF EXPERIMENTS         Description       CO1         nectivity between two different program modules.       CO1         op using Figma.       CO2/CO3         ing Figma.       CO2/CO3         endar application using Adobe XD       CO2/CO3         sens.       CO2/CO3         eense       COURSE OUTCOMES         kents will be able to:       Bloom's				,	
Dotation         Control Names         Display Stress           South Course         0:0:2:0         SEE Marks         50           Total Hours of Pedagogy         20P         Exam Hours         03           CREDITS – 1           COURSE PREREQUISITES: <ul> <li>Basic Knowledge of creating Graphical User Interface</li> </ul> COURSE OBJECTIVES:         0 <ul> <li>To to provide students with the knowledge of user- centered design, user -centered methods in design, design on screens.</li> <li>Learn about the importance of user experience design in the digital world.</li> <li>To enable the students to design theuser centered design in corporate perspective.</li> <li>To give exposure to wire framing and Prototyping software in the various UI/UX Design tools.</li> </ul> FEACHING - LEARNING STRATEGY:         "ollowing are some sample strategies that can be incorporate for the Course Delivery <ul> <li>Chalk and Talk Method/Blended Mode Method</li> <li>Power Point Presentation</li> <li>Expert Talk/Webinar/Seminar</li> <li>Video Streaming/Self-Study/Simulations</li> <li>Peer-to-Peer Activities</li> <li>Activity/Problem Based Learning</li> <li>Case Studies</li> <li>MOOC/NPTEL Courses</li> <li>Any other innovative initiatives with respect to the Course contents</li> </ul> <li>IST OF EXPERIMENTS</li> <li>SI.</li> <li>Demonstrate the Interface connectivity between two di</li>	P: S)       0:0:2:0       SE Marks       50         20P       Exam Hours       03         CREDITS – 1	7				50
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COURSE PREREQUISITES: <ul> <li>Basic Knowledge of creating Graphical User Interface</li> </ul> COURSE OBJECTIVES: <ul> <li>To to provide students with the knowledge of user- centered design, user -centered methods in design, design on screens.</li> <li>Learn about the importance of user experience design in the digital world.</li> <li>To enable the students to design theuser centered design in corporate perspective.</li> <li>To give exposure to wire framing and Prototyping software in the various UI/UX Design tools.</li> </ul> FEACHING - LEARNING STRATEGY:           "ollowing are some sample strategies that can be incorporate for the Course Delivery           • Chalk and Talk Method/Blended Mode Method           • Power Point Presentation           • Expert Talk/Webinar/Seminar           • Video Streaming/Self-Study/Simulations           • Peer-to-Peer Activities           • Activity/Problem Based Learning           • Case Studies           • MOOC/NPTEL Courses           • Any other innovative initiatives with respect to the Course contents           SI.         Description           0         Outer           1         Demonstrate the Interface connectivity between two different program modules.         CO           2         Designing a small calculator app using Figma.         CO2           3 </td <td>phical User Interface         knowledge of user- centered design, user -centered methods in design, graphic         er experience design in the digital world.         heuser centered design in corporate perspective.         and Prototyping software in the various UI/UX Design tools.         EGY:         at can be incorporate for the Course Delivery         Mode Method         allations         statistic state         vith respect to the Course contents         LIST OF EXPERIMENTS         Description       CO         nectivity between two different program modules.       CO1         op using Figma.       CO2/CO3         ing Figma.       CO2/CO3         lendar application using Adobe XD       CO2/CO3         ersp.       CO2/CO3         ens.       CO2/CO3         Biom's       CO2/CO3</td> <td></td> <td>· · · · ·</td> <td>20P</td> <td></td> <td>03</td>	phical User Interface         knowledge of user- centered design, user -centered methods in design, graphic         er experience design in the digital world.         heuser centered design in corporate perspective.         and Prototyping software in the various UI/UX Design tools.         EGY:         at can be incorporate for the Course Delivery         Mode Method         allations         statistic state         vith respect to the Course contents         LIST OF EXPERIMENTS         Description       CO         nectivity between two different program modules.       CO1         op using Figma.       CO2/CO3         ing Figma.       CO2/CO3         lendar application using Adobe XD       CO2/CO3         ersp.       CO2/CO3         ens.       CO2/CO3         Biom's       CO2/CO3		· · · · ·	20P		03
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3       Create a photo gallery prototype using Figma.       CO2         4       Create a custom profile card using Figma.       CO2         5       Build the user interface for calendar application using Adobe XD       CO2         6       Build the Travel application design using Adobe XD and include animation between       CO2	De using Figma.       CO2/CO3         ing Figma.       CO2/CO3         lendar application using Adobe XD       CO2/CO3         esign using Adobe XD and include animation between       CO2/CO3         course Outcomes       CO2/CO3         lents will be able to:       Bloom'	1	Demonstrate the Interface connectivity betw	veen two different	program modules.	CO1
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6     Build the Travel application design using Adobe XD and include animation between     CO2	COURSE OUTCOMES lents will be able to: Bloom' Bloom'	4	Create a custom profile card using Figma.			CO2/CO3
8	COURSE OUTCOMES lents will be able to: Bloom'	5	Build the user interface for calendar applic	ation using Adobe	XD	CO2/CO3
contents between different screens.	lents will be able to: Bloom' Bloom'	6	Build the Travel application design using A contents between different screens.	Adobe XD and incl	ude animation between	CO2/CO3
	Course Outcome Description Bloom'				ES	
Upon completion of this course, the students will be able to:	Course Outcome Description	-	mpletion of this course, the students will be a	able to:		
Course Outcome Description	Level		Course O	Outcome Descript	tion	Taxonomy
		CO1	Illustrate effective and compelling screen	n based experience	es in UI/UX development.	CL4
CO1 Illustrate effective and compelling screen based experiences in UI/UX development.	STILLY STREET DANCE EADERFUES III UT/UTA DEVELOPTITETI $1 - 1 - 1 - 1 - 4$	0.01	mastrate effective and competing select	a subta experiente	es in ou ou development.	

Experiment and analyze the various visual design aspects in UI/UX development.

Analyze all stages of the UI/UX development process in different tools.

CL4

CL4

CO2

CO3



	CO-PO-PSO MAPPING													
СО					Progr	amme (	Outcom	ies (PO)	)				-	ramme ecific
No.										I	Outcon	ne (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	2	3				2		3	3	3	3
CO2	3	2	3	2	3				2		3	3	3	3
CO3	3	2	3	2	3				2		3	3	3	3
CO4	3	2	3	2	3				2		3	3	3	3
CO5	3	2	3	2	3				2		3	3	3	3
	3:	Substar	ntial (Hi	gh)		2: Moderate (Medium)						1	: Poor (L	ow)

MANGALURU

MANAGEMENT

### ASSESSMENT STRATEGY

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

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

#### **ASSESSMENT STRATEGY:**

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

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

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

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

- In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A).
- A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier. The obtained marks are scaled down to 25 Marks (B) The Sum of marks obtained across (A) and (B) will be the Final CIA marks.
- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) - 25 Marks (Weekly Assessment), (B) - 15 Marks (Laboratory Examination), (C) – 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

#### **SEE OUESTION PAPER PATTERN:**

- 1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
  - 2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.



3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.

4. Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.

### **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

1. https://help.figma.com/hc/en-us/sections/4405269443991-Figma-for-Beginners-tutorial-4-parts-

- 2. https://www.youtube.com/watch?v=HZuk6Wkx Eg
- 3. https://www.youtube.com/watch?v=dXQ7IHkTiMM



			MANGAL	URU	
			MERN		
		(1	Effective from the Academic III SEMES	,	
Course (	Code		CS32298CC	CIA Marks	50
		ct Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50
	ours of Pe		20P	Exam Hours	03
			CREDITS	-1	
	COURS •	SE PREREQUISITES: Fundamental Knowledge of HTM	ML, CSS.		
	COURS	SE OBJECTIVES:			
	•	To design as web page using from To develop application with serv To develop web application with To build as responsive web appli	er side scripting tools. REST APIs and use of f	ramework to communicate client-server agona to the server agona to	pplications.
	TEACI	HING - LEARNING STRATE	GY:		
	• E • V • P • A • C	ower Point Presentation (xpert Talk/Webinar/Seminar Video Streaming/Self-Study/Simu eer-to-Peer Activities (activity/Problem Based Learning Case Studies MOOC/NPTEL Courses (any other innovative initiatives we			
	SI.				
	No.		Desci	ription	
	1	Demonstrate React Component	t Life cycle.		
	2	Develop React components for	a basic frontend applica	tion.	
	3	Simulate the process of establish	shing communication bet	ween the React frontend and Express back	cend.
	4	Demonstrate process of connect operations.	ting Express application	to a MongoDB database and perform data	lbase
	5	Implement MERN application	for user authentication a	nd authorization	
	6	Demonstrate the Redux integra	tion method for state ma	nagement in your React application.	
	7	Build a web application using t	he Express.js framework	- - •	
	8	** *		lata I/O (Buffer, Stream, Zlib modules).	
		1 J	COURSE OUT		
	Upon co	ompletion of this course, the stude			
CO No.			Course Outcome De	-	Bloom's Taxonomy Level
CO1		frontend application.		lement React components for a basic	CL3
CO2		backend.	-	etween the React frontend and Express	CL3
CO3		Demonstrate various database Database.	e operations by connecti	ng Express application to a MongoDB	CL3

An Autonomous Institution MANGALURU Illustrate MERN application for user authentication and implement Redux integration method CO4 CL3 for state management. CO5 CL3 Demonstrate Node.js application and handling I/O data. **CO-PO-PSO MAPPING Programme Specific** CO **Programme Outcomes (PO) Outcome (PSO)** No. 1 2 3 4 5 7 8 9 10 11 12 1 2 3 6 3 2 2 2 **CO1** 1 1 3 2 2 2 1 1 **CO2 CO3** 3 2 1 2 1 2 3 2 1 2 1 2 **CO4 CO5** 3 2 1 2 1 2 3: Substantial (High) 2: Moderate (Medium) 1: Poor (Low) ASSESSMENT STRATEGY Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods: Sl. No. **Assessment Description** Weightage (%) Max. Marks **Continuous Internal Assessment (CIA)** 100 % 50 1 50 % Laboratory Work (A) 25 Laboratory Test (B) 30 % 15 Open Ended Experiments /Mini Projects (C) 20 % 10 100 % 2 **Semester End Examination (SEE)** 50 **ASSESSMENT STRATEGY:** I. In Laboratory Courses where (B) and (C) are not the components of the assessment pattern, then (A) will have 100% weightage (50 Marks). Assessment Mode: Weekly Assessment of Laboratory Work (50 Marks) - the marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment, each of 25 marks) of the students in each laboratory session. The average of all the marks obtained across the sessions will be the Final CIA marks. II. In Laboratory Courses where (C) is not a component of the assessment pattern, then (A) will have 50% weightage (25 Marks), and (B) will have 50% weightage (25 Marks). Assessment Mode: The marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment) (A) and One Laboratory Test (B). • In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A). • A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier. The obtained marks are scaled down to 25 Marks (B) The Sum of marks obtained across (A) and (B) will be the Final CIA marks. III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) - 25 Marks (Weekly Assessment), (B) - 15 Marks (Laboratory Examination), (C) – 10 marks (Open Ended Experiments/Mini Projects) • The respective course instructor will design the assessment criteria for the said assessment components. • The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work. In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator. **SEE QUESTION PAPER PATTERN:** 1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50. 2.

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3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.



4. Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.
REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):
<ol> <li>https://nptel.ac.in/courses/106106156</li> <li>https://www.coursera.org/learn/introduction-to-front-end-development</li> </ol>



COLLEGE OF ENGINEERING & MANAGEMENT

	SAHYADRI		ous Institution ALURU					
			MING USING C++					
(Effective from the Academic Year 2023 - 2024) III SEMESTER								
Course	e Code	CS32298CD	CIA Marks	50				
	er of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50				
	Hours of Pedagogy	20P	Exam Hours	03				
		CREDITS -	1					
COUF	RSE PREREQUISITES:							
	Basic Knowledge of C.							
COUR	RSE OBJECTIVES:							
•								
TEAC	CHING - LEARNING STRATEGY:							
	ving are some sample strategies that can be	-	e Course Delivery					
	Chalk and Talk Method/Blended Mode Me Power Point Presentation	ethod						
	Expert Talk/Webinar/Seminar							
	Video Streaming/Self-Study/Simulations							
	Peer-to-Peer Activities							
•	Activity/Problem Based Learning							
	Case Studies							
•	Any other innovative initiatives with respe	ct to the Course of	ontents					
	LIST	OF EXPERI	MENTS					
SI. No.		Descri	ption					
1	Introduction to programming in C++: i Logical, comparison, Bitwise, operator p		ables, datatypes, operators	(Arithmetic, Assignment,				
2	Conditions, Loop, Functions, Introduction	n to competitive j	programming- sample progra	ams				
3	Simple programs in C++							
4	Standard Template Library: Sequential – Pairs, Programs							
5	Standard Template Library: Sequential – Vectors, Programs							
6	Standard Template Library: Sequential- Stacks, Programs							
7	Standard Template Library: Sequential- (	Queue, Programs						
8	Standard Template Library: Ordered and Unordered Maps, Programs							
9	Standard Template Library: Ordered and	Unordered – Sets	, Programs					
10	Recursion, backtracking, Upper Bound, I	lower Bound						
11	Recursion, backtracking, Upper Bound, I	lower Bound						
12	Introduction to Classes and objects in C+	+, Programs						



#### **COURSE OUTCOMES**

Upon co	mpleti	on of th	is course	e, the stu	udents w	rill be ab	le to:									
CO No.					Cou	rse Ou	tcome	Descrip	tion					Ta	loom's xonomy Level	
CO1	Write	e simple	e progra	ms in C	C++ and	work w	ith vari	ous con	npetitive	e progra	mming	website	s		CL2	
CO2		nderstand and apply Pair, and vectors as a part of the Standard Template Library (STL) in ++ to different problem statements									CL3					
CO3		Understand and apply Stacks, and queue as a part of the STL in C++ to different problem CL3														
CO4	Understand and apply Maps, and Sets as STL in C++ to different problem statements CL3															
CO5	Understand and apply Object Oriented Concepts in C++, recursion and backtracking									CL2						
						CO-PO	D-PSO	MAPP	NG							
CO No.					Progr	amme	Outcom	nes (PO	)					Programme Specific utcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3	3	1	3							2	2	1	3	
CO2	3	3	3	1	3							2	2	1	3	
CO3	3	3	3	1	3							2	2	1	3	
<b>CO4</b>	3	3	3	1	3							2	2	1	3	
CO5	3	3	3	1	3							2	2	1	3	
3	8: Subs	tantial	(High)		2: Moderate (Medium) 1: Poor (Lo					(Low	r)					

#### ASSESSMENT STRATEGY

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

Sl. No.	Assessment Description	Weightage (%)	Max. Marks
1	Continuous Internal Assessment (CIA)	100 %	50
	Laboratory Work (A)	50 %	25
	Laboratory Test (B)	30 %	15
	Problems solved in Competitive Programming websites (C)	20 %	10
2	Semester End Examination (SEE)	100 %	50

#### **ASSESSMENT STRATEGY:**

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

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

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

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

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

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

III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by

considering the weightages given above, i.e. (A) - 25 Marks (Weekly Assessment), (B) - 15 Marks (Laboratory Examination), (C) - 10 marks (Open Ended Experiments/Mini Projects)

- The respective course instructor will design the assessment criteria for the said assessment components.
- The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

#### SEE QUESTION PAPER PATTERN:

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

### **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

- 1. https://www.geeksforgeeks.org/competitive-programming-a-complete-guide/
- 2. https://www.youtube.com/playlist?list=PLauivoElc3ggagradg8MfOZreCMmXMmJ-



	SAHYADRI	MANGALU		
		UI/UX DESIGN		
	(Effective fro	om the Academic Year	· 2023 - 2024)	
		III SEMESTER		
	e Code	CS32298CB	CIA Marks	50
	er of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50
Total I	Hours of Pedagogy	20P	Exam Hours	03
		<b>CREDITS</b> – 1		
COUR	RSE PREREQUISITES:			
•	Basic Knowledge of creating Graphical User	r Interface		
COUR	RSE OBJECTIVES:			
•	To to provide students with the knowledge of design on screens.	of user- centered des	ign, user -centered methods in desi	gn, graphic
	Learn about the importance of user experier	÷ *		
	To enable the students to design theuser cert	• •		
	To give exposure to wire framing and Proto	otyping software in the	ne various UI/UX Design tools.	
TEAC	CHING - LEARNING STRATEGY:			
Follow	ing are some sample strategies that can be ir	ncorporate for the Co	ourse Delivery	
•	Chalk and Talk Method/Blended Mode Method	hod		
•	Power Point Presentation			
•	Expert Talk/Webinar/Seminar			
	Video Streaming/Self-Study/Simulations			
	Peer-to-Peer Activities			
	Activity/Problem Based Learning			
	Case Studies			
	MOOC/NPTEL Courses	to the Course conto		
•	Any other innovative initiatives with respect	<b>OF EXPERIMI</b>		
CT				00
SI.	1	Description		CO
No				
1	Demonstrate the Interface connectivity be	tween two different	program modules.	CO1
2	Designing a small calculator app using Fi	gma.		CO2/CO3
3	Create a photo gallery prototype using Fig			CO2/CO3
4	Create a custom profile card using Figma.			CO2/CO3
5	Build the user interface for calendar appli	cation using Adobe	XD	CO2/CO3
6	Build the Travel application design using	Adobe XD and incl	ude animation between contents	CO2/CO3

	COURSE OUTCOMES									
Upon co	mpletion of this course, the students will be able to:									
CO No.	Course Outcome Description	Bloom's Taxonomy Level								
CO1	Illustrate effective and compelling screen based experiences in UI/UX development.	CL4								
CO2	Experiment and analyze the various visual design aspects in UI/UX development.	CL4								
CO3	Analyze all stages of the UI/UX development process in different tools.	CL4								

between different screens.



						CO-PC	J-P50	WAPPI	ING					
CO No.		Programme Outcomes (PO)												ramme ecific ne (PSO)
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	2	3				2		3	3	3	3
CO2	3	2	3	2	3				2		3	3	3	3
CO3	3	2	3	2	3				2		3	3	3	3
CO4	3	2	3	2	3				2		3	3	3	3
CO5	3	2	3	2	3				2		3	3	3	3
3	B: Sub	stantial	(High)	1		2: Mod	erate (N	/ledium	)			1: Poor	(Low)	

#### ASSESSMENT STRATEGY

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

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

### **ASSESSMENT STRATEGY:**

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

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

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

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

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

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

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

### **SEE QUESTION PAPER PATTERN:**

- 1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
- 2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.



- 3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.
- 4. Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.

### **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

- 1. https://help.figma.com/hc/en-us/sections/4405269443991-Figma-for-Beginners-tutorial-4-parts-
- 2. <u>https://www.youtube.com/watch?v=HZuk6Wkx Eg</u>
- 3. https://www.youtube.com/watch?v=dXQ7IHkTiMM



		MANGA	LURU								
MERN											
(Effective from the Academic Year 2023 - 2024)											
III SEMESTER											
Course C		CS32298CC	CIA Marks	50							
	of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50							
Total Ho	Total Hours of Pedagogy20PExam Hours03										
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		CREDITS – 1									
	<b>E PREREQUISITES:</b> Fundamental Knowledge of HTML, CSS.										
COURS	E OBJECTIVES:										
• 7 • 7 • 7 • 7 • 7 • 7 • 7 • 7 • 7 • 7	To design as web page using front end techn To develop application with server side scri To develop web application with REST AP. To build as responsive web application with <b>ING - LEARNING STRATEGY:</b> g are some sample strategies that can be included nalk and Talk Method/Blended Mode Methor wer Point Presentation typert Talk/Webinar/Seminar deo Streaming/Self-Study/Simulations er-to-Peer Activities ctivity/Problem Based Learning ase Studies OOC/NPTEL Courses	pting tools. Is and use of fram a managing SQL of corporate for the O od	latabases.	nt-server applications.							
• Ar	ny other innovative initiatives with respect										
		OF EXPERIM	IENTS								
Sl. No.		Descript	ion								
1	Demonstrate React Component Life cycle.										
2	Develop React components for a basic from	itend application.									
3	Simulate the process of establishing comm	unication betweer	the React frontend and Exp	press backend.							
4	Demonstrate process of connecting Express operations.	s application to a	MongoDB database and peri	form database							
5	Implement MERN application for user auth	nentication and au	thorization								
6	Demonstrate the Redux integration method	for state manage	ment in your React application	on.							
7	Build a web application using the Express.	js framework.									
8	Develop a Node.js application demonstration	ng handling data l	O (Buffer, Stream, Zlib mo	dules).							

	COURSE OUTCOMES									
Upon co	Upon completion of this course, the students will be able to:									
CO No.	Course Outcome Description	Bloom's Taxonomy Level								
CO1	Demonstrate React Component Life cycle and implement React components for a basic frontend application.	CL3								
CO2	Illustrate the process of establishing communication between the React frontend and Express backend.	CL3								

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CO3	Demonstrate various database operations by connecting Express application to a MongoDB Database.	CL3
CO4	Illustrate MERN application for user authentication and implement Redux integration method for state management.	CL3
CO5	Demonstrate Node.js application and handling I/O data.	CL3

### **CO-PO-PSO MAPPING**

CO No.		Programme Outcomes (PO)												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	1		2				1			2		
CO2	3	2	1		2				1			2		
CO3	3	2	1		2				1			2		
CO4	3	2	1		2				1			2		
CO5	3	2	1		2				1			2		
3	B: Subs	stantial	(High)			2: Mode	erate (N	ate (Medium) 1: Poor					(Low)	
Assessm	nent wi	ll be bot	th CIA a	nd SEE		SSESSI Its learnin			-	g Direct	and Inc	lirect me	ethods:	
Sl. No.	Assessment Description							Weightage (%) Max. Marks						
1			Interna		sment (	CIA)		100	%				50	
		2	Work (A	)				50	%				25	
	Labo	oratory T	Cest (B)					30 % 15						

### **ASSESSMENT STRATEGY:**

2

Open Ended Experiments /Mini Projects (C)

Semester End Examination (SEE)

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

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

20 %

100 %

10

50

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

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

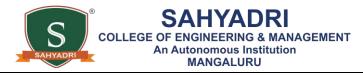
- In Weekly Assessment, the student will be evaluated in each laboratory session for 25 marks. The average marks obtained across all the experiments will be the marks obtained for (A).
- A Laboratory Test, similar to the SEE exam is conducted towards the end of the Semester/Course, whichever is earlier.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

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

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

### **SEE QUESTION PAPER PATTERN:**



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

# **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

- 1. https://nptel.ac.in/courses/106106156
- 2. https://www.coursera.org/learn/introduction-to-front-end-development



### COMPETITIVE PROGRAMMING USING C++

(Effective from the Academic Year 2022 - 2023)

**III SEMESTER** 

III SEMIESTER									
Course Code	CS32298CD	CIA Marks	50						
Number of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50						
Total Hours of Pedagogy	20P	Exam Hours	03						
	CREDITS – 1								

# **COURSE PREREQUISITES:**

• Basic Knowledge of C.

### **COURSE OBJECTIVES:**

# **TEACHING - LEARNING STRATEGY:**

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

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

### LIST OF EXPERIMENTS

Sl. No.	Description						
1	Introduction to programming in C++: input/output, variables, datatypes, operators (Arithmetic, Assignment, Logical, comparison, Bitwise, operator precedence)						
2	Conditions, Loop, Functions, Introduction to competitive programming- sample programs						
3	Simple programs in C++						
4	Standard Template Library: Sequential – Pairs, Programs						
5	Standard Template Library: Sequential – Vectors , Programs						
6	Standard Template Library: Sequential- Stacks , Programs						
7	Standard Template Library: Sequential- Queue, Programs						
8	Standard Template Library: Ordered and Unordered Maps, Programs						
9	Standard Template Library: Ordered and Unordered – Sets, Programs						
10	Recursion, backtracking, Upper Bound, Lower Bound						
11	Recursion, backtracking, Upper Bound, Lower Bound						
12	Introduction to Classes and objects in C++, Programs						
	COURSE OUTCOMES						
Upon co	ompletion of this course, the students will be able to:	1					
CO No.	Course Outcome Description	Bloom's Taxonomy Level					
CO1	Write simple programs in C++ and work with various competitive programming websites	CL2					

CO2		Understand and apply Pair, and vectors as a part of the Standard Template Library(STL) in C++ to different problem statements													CL3
CO3		Understand and apply Stacks, and queue as a part of the STL in C++ to different problem CL3													
CO4	Unde	Understand and apply Maps, and Sets as STL in C++ to different problem statements CL3													
CO5	Understand and apply Object Oriented Concepts in C++, recursion and backtracking													CL2	
						CO-PO	O-PSO	MAPPI	NG			-			
	Progr											amme			
СО					Progr	amme	Outcom	es (PO	)					Spe	cific
No.													Ou	utcome (PSO)	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	1	3							2	2	1	3
CO2	3	3	3	1	3							2	2	1	3
CO3	3	3	3	1	3							2	2	1	3
CO3 CO4	3 3	3 3	3 3	1 1	3 3							2 2	2 2	1 1	3 3
	U	-	-	1 1 1	-							_	-	1 1 1	-
CO4 CO5	3 3	3 3	3	1 1 1	3	2: Mod	erate (N	(Iedium	)			2	2 2 2	1 1 1	3

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

Sl. No.	Assessment Description	Weightage (%)	Max. Marks
1	Continuous Internal Assessment (CIA)	100 %	50
	Laboratory Work (A)	50 %	25
	Laboratory Test (B)	30 %	15
	Problems solved in Competitive Programming websites (C)	20 %	10
2	Semester End Examination (SEE)	100 %	50

### ASSESSMENT STRATEGY:

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

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

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

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

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

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

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators



prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

### SEE QUESTION PAPER PATTERN:

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

## **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

- 1. https://www.geeksforgeeks.org/competitive-programming-a-complete-guide/
- 2. https://www.youtube.com/playlist?list=PLauivoElc3ggagradg8MfOZreCMmXMmJ-



#### PRINCIPLES OF ARTIFICIAL INTELLIGENCE (Effective from the Academic Year 2023 - 2024) **IV SEMESTER** Course Code AM422I1A CIA Marks 50 Number of Contact Hours/Week (L: T: P: S) SEE Marks 3:0:2:0 50 Total Hours of Pedagogy 40L + 20PExam Hours 03 **CREDITS – 4 COURSE PREREOUISITES:** • Fundamental knowledge of mathematical concepts, analytical skills and programming. **COURSE OBJECTIVES:** • Gain a historical perspective of AI and its foundations. • Learn the methods of solving problems using AI. • Learn the knowledge representation techniques, logic concepts and planning. • Investigate applications of AI techniques in expert systems. **TEACHING - LEARNING STRATEGY:** Following are some sample strategies that can be incorporate for the Course Delivery • Chalk and Talk Method/Blended Mode Method • Power Point Presentation • Expert Talk/Webinar/Seminar • Video Streaming/Self-Study/Simulations • Peer-to-Peer Activities • Activity/Problem Based Learning • Case Studies • MOOC/NPTEL Courses • Any other innovative initiatives with respect to the Course contents **COURSE CONTENTS MODULE - I** Introduction to AI: Intelligent systems, Foundations and Sub area of AI, Applications, Tic-Tac-Toe 8 Game playing, Currents trend and developments of AI, General problem solving, Characteristics of Hours problem, Constraint satisfaction. **MODULE - II** Search Techniques and Game playing: Exhaustive searches, Heuristic search techniques, Game playing, 8 Bounded look-ahead strategy, Alpha-beta pruning, Two-player perfect information games. Hours **MODULE - III** Logic concepts and Prolog Programming concepts: Propositional calculus, Propositional logic, Natural 8 deduction system, Axiomatic system, Semantic tableau system in Propositional logic, Prolog program, Control strategy of prolog, Programming techniques in prolog, List manipulation in prolog, Structuring Hours of data in prolog, Recursive data types in prolog. **MODULE - IV** Planning and Knowledge Representation: Types of planning systems, Block world problem, Logic based 8 planning, Linear planning using Goal stack, Means-Ends analysis, Approaches to knowledge representation, Hours Knowledge representation using semantic network, Knowledge representation using frames. **MODULE - V** Expert system and Applications: Phases in building expert systems, Architecture of expert system, Expert 8 system versus traditional systems, Rule-based expert systems, Blackboard systems, Truth maintenance Hours systems, Application of expert systems.

#### **COURSE OUTCOMES**

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



CO No.	Course Outcome Description									Bloc Taxo Le	nomy				
CO1	Demonstrate the fundamental understanding of AI and its foundations.									Cl	L3				
CO2	Appl	Apply the knowledge of AI in search techniques and game playing.									Cl	L3			
CO3	Dem	Demonstrate the Logic concepts and Logic programming in AI.									Cl	L3			
CO4	Apply principles of AI in knowledge representation and planning.									Cl	L3				
CO5	Apply AI techniques to develop intelligent systems.									Cl	L3				
					LAB	BORA	<b>FORY</b>	СОМРО	NENTS						
Exp. No.	Experiment Description CO No.									Bloo Taxo Le	nomy				
1	Desig	Design and implement Tic-Tac-Toe game using Python programming. CO1									CO1	Cl	L3		
2	Demonstrate Nim game using Python programming. CO2									Cl	L3				
3	Write a program to implement A* Algorithm.CO2									Cl	L3				
4	Write a python program to demonstrate the working of Alpha-Beta Pruning.CO2									Cl	L3				
5	Demonstrate the Union and Intersection of two fuzzy Sets using python programming. CO3 C										Cl	L3			
6	Write a program in Prolog to implement simple arithmetic.CO3									Cl	L3				
7	Design and implement a Cross word puzzle using Python programming. CO4									Cl	L3				
8	Demonstrate a simple Chatbot with minimum 10 conversations. CO5									Cl	L3				
						СО-Р	O-PSO	MAPPI	NG						
CO No.	Programme Outcomes (PO)											Programme Specific Outcome (PSO)			
	1	2	3	4	5	6	7	8	9	10	11	12		1	2
CO1	3	3	2		2				1	1	1	1			
CO2	3	3	2	1	2					1		1			
CO3 CO4	3	3	$\begin{array}{c} 2\\ 2 \end{array}$		2					1					
C04 C05	3	3	2		2				1	1		1			
	3: Substantial (High)     2: Moderate (Medium)     1: Poor (Low)								·)						
Assessm	nent wi	ll be bot	th CIA a	and SEE				<b>STRAT</b> be assess		g Direc	et and Inc	direct	method	s:	
Sl. No.	Assessment Description						Weightage (%)			Max. Marks					
1	Continuous Internal Assessment (CIA) Continuous Internal Evaluation (CIE)				<b>100 %</b> 60 %				<b>50</b> 30						
	Practical Session (Laboratory Component Semester End Examination (SEE)				t)				20						
<u> </u>	Seme	ester Er	nd Exan	ninatior		ACCE		100 T DETA					50		
2					1	HODES	DOWLEIN	T DETA	ILS						
2		Cart		nto-m-1	A	mont (f	TA \ (64	)0/)		e	omostor	End 1	From (	SEE) (	(10/)
	nuous		nuous Iı l Evalua				, ,	)%) cal Sessio	ons (40%		emester	End l	Exam (	SEE) (5	50%)



	Syllabus Coverag	ge	Syllabus Coverage	Syllabus Coverage		
40%	30%	30%	100%	100%		
MI			MI	MI		
MII	MII		MII	MII		
	MIII		MIII	MIII		
		MIV	MIV	MIV		
		MV	MV	MV		

# NOTE:

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

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

### SEE QUESTION PAPER PATTERN:

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

### **TEXT BOOKS:**

- 1. Saroj Kaushik, Artificial Intelligence, Cengage Learning India Private Limited, 1<sup>st</sup> Edition, 2011, ISBN: 978-8131510995.
- 2. Elaine Rich and Kevin Knight, Artificial Intelligence, Tata McGraw Hill Publications, 3rd Edition, 2019, ISBN: 9780070087705.
- 3. Stuart Jonathan Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Publications, 3<sup>rd</sup> Edition, 2016, ISBN: 9781292153964.

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

- 1. https://onlinecourses.nptel.ac.in/noc22\_cs56
- 2. https://onlinecourses.nptel.ac.in/noc23\_ge40

#### COLLEGE OF **ENGINEERING & MANAGEMENT** An Autonomous Institution MANGALURU **COMPUTER NETWORK AND IT'S APPLICATIONS** (Effective from the Academic Year 2023 - 2024) **IV SEMESTER** Course Code AM422I2A CIA Marks 50 Number of Contact Hours/Week (L: T: P: S) 3:0:2:0 **SEE Marks** 50 Total Hours of Pedagogy 40L + 20PExam Hours 03 **CREDITS – 4 COURSE PREREOUISITES:** • Basic knowledge of computer. **COURSE OBJECTIVES:** Demonstration of application layer protocols Discuss transport layer services and understand UDP and TCP protocols • Explain routers, IP and Routing Algorithms in network layer • Illustrate concepts of Data link Layer, Physical layer and Multimedia Networking • Describe the concepts of networking over machine learning **TEACHING - LEARNING STRATEGY:** Following are some sample strategies that can be incorporate for the Course Delivery • Chalk and Talk Method/Blended Mode Method • Power Point Presentation • Expert Talk/Webinar/Seminar • Video Streaming/Self-Study/Simulations • Peer-to-Peer Activities • Activity/Problem Based Learning • Case Studies MOOC/NPTEL Courses • Any other innovative initiatives with respect to the Course contents **COURSE CONTENTS MODULE - I** Introduction to networks: Network hardware, Network software, Reference models 8 Hours Principles of Network Applications: Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols. The Web and HTTP: Overview of HTTP, Non-persistent and Persistent Connections, HTTP Message Format, User-Server Interaction: Cookies, Web Caching, The Conditional GET, File Transfer: FTP Commands & Replies, Electronic Mail in the Internet: SMTP, Comparison with HTTP, Mail Message Format, Mail Access Protocols, DNS; The Internet's Directory Service: Services Provided by DNS, Overview of How DNS Works, DNS Records and Messages. **MODULE - II** Introduction and Transport-Layer Services: Relationship Between Transport and Network Layers, 8 Hours Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing: Connectionless Transport: UDP, UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N, Selective repeat, Connection-Oriented Transport TCP: The TCP Connection, TCP Segment Structure, Round Trip Time

MODULE - III

Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management.

The Network layer: Router Architecture, Input Processing, Switching, Output Processing, Occurrence of<br/>Queuing, IPv6, A Brief foray into IP Security, Routing Algorithms: The Link-State (LS) Routing<br/>Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet,<br/>Intra-AS Routing in the Internet: RIP and OSPF. Inter/AS Routing: BGP, Broadcast Routing Algorithms<br/>and Multicast.8 HoursPhysical Learner Cuided temperature and is<br/>Wireless temperature.Wireless temperature.8

Physical Layer: Guided transmission media, Wireless transmission.



#### SAHYADRI COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU

The De	MODULE - IV		1-
	ta link layer: Design issues of Data Link Layer, Error detection and correction, Elementary		0 Hours
-	ls, Sliding window protocols. The medium access control sublayer: The channel allocation e access protocols.	ii problem	Ι,
-	edia Networking: Properties of video, properties of Audio, Types of multimedia	Networ	k
	tions, <b>Streaming stored video:</b> UDP Streaming, HTTP Streaming, Adaptive streaming ar		
	distribution Networks Voice-over-IP: Limitations of the Best-Effort IP Service, Removir		
	eiver for Audio, Recovering from Packet Loss Protocols for Real-Time Conversational Ap	0	
RTP, SI		1	7
	MODULE - V		
Deep L	earning in Traffic Management: Introduction, Survey on DNS over HTTPS, DNS over	Telnet and	d 8 Hours
machine	e Learning Classification, Implementation, Results and Analysis.		0 Hours
Machin	e Learning–Based Approach for Detecting Beacon Forgeries in Wi-Fi Networks: Intro	duction to	0
the Mod	lels, Dataset Generation, Dataset Classification, Evaluation.		
	COURSE OUTCOMES		
Upon co	ompletion of this course, the students will be able to:		
CO No.	Course Outcome Description		Bloom's Taxonomy Level
CO1	Discuss the principles of application layer and importance of its protocol		CL2
CO2	Discuss transport layer services and infer UDP and TCP protocol		CL2
CO3	Explain the architecture of Router and its algorithms in network layer and able to explain the transmission of data over medium in physical layer		CL2
CO4	Discuss the design issues and error control of data link layer		CL2
CO5	Explain the application of networking concepts in deep learning and machine learning		CL2
	LABORATORY COMPONENTS		012
	LABORATORY COMPONENTS		
Exp. No.	LABORATORY COMPONENTS Experiment Description	CO No.	Bloom's Taxonomy
-			Bloom's
No.	Experiment Description           Implement three nodes point – to – point network with duplex links between them. Set	No.	Bloom's Taxonomy Level
<b>No.</b> 1.	Experiment Description         Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2         Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using	<b>No.</b> CO1	Bloom's Taxonomy Level CL3
No. 1. 2.	Experiment Description         Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2         Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2         Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2         Write a program for error detecting code using CRC-CCITT (16- bits).	No.           CO1           CO3	Bloom's Taxonomy Level CL3 CL3
No.           1.           2.           3.	Experiment Description         Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2         Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2         Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2	No.           CO1           CO3           CO2	Bloom's Taxonomy Level CL3 CL3 CL3
No.           1.           2.           3.           4.	Experiment Description         Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2         Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2         Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2         Write a program for error detecting code using CRC-CCITT (16- bits).         Write a program to find the shortest path between vertices using bellman-ford	No.           CO1           CO3           CO2           CO4	Bloom's Taxonomy Level CL3 CL3 CL3 CL2
No.           1.           2.           3.           4.           5.	Experiment Description         Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2         Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2         Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2         Write a program for error detecting code using CRC-CCITT (16- bits).         Write a program to find the shortest path between vertices using bellman-ford algorithm.         Write a program for simple RSA algorithm to encrypt and decrypt the data.         Write a program for congestion control using leaky bucket algorithm.	No.           CO1           CO3           CO2           CO4           CO3	Bloom's Taxonomy Level CL3 CL3 CL3 CL3 CL2 CL2
No.           1.           2.           3.           4.           5.           6.	Experiment Description         Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2         Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2         Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2         Write a program for error detecting code using CRC-CCITT (16- bits).         Write a program to find the shortest path between vertices using bellman-ford algorithm.         Write a program for simple RSA algorithm to encrypt and decrypt the data.	No.           CO1           CO3           CO2           CO4           CO3           CO5	Bloom's Taxonomy Level CL3 CL3 CL3 CL3 CL2 CL2 CL2
No.           1.           2.           3.           4.           5.           6.           7.	Experiment Description         Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2         Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2         Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2         Write a program for error detecting code using CRC-CCITT (16- bits).         Write a program to find the shortest path between vertices using bellman-ford algorithm.         Write a program for simple RSA algorithm to encrypt and decrypt the data.         Write a program on datagram socket for client/server communication to display the	No.           CO1           CO3           CO2           CO4           CO3           CO3           CO3           CO3	Bloom's Taxonomy Level CL3 CL3 CL3 CL3 CL2 CL2 CL2 CL2 CL2
No.           1.           2.           3.           4.           5.           6.           7.           8	Experiment Description           Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2           Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2           Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2           Write a program for error detecting code using CRC-CCITT (16- bits).           Write a program to find the shortest path between vertices using bellman-ford algorithm.           Write a program for simple RSA algorithm to encrypt and decrypt the data.           Write a program on datagram socket for client/server communication to display the messages on client side, typed at the server side.           CO-PO-PSO MAPPING	No.           CO1           CO3           CO2           CO4           CO3           CO5           CO2           CO1	Bloom's Taxonomy Level CL3 CL3 CL3 CL2 CL2 CL2 CL2 CL2 CL2 CL2
No.           1.           2.           3.           4.           5.           6.           7.	Experiment Description           Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped using NS2           Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion using NS2           Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination using NS2           Write a program for error detecting code using CRC-CCITT (16- bits).           Write a program to find the shortest path between vertices using bellman-ford algorithm.           Write a program for simple RSA algorithm to encrypt and decrypt the data.           Write a program on datagram socket for client/server communication to display the messages on client side, typed at the server side.	No.           CO1           CO3           CO2           CO4           CO3           CO4           CO3           CO4           CO3           CO4           CO3           CO4           CO3           CO4           CO3           CO4           CO5           CO2           CO1	Bloom's Taxonomy Level CL3 CL3 CL3 CL2 CL2 CL2 CL2 CL2 CL2



# COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU

							IVI	ANGALU	JKU					
CO1	3			1	1							1		
CO2	3	2		1	1							1		
CO3	3	3		1	1							1		
CO4	3	2		1	1							1		
CO5	3	2	1	1	1							1		
3	: Subs	stantial	(High)		2:	Moder	ate (M	edium)				1: Poor	(Low)	
Assessm	ent wi	ll be bot	th CIA a	and SEE	AS	SESSM learning				Direct	and Inc	lirect m	ethods:	
Sl. No.				nt Desci				/eightag					Marks	
1					sment (Cl			100 9					50	
					ation (CIE	,		60 %					30	
					ory Comp	onent)		40 %					20	
2	Sem	ester Er	nd Exan	ninatior	n (SEE)		100 %			50				
					Α	SSESSN	MENT	DETA	ILS					
		Conti	nuous Ii	nternal	Assessme	nt (CIA	) (50%	)		Ser	nester	End Ex	am (SEE	c) (50%)
Contin	uous ]	Interna	l Evalua	ation (C	EE) (60%	) Pr	actical	Session	ns (40%)					
I			II		III									
		Syllab	us Cove	erage			Syllab	ous Cov	erage		S	Syllabus	s Coveraș	ge
40	%		30%		30%			100%				10	)0%	
Μ	I							MI					MI	
MI	Ι		MII					MII				I	MII	
			MIII					MIII				Ν	ЛШ	
					MIV			MIV				Ν	/IV	
					MV			MV				ľ	МV	
NOTE:		<b>I</b>		<b>I</b>										
- 4		11 1	1 (1 )		OFF									

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

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

# **SEE QUESTION PAPER PATTERN:**

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

# **TEXT BOOKS:**

- 1. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson, 2017.
- 2. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition
- 3. Larry L Peterson and Brusce S Davie, Computer Networks, fifth edition, ELSEVIER
- 4. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson.
- 5. Mayank Dave, Computer Networks, Second edition, Cengage Learning

- 1. https://onlinecourses.nptel.ac.in/noc22\_cs93/unit?unit=17&lesson=18
- 2. https://onlinecourses.nptel.ac.in/noc22\_cs93/unit?unit=26&lesson=27
- 3. https://onlinecourses.nptel.ac.in/noc22\_cs93/unit?unit=43&lesson=44
- 4. https://onlinecourses.nptel.ac.in/noc22\_cs93/unit?unit=52&lesson=53
- 5. https://onlinecourses.nptel.ac.in/noc22\_cs93/unit?unit=75&lesson=76



# PRINCIPLES OF OPERATING SYSTEMS

(Effective from	the Academic	Year 2023 - 2024)
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(		)	
	<b>IV SEMESTER</b>		
Course Code	AM422T3A	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40L	Exam Hours	03
	CREDITS – 3		

# **COURSE PREREQUISITES(THEORY):**

• C Programming, Data Structures, Object Oriented Programming, Computer Organization

#### **COURSE OBJECTIVES:** The course will enable the student to

- Obtain awareness on various types of operating systems and their structures.
- Understand and implement the concept of Process and threads
- Demonstrate the common synchronization problems arising in the Operating systems and provide solutions to them
- Demonstrate the issue of deadlock and handle them effectively.
- Understand the concept of Memory and demonstrate its management using various strategies.
- Know the various storage mechanisms available and discuss the management of storage space.

**TEACHING - LEARNING STRATEGY:** Following are some sample strategies that can be incorporate for the Course Delivery

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

# COURSE CONTENTS

MODULE - I	
Operating Systems and Structures: Introduction, user view, system view, Single processor systems,	8 Hours
multiprocessors systems, clustered systems, multiprogramming and multitasking, dual mode and multimode	
operations, Distributed systems, Computing environments, Operating System services, System Calls, Linkers	
and Loader, Operating system design and implementation, Operating System Structures.	
<b>Process Management:</b> Process concept, process state, process control block, context switch; operations on processes, inter process communication.	
MODULE - II	
Multi-Threaded Programming: Overview of threads, multithreading models, thread libraries, threading	8 Hours
issues.	
CPU Scheduling: Schedulers, Pre-emptive and non-pre-emptive scheduling, dispatcher; Scheduling Criteria.	
Scheduling Algorithms: FCFS, SJF, SRTF, RR, Priority, HRRN, multi-level feedback Queue scheduling,	
Multiprocessor scheduling.	
MODULE - III	
<b>Process</b> Synchronization: Background, critical section problem, Peterson's solution; synchronization	8 Hours
hardware- mutex, semaphores, monitors.	
<b>Deadlocks:</b> System model, necessary conditions for deadlocks, methods for handling deadlocks, deadlock prevention, deadlock avoidance -resource allocation graph algorithm, banker's algorithm,	

deadlock detection, recovery from deadlock

#### **MODULE - IV**



•	Memo	ry Mar	nagemen	nt: Back	•	ous memo demand p	•	-			-	ent algor	ithms -	8 Hours
						access me n methods					Protect	ion, File	e systen	ו
						Μ	ODUI	LE - V						
Storage manager		gement	t and Se	curity:	Mass sto	orage struc	ctures;	Disk scl	neduling	g algorit	hms, Sv	vap space	e	8 Hours
<b>Protecti</b> Revocati						protectior	n, Acce	ess matri	x, Imple	ementati	ion of a	ccess ma	trix,	
						COURS		JTCOM	IES					
Upon co	mpleti	on of th	is course	e, the stu	udents w	vill be able	e to:						<u> </u>	
CO No.					Cou	irse Outc	ome I	Descript	ion				,	Bloom's Taxonom y Level
CO1			operatir municati		m and it	s compon	ents. I	Demonst	rate the	concep	t of pro	cess and	inter-	CL3
CO2			concepts different			ing and de eria.	emonst	trate vari	ous CPI	U sched	uling al	gorithms	by	CL3
CO3						n, its class e various s					ns to the	em. Disc	uss	CL3
CO4	strate					anagemen of vario								CL3
CO5			structure he conce		U	e devices a tion.	and der	monstrat	e variou	ıs disk s	cheduli	ng techn	iques.	CL3
						CO-PO-	P SO	MAPP	ING					
CO No.					Progr	amme O	utcom	nes (PO)	)				S	ogramme pecific ome (PSO)
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	1	1			1	2	1		2		
CO2	3	3	3	2	1			1	2	1		2		
CO3	3	3	3	2	1			1	2	1		2		
CO4	3	3	3	2	1			1	2	1		2		
CO5	3 • Suba	3 stantial	$\frac{3}{(High)}$	3	2	2: Moder	ota (N	1 (Indium)	2	1		2 1: Poor		
<u>ل</u>	. Sub:	stantiai	(Ingn)			2. WIUUCI		(icuiuiii)				1.1001	(LUW)	
Assessm	ent wi	ll be bo	th CIA a	and SEE		SSESSM				g Direct	and Inc	lirect me	ethods:	
Sl. No.			ssessme					Weighta					Marks	
1	Cont		Interna			CIA)	1	100	%				50	
			s Interna			· ·		60					30	
			bession (l			ponent)		40					20	
2	Sem	ester Ei	nd Exan	unation	1 (SEE)			100	70				50	

## ASSESSMENT DETAILS



	Continuous Inter	rnal Assessment (	(CIA) (50%)	Semester End Exam (SEE) (50%)
Continuous Ir	inuous Internal Evaluation (CIE) (60%) Practical Sessions (40%)			
Ι	II	III		
l.	Syllabus Coverag	je	Syllabus Coverage	Syllabus Coverage
40%	30%	30%	100%	100%
MI			MI	MI
MII	MII		MII	MII
	MIII		MIII	MIII
		MIV	MIV	MIV
		MV	MV	MV

IANAGEMENT

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

# ASSIGNMENT TYPES WITH WEIGHTAGES

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

*Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands* **SEE QUESTION PAPER PATTERN:** 

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

# **TEXT BOOKS:**

- Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles", 10th edition, Wiley-India, 2021
- 2. M. Morris Mano, "Computer System Architecture", PHI, 3rd Edition.
- 3. Ann McHoes, Ida M Fylnn, "Understanding Operating System", Cengage Learning, 6th Edition
- 4. D.M Dhamdhere, "Operating Systems: A Concept Based Approach", 3rd Edition, McGraw-Hill, 2013.
- 5. P.C.P. Bhatt, "An Introduction to Operating Systems: Concepts and Practice", 4th Edition, PHI(EEE), 2014.
- 6. William Stallings, "Operating Systems: Internals and Design Principles", 6th Edition, Pearson.

- 1. https://www.geeksforgeeks.org/operating-systems/
- $2. https://www.youtube.com/watch?v=RozoeWzT7IM\&list=PLdo5W4Nhv31a5ucW_S1K3-x6ztBRD-PNa$
- 3. https://en.wikipedia.org/wiki/Operating\_system
- 4. https://www.youtube.com/watch?v=By6lWjiPpVI&list=PLG9aCp4uE-s17rFjWM8KchGlffXgOzzVP
- 5. https://www.youtube.com/watch?v=bkSWJJZNgf8&list=PLxCzCOWd7aiGz9donHRrE9I3Mwn6XdP8



# DESIGN AND ANALYSIS OF ALGORITHMS (Effective from the Academic Year 2023 - 2024)

#### SEMESTER - IV

Course Code	CS422T4C	CIA Marks	50
Number of Contact Hours/Week (L:T:P:S)	3:0:0:2	SEE Marks	50
Total Hours of Pedagogy	40 L + 20 S	Exam Hours	3 Hours
	CREDITS -	3	ì

#### **Prerequisites:**

• Fundamental knowledge of Mathematics, Data Structures.

#### **Course Objectives:**

This course will enable students to:

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

#### **Teaching - Learning Strategy:**

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

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses

# **COURSE CONTENTS**

# **MODULE - 1**

**Module Contents** 

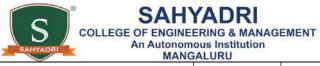
**Lecture Hours** 



Introduction to Algorithms- Properties, Specification, Fundamentals of Algorithmic Problem	8 Hours
solving, Analysis Framework.	8 110ur s
solving, Analysis I fame work.	
Performance Analysis: Estimating Space complexity and Time complexity of algorithms.	
Asymptotic Notations with examples, Basic efficiency classes, Mathematical analysis of Non-	
Recursive and Recursive Algorithms with Examples.	
Brute force design techniques: Selection sort, sequential search and String-matching	
algorithm with complexity Analysis.	
MODULE - 2	
MODULE - 2	
Divide and Conquer: General method, Recurrence equation for divides and conquers, solving	8 Hours
it using Master's theorem. , Divide and Conquer algorithms and complexity Analysis of	
Finding the maximum & minimum, Binary search, Merge sort, Quick sort.	
Decrease and Conquer Approach: Introduction, Insertion sort, Topological Sorting and	
efficiency analysis.	
MODULE - 3	
Greedy Method: General method, Coin Change Problem, Knapsack Problem, Job sequencing	8 Hours
with deadlines, Minimum cost spanning tree algorithms: Prim's Algorithm, Kruskal's	
Algorithm. Single source shortest paths: Dijkstra's Algorithm. Optimal Tree problems:	
Huffman Trees and Codes. Transform and Conquer Approach: Heaps and Heap Sort.	
MODULE - 4	
<b>Dynamic Programming:</b> General method with Examples, Multistage Graphs.	9.11.
2 januar 1 rogi maning, Sonoran mourou wan Zhampros, manasago Shapasi	8 Hours
Transitive Closure: Warshall's Algorithm. All Pairs Shortest Paths: Floyd's Algorithm,	
Knapsack problem, Optimal Binary Search Trees, Travelling Sales Person problem.	
Space-Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching	
Harspool's algorithm.	
MODULE - 5	
MODULE - 5	
Backtracking: General method, N-Queens problem, Sum of subsets problem, Hamiltonian	8 Hours
cycles Problems.	
Branch and Bound: Basic concepts, Assignment Problem, Travelling Sales Person problem,	
0/1 Knapsack problem.	
NP-Complete and NP-Hard problems: Basic concepts, non-deterministic algorithms, P, NP,	



						~ ~ ~ ~	-		~	~				
								OUTC	OMES	5				
Upon co	ompletic	on of th	is cours	e, the s	tudents	will be	able to						DI	
CO No.	Cour	·se Ou	tcome	Descri	ption									om's my Level
CO1			ne com otic not		of rec	cursive,	non-re	cursive	and br	rute for	ce algo	rithms	C	CL3
CO2			ecurrenc conque			obtain	the p	erforma	nce of	divide	-and-co	onquer,	C	CL3
CO3		greed		ique, tı	cansform	n and c	conquei	strateg	y to so	olve the	proble	em for	C	CL3
CO4			ne time hniques		lexity f	for Dyn	amic-P	rogram	ning p	aradign	n and S	String-	C	CL3
CO5			-			d-bound -comple	••				probler	ns and	C	CL3
	1					CO-P	O-PS	O MA	PPINO	J			I	
CO				]	Progra	mme C	Outcom	nes (PO	)					me Specifi ne (PSO)
No.	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	1		1						3		
CO2	3	3	2	1		1						3		
CO3	3	3	3	1		1						3		
<b>CO4</b>	3	3	3	1		1						3		
CO5	3	3	3	1		1						3		
3	: Subst	antial	(High)		2	: Mode	erate (I	Mediun	n)			1: Po	or (Low)	1
<b>CO -</b> A	Assessn	nent N	<b>Aappi</b> r	ıg:	1									
Cours	se Outco	omes	(	Continu	ious In	ternal A	Assessn	nent (C	IA) (50	%)		Semest	er End Exa	m (SEE)



		Continuous	Internal Eval (60%)	uation (CIE)	GALURU Assignment/ Activities	(50%)
		Ι	II	III	(40%)	
			vllabus Covera	_	1000/	1000/
		40%	30%	30%	100%	100%
	CO1	X			x	Х
	CO2	x			x	х
	CO3		x		x	Х
	CO4		x	X	x	Х
	CO4			х	x	Х
1		Internal Asses			<b>100 %</b>	<b>50</b> 30
1						
		Internal Evaluat			40 %	20
	Assignments*				40 /0	
2	-	nd Examinatio	n (SFF)		100 %	
2 Assignr	Semester Er	nd Examinatio	n (SEE)		100 %	50
	Semester Er nent Types:	nd Examinatio	n (SEE)	We	100 % Max. ightage (%)	
Assignr	Semester Er nent Types:	Description	n (SEE)	Wei	Max.	50
Assignr Sl. No.	Semester Er nent Types: Assignment	Description	n (SEE)	Wei	Max. ightage (%)	50 Max. Marks
Assignr Sl. No. 1	Semester Er nent Types: Assignment Written Assi Quiz	Description		Wei	Max. ightage (%) 25 %	50 Max. Marks 5
Assignr Sl. No. 1 2	Semester Er nent Types: Assignment Written Assi Quiz Field Visits/S	<b>Description</b> gnments	udies	Wei	Max.       ightage (%)       25 %       25 %       50 %	50 Max. Marks 5 5 10
Assignr Sl. No. 1 2 3	Semester Er nent Types: Assignment Written Assi Quiz Field Visits/S	Description gnments Survey/Case St otype Developi	udies	Wei	Max.       ightage (%)       25 %	50 Max. Marks 5 5
Assignr Sl. No. 1 2 3 4	Semester Er nent Types: Assignment Written Assi Quiz Field Visits/S Model / Prot	Description gnments Survey/Case St otype Develops d Learning	udies	Wei	Max.       ightage (%)       25 %       25 %       50 %	50 Max. Marks 5 5 10



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

#### **Reference Books:**

- 1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 3rd Edition, Pearson.
- 2. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, Universities Press.
  - 3. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
  - 4. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education).

#### **Reference Web Links and Video Lectures (e - Resources):**

- $1. https://www.youtube.com/watch?v=gY0MwGLq9W8\&list=PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PLyqSpQzTE6M9DKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWu-639\_PNKhN7z2fOpKTJWU-639\_PNKhN7z2fOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-639\_PNKhN7ZfOpKTJWU-630\_PNKhN7ZfOpKTMN7$
- 2. https://www.youtube.com/watch?v=5Y8Lfsreeck&list=PL7DC83C6B3312DF1E
- 3. https://www.youtube.com/watch?v=S47aSEqm\_0I&list=PLgj\_V-ZKxRKrxgFyOutPJpoLFBaQMOpK-



# DESIGN AND ANALYSIS OF ALGORITHMS LAB

# (Effective from the Academic Year 2023 -2024)

# SEMESTER - IV Course Code CS422L5C CIA Marks 50 Number of Contact Hours/Week (L:T:P:S) 0:0:2:1 SEE Marks 50 Total Hours of Pedagogy 24 P+ 12 S Exam Hours 3 Hours CREDITS -1

#### **Prerequisites:**

- Knowledge of Mathematics, Data Structures and java Programming
- Usage of IDEs Eclipse, Netbeans and VS studio

# **Course Objectives:**

This course will enable students to:

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

#### **Descriptions:**

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

# Algorithm Implementation using Python Programming (Max. Marks: 50)

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

# LIST OF EXPERIMENTS

Exp No.	Experiment Description
1	Design an application to create a list of TV channels (minimum 10) that includes the numbers of viewers and viewing time. Rate the channels based on the number of viewers (1 High - 6 low). Plot graphs to analyze the running times of different sorting algorithms.

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2	Design and implement an application that considers the problem of scheduling n jobs of known durations t1, t2,, tn for execution by a single processor. The jobs can be executed in any order, one job at a time. Find and display the schedule that minimizes the total time spent by all the jobs in the system by maximizing the profit.
3	Develop an optimal route for a scenario where a person wants to buy a ticket to a baseball game. Along the way from the house to reaching the destination, some known person who lives on that street might give money. Visit towns for the collection of more money to buy a ticket.
4	Design an application for a thermal power station and electrical lines that are connected among various power stations. The costs of electrification involved appear as weights on the edges. Obtain the minimum possible connection among the thermal stations so that any two thermal stations can be linked with the minimum cost involved.
5	<ul><li>Develop a program for the following:</li><li>a. To construct a Huffman code for a given English text and encode it.</li><li>b. To decode an English text which has been encoded with a Huffman code?</li></ul>
6	The owner of a gourmet coffee shop wishes to mix a 10-pound bag of coffee using various types of coffee beans in such a way to produce the coffee blend at the maximum cost. The weights of the objects in the problem correspond to the quantity in pounds available of each type of coffee bean. The value of each quantity of coffee beans is the total cost of that quantity in rupees. Apply the Knapsack algorithm to maximize the profit.
7	Design an application for drilling an optimal printed circuit board. To drill two holes of different diameters consecutively, the head of the machine has to move to a toolbox and change the drilling equipment. This is quite time consuming. Thus, it is clear that one has to choose some diameter, drill all holes of the same diameter, change the drill, drill the holes of the next diameter, etc. Thus, this drilling problem has to minimize the travel time for the machine head. Find the optimal time to drill the circuit board.
8	Design and implement Java Program to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.
9	Design and implement for a given chess board having N×N cells, place $N$ queens on the board in such a way that no queen attacks any other queen. If it is possible to place all the $N$ queens in such a way that no queen attacks another queen, then print $N$ lines having $N$ Queens. If there is more than one solution of placing the queens, print all of them. If it is not possible to place all $N$ queens in the desired way, then print "Not possible".



#### **COURSE OUTCOMES**

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CO No.	Course Outcome Description													Bloom's Taxonomy Level	
CO1	Impler data.	Implement Python data structures – lists, tuples & amp; dictionaries to represent compound data.													
CO2		Design, analyze and implement the brute force, divide and conquer algorithms and compare their time complexity.													
CO3		Design and implement the greedy technique algorithms to solve the problem for optimal solution.												CL3	
CO4		Apply dynamic programming techniques to solve Traveling Salesperson Problem and Knapsack problem.												CL3	
со							PSO M						-	ramm ecific come	
No.														SO)	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	3	3	1	3			2	2	1	2	2			
CO2	3	3	3	1	3			2	2	1	2	2			
CO3	3	3	3	1	3			2	2	1	2	2			
CO4	3	3	3	1	3			2	2	1	2	2			
	3: Subs	tantial (	(High)	1		: Mode	erate (N	ledium	)		1:	Poor (L	Jow)	1	

- Assessment will be both CIA and SEE. .
- All laboratory experiments should be included for practical examination. •
- Students are allowed to pick one experiment from the lot. .
- Lab test should be conducted for 25 Marks. •
- Marks Distribution: Procedure + Conduction + Viva = 05 + 15 + 05 = 25 Marks. .
- Change of experiment is allowed only once and marks allotted to the procedure part to be made zero. •



	S COLLEGE OF E	ENGINEERING & MANAGEMENT utonomous Institution MANGALURU	r
Sl. No.	Assessment Description	Weightage (%)	Max. Marks
	Continuous Internal Assessment (CIA)	100 %	50
1	Weekly Assessment	50 %	25
	Lab Test	50 %	25
2	Semester End Examination (SEE)	100 %	50

SAHYADRI

# **Learning Resources:**

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

# **Reference Web Links and Video Lectures (e - Resources):**

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



	OR MACHINE LI m the Academic Year 20. SEMESTER		
Course Code	MA422T6AA	CIA Marks	50
Number of Contact Hours/Week (L:T:P:S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40 L	Exam Hours	3 Hours
	REDITS – 3		
<b>COURSE PREREQUISITES:</b> Fundamentals of Statistics, Linear algebra and Ve			
COURSE OBJECTIVES:			
<ul> <li>Enable the students to understand the adva</li> <li>Familiarize the importance of vector calculengineering.</li> <li>Understand the concept of probability and experiments</li> <li>Understand the concept of optimization teenstation teenst</li></ul>	ulus associated with	one variable and two varia	
TEACHING - LEARNING STRATEGY:			
These are some sample strategies, which course f Process: • Chalk and Talk Method/Blended Mode Me • Power Point Presentation • Expert Talk/Webinar/Seminar • Video Streaming/Self-Study/Simulations • Peer-to-Peer Activities • Activity/Problem Based Learning • Case Studies • MOOC/NPTEL Courses		n incorporate in the Teachin	g Learnin
	Iodule – 1		
Linear Algebra-Part1: Linear Transformations. Matri of Basis theorem related problems. Kernel and Image of Problems, Applications of Linear Algebra.	x representation of Li		8 Hours
N	Iodule – 2		
<b>Linear Algebra-Part2:</b> Inner product spaces. Norm Construction of orthonormal basis using Gram-Sch Rotations, Projections.			8 Hours
N.	Iodule – 3		
<b>Vector Calculus:</b> Introduction, Differentiation of U Gradients, Gradients of Vector-Valued Functions, Grad Gradients, Backpropagation.			8 Hours
N	Iodule – 4		
<b>Probability and Distribution:</b> Probability concepts, C and Continuous Random Variables and Distributions, Ex	1 1	· · ·	8 Hours

Probability and Distribution: Probability concepts, Conditional probability, Bayes' Theorem, Discrete<br/>and Continuous Random Variables and Distributions, Expectation and its Interpretations, Standard discrete<br/>and continuous distribution functions, Central Limit theorem.8 Hou

							Modul	e – 5						•		
<b>Optimiz</b> Multiplie					tion Usi	ng Grad	ient Des	scent, Co	onstraine	d Optin	nization	and Lag	grange	8 H	ours	
						COUR			MES							
Upon c	omple	etion of	this co	ourse, t	he stud	ents wi	II be ab	ole to:						Bloo	m's	
CO No.					Cour	rse Out	come l	Descrij	ption					Taxor Lev	nomy	
CO1	-	loy four ction.	Idational	concer	ots of lin	ear trans	formati	on to da	ta scienc	e tasks,	in dime	ensional		CL3		
CO2	optin	Apply advanced linear algebra concepts to analyze data, perform dimensional reduction, and ptimize machine learning models.												CL	,3	
CO3	Illustrate advanced vector calculus techniques, including gradients and back propagation, to optimize machine learning algorithms in data science.												CL	.3		
CO4	Determine advanced probability model for machine learning algorithms and predictive analytics.												CL	.3		
CO5	Establish optimization techniques, including gradient descent, Lagrange multipliers, and convex optimization, in machine learning models CO-PO-PSO MAPPING													CL3		
						CO-PC	D-PSO	MAP	PING				-			
CO No.	Programme Outcomes (PO)											Programme Specific Outcome (PSO)				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2			1			1	1			1				
CO2	3	2		1					1	1		1			<u> </u>	
CO3	3	1						1				1			<u> </u>	
CO4	2	3	2	1	1	1		1		1		1				
<u>CO5</u>	3 Subs	3 tantial	2 ( <b>High</b> )		1	: Mode	rato (I	1 Modim			1	Poor		v)		
Assessi method	nent v				AS	SSESSI	MENT	STRA	TEGY	ssed u						
Sl. No.			sessmer		-		V	Veighta	age (%)			Max.	Mar	ks		
1	(CL	4)	s Inter					100					50			
			us Inter	nal Ev	aluation	n (CIE)		<u>60</u> 40					30 20			
2		Assign	ments E <b>nd Ex</b>	amina	tion (S	EE)		40 100					20 50			
					A	SSES		T DET		I						
	C	ontinu	ous Int	ernal	Assessi	ment (		,				r End I	Exam	(SEE)		
Contin		Intern		luation				Assign ctivitie	ment/ s (40%)	`	0%)					
]	L	G_ 11 7	II			II	0.1		n		n		C			
//	%	Sylla	<u>bus Co</u> 30%	verage		)%	Syl	<u>labus (</u> 100	Coverag	ge	Sy	yllabus 10	<u>Cove</u> 0%	erage		
	17 <u>0</u> 11		JU 70		31	, /0										
IV.	11							MI				MI				

MII	MII		MII	MII
	MIII		MIII	MIII
		MIV	MIV	MIV
		MV	MV	MV

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

# ASSIGNMENT TYPES WITH WEIGHTAGES

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

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

# **SEE QUESTION PAPER PATTERN:**

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

# **TEXT BOOKS:**

- 1. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- 2. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- 3. B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
- 4. B.V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
- 5. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press,3 rd Ed., 2016.
- **6.** C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw Hill Book Co., Newyork, 6th Ed., 2017.

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



# **REGRESSION STATISTICAL COMPUTING**

(Effective from the Academic Year 2023 - 2024)

An Autonomous Institution MANGALURU

EERING & MANAGEMENT

( ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) )											
<b>IV SEMESTER</b>											
Course Code	MA422T6CB	CIA Marks	50								
Number of Contact Hours/Week (L:T:P:S)	3:0:0:1	SEE Marks	50								
Total Hours of Pedagogy	40 L	Exam Hours	3 Hours								
	CREDITS – 3	·									

**COURSE PREREQUISITES:** Basic knowledge of statistics and programming.

## COURSE OBJECTIVES:

- Understand the fundamentals of regression analysis and its application in statistical computing.
- Develop proficiency in implementing regression models, assessing model fit, and interpreting results.
- Apply regression techniques to real-world datasets, solving complex problems in data analysis and prediction.

# **TEACHING - LEARNING STRATEGY:**

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

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses

# **COURSE CONTENTS**

MODULE - I	
<b>Introduction to Regression Analysis:</b> Basics of regression analysis. Simple linear regression model. Assumptions, Estimation of model parameters, least squares method, Difference between descriptive and inferential statistics. Regression, Dependent and independent variables.	8 Hours
MODULE - II	
<b>Simple Linear Regression:</b> least squares method, Interpretation of Regression coefficient properties Correlation-Karl Pearson's coefficient of correlation regression analysis-lines of regression. Fitting of first and second-degree curve, exponential curve by the method of least squares after logarithmic transformation.	8 Hours
MODULE - III	
<b>Multivariate data analysis 1</b> : Multiple linear regression (3 variables only), Assumption, Estimation of Regression by least squares method. Estimation of regression coefficients. Partial, multiple correlation coefficients. Coefficient of Determination ( $R^2$ )	8 Hours
MODULE - IV	
<b>Multivariate Data Analysis 2</b> - (Description of various multivariate methods to be given) Logistic regression, Factor Analysis, Structural Equation Modelling, Cluster Analysis, Discriminant Analysis, conjoint analysis, Correspondence Analysis	8 Hours

**MODULE – V** 

COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU
Statistical Computing: Packages, GGplot2 package, Likert package, correlation and regression
analysis (bivariate and multivariate data), polynomial regression

8 Hours

TT			•	- 414-	- 1 4		RSE OU	JTCON	IES							
CO No.	mpieti	on of th	iis cours	e, the su		vill be ab		Descrip	otion					Bloom's Taxonomy Level		
CO1	App	y regre	ssion ar	nalysis t	o solve	complex	compu	iter scie	ence prob	lems.				CL3		
CO2	Use statistical software tools proficiently for data analysis and modeling.													CL2		
CO3	Inter	Interpret and communicate results effectively.													.3	
CO4		Apply regression techniques to enhance decision-making and prediction in computer science.												CL	.3	
CO5	Dem	Demonstrate critical thinking and problem-solving skills in practical applications													.3	
						CO-PO	)-PSO	MAPP	ING							
CO No.					Progr	camme (	Dutcom	nes (PO	)				5	ogram Specifi come (	ic	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	3	1		1		1				1	1				
CO2 CO3	3	3	2		1					1	1	1			_	
CO3	3	2			2		1			1		1				
C04	3	3	2		1		1				1	1				
	-	-	(High)		-	2: Mod		/ledium	)			1: Poor	(Low)			
Assessn	nent wi	ll be bo	th CIA a	and SEE		SSESS ats learni			<b>FEGY</b> sed using	Direct	and Inc	lirect me	ethods:			
Sl. No.		A	ssessme	nt Desc	ription		1	Weighta	age (%)			Max.	Marks	5		
1			Interna		· · · ·			100			50					
		<u>Continu</u> Assignn	ous Inter	rnal Eva	luation	(CIE)		60			30 20					
2			nd Exan	ninatior	n (SEE)			40 % 100 %					50			
						ASSES	SMENT	Γ DETA	AILS							
		Conti	nuous I	nternal	Assessn	nent (CI	A) (50%	<b>(</b> )		Sei	mester	End Ex	am (SE	E) (50	%)	
Con	tinuou		nal Eval					Assign	ment/ s (40%)							
	I		II		J	II										
		Sylla	abus Co	verage			Sy		Coverage		S	yllabus		age		
	)% /I		30%		3	0%		<u>100</u> M					0% MI			
	III		MII					M					лн ЛП			
10.			MIII					MI					/III /III			
			171111		N	IIV		MI					111 1IV			
						/IV		M					//V			

SAHYADRI	SAHYADRI COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU
	MANGALURU

assignments.

# ASSIGNMENT TYPES WITH WEIGHTAGES

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

*Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands* **SEE QUESTION PAPER PATTERN:** 

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

# **TEXT BOOKS:**

- 1. Gupta, S. C., & Kapoor, V. K. (2002). Fundamental of Mathematical Statistics. Sultan Chand & sons.
- 2. Joseph Hair, F., Willium Black, C., Barry Babin, J., & Rolph Anderson, E. (2010). Multivariate Data Analysis, Seventh edition. Pearson Prentice Hall.
- 3. Kothari, C. R. (2004). Research methodology. New Age International Publishers.
- 4. Levin, R. (2013). Statistics for Management. Prentice Hall India.
- 5. Medhi, J. (2006). Statistical Methods: An Introductory Text. New Age International(P) Limited, New delhi.
- 6. Montgomery, D. C. (2007). Introduction to Linear Regression analysis. John Willey & sons.
- 7. Mukhopadhyay, P. (2000). Mathematical Statistics. Books & Allied Pvt. Ltd.
- 8. Robert Kabacoff, I. (2015). R in Action Data Analysis and Graphics with R, second edition. dreamtech Press.
- 9. Sudha Purohit, G., Sharad Gore, D., & Shailaja Deshmukh, R. (2008). Statistics Using R. Narosa Publishing House.

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



# **OPTIMIZATION TECHNIQUES**

(Effective from the Academic Year 2023 - 2024) IV SEMESTER

Subject code	MA422T6CC	CIA Marks	50			
Number of Contact Hours/Week (L:T:P:S)	3:0:0:1	SEE Marks	50			
Total Hours of Pedagogy	40 L	Exam Hours	3 Hours			
CREDITS – 3						

# **COURSE PREREQUISITES:**

Basics of Statistics, Probability distributions. Multiple integration

# **COURSE OBJECTIVES:**

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

# **TEACHING - LEARNING STRATEGY:**

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

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses

# COURSE CONTENTS

# MODULE - I

8 Hours

**Joint Probability Distribution Functions:** Discrete and Continuous Random variables, Probability mass function, Probability density functions. Cumulative distribution functions.

Lab Components: Finding joint Probability using R-software

MODULE - II	
Stochastic Process and Estimation: Regular stochastic matrices. Transition Probability	8 Hours
matrices. Markov Process. Estimation of Parameters, Interval Estimation, Central Limit	
Theorem. Maximum Likelihood functions.	
MODULE - III	
Linear Programming Problem: Components of LPP, Characteristics of LPP Advantages of	8 Hours
LPP Simplex method, Big M method, Duality in LPP.	
Lab Components: Solving LPP using R-software	
MODULE - IV	
Transportation and Assignment Problem: Balanced TP. Components of TP, Northwest	8 Hours
corner method. Least. cost cell method. Objectives of AP. Hungarian method of solving AP.	
MODULE – V	

number	r of pl	<b>bry:</b> Introduction of game theory, Two-person zero sum game with two or more players. Payoff matrix. Optimal strategy. Minimax-Maxmin Principle .Games with it Saddle point.										8 Hours			
							RSE OU	JTCOM	IES						
Upon co CO No.	mplet	npletion of this course, the students will be able to: Course Outcome Description											Bloo Taxor	nomy	
CO1		Illustrate random variables and Joint probability distribution functions to analyse the probability models in engineering field.										the	Lev CL		
CO2	Î	•	larkov n	Ũ	Ũ		bility fo	or a prob	lem stat	ement.				CL	.3
CO3	Solv	e Linea	r Progra	mming	Proble	n to get	optimal	l solutio	ns of a l	Mathem	natical	nodel.		CL	-3
CO4	Abil	ity to so	olve bala	anced T	ranspor	tation a	nd Assig	gnment	problem	IS				CL	.3
CO5	Dev	elop the	e techniq	ue of b	est strat		-	-		ry.				CL	.3
CO No.					Progr		O-PSO				Sp			ogramme Specific come (PSO)	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3		1	2				1			1	-		
CO2	2		1	1	1			1	1	1		1		_	
CO3 CO4	3	3	1	1	1			1	1			1			
C04 C05	3	3	1	1	1			1	1			1		_	
	2	stantial	(High)	1		2: Mod	erate (N	-				1: Poor	(Low)	)	
Assessn <mark>Sl. No.</mark> 1	Con	A tinuous	ssessme Interna ous Inter	nt Desc Il Asses	. Studen ription sment (	ts learni			sed using <b>ge (%)</b> %	g Direct	and Ind		ethods: Mark 50 30 20		
2			nd Exan	nination	n (SEE)			100					50		
							SMEN		AILS						
Con	Continuous Internal Assessment (CIA Continuous Internal Evaluation (CIE) (60%)							%) Assignı .ctivities		Se	mester	End Exa	am (Sl	EE) (50	<b>%</b> )
	I		II		1	Π			(10/0)						
		Sylla	abus Co	verage			Sy	Syllabus Coverage Syllabus C				Cove	rage		
4(	40% 30% 30%									10	0%				
Ν	<b>1</b> I							M	[			Ν	ΛI		
N	III		MII					MI					<b>1</b> II		
			MIII					MI	Ι			Μ	IIII		
										1					
						IIV 1V		MI MV					IIV 1V		



appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the assignments.

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

#### *Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands* **SEE OUESTION PAPER PATTERN:**

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

# **TEXT BOOKS:**

- 1. V.K Kapoor and S.C Gupta "Mathematical Statistics" 11<sup>th</sup> edition, S. Chand Publications
- 2. 2.B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- 3. C Ray Wylie, Louis C Barrett: "Advanced Engineering Mathematics", 6th Edition,
- 4. B.V Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill,
- 5. Dr. K. Chandrashekar: " Complex analysis, Probability and Statistical Methods" Sudha Publications, 2021

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



# METRIC SPACES

IV SEMESTER						
Course CodeMA422T6CDCIA Marks50						
Number of Contact Hours/Week (L:T:P:S)	3:0:0:1	SEE Marks	50			
Total Hours of Pedagogy	50 L	Exam Hours	3 Hours			
	CREDITS – 3		·			

## **COURSE PREREQUISITES:**

Basic knowledge of Set theory and Group theory

## **COURSE OBJECTIVES:**

Introduce computer engineering students to metric theory, emphasizing its application in analyzing and optimizing data structures, algorithms, and network performance.

# **TEACHING - LEARNING STRATEGY:**

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

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies
- MOOC/NPTEL Courses

# **COURSE CONTENTS**

8 Hours

#### **MODULE - II**

**Topology of a Metric Space:** Topological concepts, Convergence and Limit Points, Convergence**8Hours**of sequences and series. Limit points, limit set.8

**Continuity in Metric Spaces**: Continuous functions in metric spaces. Properties of continuous functions.

#### **MODULE - III**

Compactness and Completeness: Connectedness, separated sets, Connected and disconnected	8 Hours			
sets, Components of metric spaces, Connectedness of product of connected metric spaces. Bounded				
sets and Compactness, Other Characterizations of Compactness, Continuous Functions on Compact				
Spaces, Locally Compact Spaces.				
MODULE - IV				
Cauchy Sequences and Completeness: Cauchy sequences and completeness. Applications in	0.11			

 Cauchy Sequences and Completeness: Cauchy sequences and completeness. Applications in analysis.
 8 Hours

**Compactness and Bolzano-Weierstrass Theorem**:Bolzano-Weierstrass theorem.Compactness and its applications.

**MODULE - 5** 



Applic metrics metric s	in netv	work de	sign. M	r Netw etric Sp	aces in	Geomet	algorith ry and <b>(</b>		g metric		•			8 H	Iours	
						COU	RSE OU	TCON	IES							
Upon co	ompleti	on of th	is cours	e, the stu	udents w	vill be at	ole to:									
CO No.		Course Outcome Description											Bloom's Taxonomy Level			
CO1	solvi	ng skill	s and a	lgorithm	n optimi	zation.			engineer					C	L2	
CO2	solvi	ing skill	s in cor	nputer s	cience.				netric sp			•		C	L3	
CO3	and	data cor	npressio	on.		•	•		space to	•			0	C	L3	
CO4	math	ematica	al analy	sis and	optimiza	ation."			actness		•			C	L3	
CO5					ns' effect nance ar	nd reliab	ility."		ics in c	ompute	er netw	ork des	ıgn,	C	L3	
	1					CO-PO	D-PSO	MAPP	NG							
CO No.					Progr	amme (	Outcom	es (PO	)					Programme Specific utcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2		1							1		1				
CO2	2	2	1					1		2		1				
CO3	2	2										1		_		
<b>CO4</b>	2	2						1				1				
CO5	3	2 stantial	2	1	2		erate (N	1				1 1: Poor				
			<u> </u>	and SEE	A	SSESS	MENT	STRA		g Direct			<u> </u>			
Sl. No.				nt Desc			I	Weightage (%)   Max. M					S			
1					sment ( luation (	,		<b>100 % 50</b> 60 % 30								
		Assignn			iuation	(CIE)						20				
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		s Interi		luation	(CIE) (6			Assign: ctivities	nent/ s (40%)							
	I		II here Co		I	II		lak (	۹۰۰۰۰		-	(1) - 1	C			
	Syllabus Coverage40%30%30%					)%	Syl	100 100	Coverage %		2	Syllabus 10	Cover 0%	rage		
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						<u> </u>		141								
Ν			MII					MI				N	411			
Ν	<b>/</b> II		MII MIII						Ι							
Ν	<b>/</b> II				M	IIV		MI	I II			Ν	<b>/</b> II			



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

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

*Note: The assignments mentioned above may be provided appropriately to the students belonging to different bands* **SEE QUESTION PAPER PATTERN:** 

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

# **TEXT BOOKS:**

- 1. Elements of Real Analysis, Shanti Narayan, Dr.M.D. Raisinghania, (2016)
- 2. Topology of Metric Spaces by S. Kumareshan, Alpha Science International Limited(2005)
- 3. Metric Spaces by Satish Shirali and Harikrishan L Vasudeva Springer, (2006)
- 4. Metric Spaces by P.K. Jain and Khalil Ahmad ,Alpha Science International, (2004)
- 5. Elements of Metric spaces by M.N. Mukherjee, Academic Publishers (2005)



# **GitHub : AI-Powered Developer Platform**

	(Effective from the Academic Year 2023 - 2024) III SEMESTER									
Course Code	CS42297CA	CIA Marks	50							
Number of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks	50							
Total Hours of Pedagogy	24	Exam Hours	03							
	CREDITS – 1	·								

# **COURSE PREREQUISITES:**

• Basic Knowledge of Programming.

# **COURSE OBJECTIVES:**

- To familiar with basic command of Git
- To create and manage branches
- To understand how to collaborate and work with Remote Repositories
- To familiar with virion controlling commands

# **TEACHING - LEARNING STRATEGY:**

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

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

# List of Experiments Sl. No. Setting Up and Basic Commands 1 Setting Up and Basic Commands 1 Initialize a new Git repository in a directory. Create a new file and add it to the staging area and commit the changes with an appropriate commit message. 2 Creating and Managing Branches 2 a) Create a new branch named "feature-branch." Switch to the "master" branch. Merge the "feature-branch" into "master." 2 b) Write the commands to stash your changes, switch branches, and then apply the stashed changes. 3 Collaboration and Remote Repositories



		c) V	Vrite the	e comm	and to	merge "f	eature-	branch'	' into "n	naster"	while p	roviding	g a custo	om commit
		n	nessage	for the	merge.									
4	G	lit Tags	and Re	eleases										
						ightweig	ht Git	tag nam	ed "v1.0	)" for a	commi	t in you	r local re	epository.
5		dvance		-			_							
						ick a rang	ge of co	ommits	from "so	ource-b	ranch"	to the cu	irrent br	anch.
	A	nalysin	0	0	0	•								
										ew the	details	of that	t specifi	c commit,
			_	-		te, and co		-						
6						list all c	ommit	s made	by the a	uthor '	JohnDo	be" betv	veen "20	)23-01-01"
			nd "202					~						
						lisplay th				•	•			
		d) V	Vrite the	e comm	and to u	indo the	-		-	the cor	nmit wi	th the I	D "abc1	23".
COURSE OUTCOMES Upon completion of this course, the students will be able to:														
			is course	e, the sti	idents w	in de adi	e to:							Bloom's
CO No.	Course Outcome Description Taxonomy Level													
CO1														
CO2				ne branc	hes									CL3
CO2 CO3	Crea	te and m	anage th			ration and	l Remo	te Repo	sitories					CL3 CL3
	Crea Appl	te and m ly comm	anage th ands rel	ated to	Collabor	ration and gs, Releas		1		erations				
CO3	Crea Appl Use	te and m ly comm	anage th ands rel nands re	ated to ( clated to	Collabor Git Tag			1		erations				CL3
CO3 CO4	Crea Appl Use	te and m ly comm the comm	anage th ands rel nands re	ated to ( clated to	Collabor Git Tag		ses and	advance	ed git op	erations				CL3 CL3 CL3
CO3 CO4 CO5	Crea Appl Use	te and m ly comm the comm	anage th ands rel nands re	ated to ( clated to	Collabor Git Tag istory	gs, Releas	ses and	advance MAPP	ed git ope	erations				CL3 CL3 CL3 gramme
CO3 CO4	Crea Appl Use	te and m ly comm the comm	anage th ands rel nands re	ated to ( clated to	Collabor Git Tag istory	gs, Releas	ses and	advance	ed git ope	erations			S	CL3 CL3 CL3
CO3 CO4 CO5 CO	Crea Appl Use	te and m ly comm the comm	anage th ands rel nands re	ated to ( clated to	Collabor Git Tag istory	gs, Releas	ses and	advance	ed git ope	erations	11	12	S	CL3 CL3 CL3 gramme pecific
CO3 CO4 CO5 CO No.	Crea Appl Use Anal	te and m ly comm the comm yse and 2	anage th ands rel mands re change the change the d	ated to elated to	Collabor Git Tag istory Progr 5 3	cO-PO	es and -PSO	advance MAPP	ed git opo NG			1	Sj Outco	CL3 CL3 CL3 gramme pecific pme (PSO)
CO3 CO4 CO5 CO No. CO1 CO2	Crea Appl Use 1 Anal	te and m ly comm the comm yse and 2 2 2	anage th ands relation change to change to and the change to an an a	ated to elated to	Collabor Git Tag istory Progr 5 3 3	cO-PO	es and -PSO	advance MAPP	ed git opo NG			1 1	Sj Outco	CL3 CL3 CL3 gramme pecific pme (PSO)
CO3 CO4 CO5 CO No. CO1 CO2 CO3	Crea Appl Use Anal	te and m ly comm the comm yse and 2	anage th ands rel mands re change the change the d	ated to elated to	Collabor o Git Tag istory Progr 5 3 3 3 3	cO-PO	es and -PSO	advance MAPP	ed git opo NG			1	Sj Outco	CL3 CL3 CL3 gramme pecific pme (PSO)
CO3 CO4 CO5 CO No. CO1 CO2	Crea Appl Use Anal	te and m ly comm the comm yse and 2 2 2 2 2	anage th ands rel mands re change the change	ated to elated to	Collabor Git Tag istory Progr 5 3 3	cO-PO	es and -PSO	advance MAPP	ed git opo NG			1 1 1	Sj Outco	CL3 CL3 CL3 gramme pecific pme (PSO)
CO3 CO4 CO5 CO No. CO1 CO2 CO3 CO4 CO5	Crea Appl Use 1 Anal	te and m ly comm the comm yse and 2 2 2 2 2 2 2	anage th ands relation change the change the	ated to elated to	Collabor Git Tag istory Progr 5 3 3 3 3 3	cO-PO	es and -PSO	advance MAPP nes (PO	ed git opd ING 9		11	1 1 1 1	Sj Outco 1	CL3 CL3 CL3 gramme pecific pme (PSO)
CO3 CO4 CO5 CO No. CO1 CO2 CO3 CO4 CO5 3	Crea Appl Use 1 Anal	te and m ly comm the comm yse and yse and 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	anage th ands relation change the change the	ated to cellated to the git h	Collabor Git Tag istory Progr 5 3 3 3 3 3 3 4 A	cO-PO amme C	PSO Putcom 7 rate (M IENT	advance MAPP nes (PO 8 4 4 4 6 4 8 1 8 7 8	9 9 FEGY	10	11	1 1 1 1 1: Poor	Sj Outco 1 (Low)	CL3 CL3 CL3 gramme pecific pme (PSO)
CO3 CO4 CO5 CO No. CO1 CO2 CO3 CO4 CO5 3	Crea Appl Use 1 Anal	te and m ly comm the comm yse and yse and 2 2 2 2 2 2 2 2 2 2 3 5 5 5 5 5 5 5 5 5	anage th ands relation change the change the	ated to celated to the git h	Collabor Git Tag istory Progr 5 3 3 3 3 3 3 3 3 3 3 4 . Studen	cO-PO amme C 6 2: Mode SSESSN	PSO Putcom 7 rate (M IENT g will b	advance MAPP nes (PO 8 8 1edium STRA	9 9 FEGY	10	11	1 1 1 1 1: <b>Poor</b>	Sj Outco 1 (Low)	CL3 CL3 CL3 gramme pecific pme (PSO)
CO3 CO4 CO5 CO No. CO1 CO2 CO3 CO4 CO5 3 Assessm	Crea Appl Use 1 Anal 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	te and m ly comm the comm yse and yse and 2 2 2 2 2 2 2 2 2 2 3 5 5 5 5 5 5 5 5 5	anage th ands relation change the change the	ated to celated to the git he	Collabor o Git Tag istory Progr 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	cO-PO amme C 6 2: Mode SSESSN ts learnin	PSO Putcom 7 rate (M IENT g will b	advance MAPP nes (PO 8 8 1edium STRA	9 9 TEGY sed using	10	11	1 1 1 1 1: Poor	Sj Outco 1 (Low)	CL3 CL3 CL3 gramme pecific pme (PSO)



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

Autonomous Institution

NAGEMENT

#### **ASSESSMENT STRATEGY:**

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

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

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

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

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

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

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

# **SEE QUESTION PAPER PATTERN:**

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

#### **Suggested Learning Resources:**

• Version Control with Git, 3rd Edition, by Prem Kumar Ponuthorai, Jon Loeliger Released October 2022, Publisher(s): O'Reilly Media, Inc.

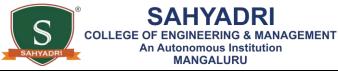


- Pro Git book, written by Scott Chacon and Ben Straub and published by Apress, https://gitscm.com/book/en/v2
- $\bullet \quad https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130944433473699842782\_shared/overview$
- $\bullet \quad https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01330134712177459211926\_shared/overview$



		DEVOPS								
	(Effective from th	ne Academic Year	2023 - 2024)							
		SEMESTER	Ι	I						
Course		CS42297CB	CIA Marks	50						
	· · · · ·	0:0:2:0	SEE Marks	50						
I otal H		20P <b>REDITS – 1</b>	Exam Hours	03						
COURS	SE PREREQUISITES:	$\mathbf{RED115} - 1$								
•	Fundamental Knowledge of Unix Commands									
	SE OBJECTIVES:									
•	To design web pages Using Jenkins, Git, and L	ocal HTTP Serv	er							
•	To implement GitHub and GitLab Operations		-							
•	Demonstrate Infrastructure as Code (IaC) with	Terraform.								
	HING - LEARNING STRATEGY:									
Followin	ng are some sample strategies that can be incorp	porate for the Co	urse Delivery							
• C	Chalk and Talk Method/Blended Mode Method									
• P	Power Point Presentation									
• E	Expert Talk/Webinar/Seminar									
Video Streaming/Self-Study/Simulations										
• Peer-to-Peer Activities										
• A	Activity/Problem Based Learning									
• 0	Case Studies									
• N	AOOC/NPTEL Courses									
• A	Any other innovative initiatives with respect to t	he Course conter	ıts							
	LIST OF	<b>EXPERIME</b>	NTS							
Sl. No.	Description									
1	Applying CI/CD Principles to Web Develop	ment Using Jenki	ns, Git, and Local HTTP Server							
2	Exploring Git Commands through Collabora	tive Coding.								
3	Implement GitHub Operations									
4	Implement GitLab Operations									
5	Exploring Containerization and Application	Deployment with	Docker							
6	Applying CI/CD Principles to Web Develop	ment Using Jenki	ns, Git, using Docker Containers							
7	Create the GitHub Account to demonstrate C	CI/CD pipeline us	ing Cloud Platform.							
8	Demonstrating Infrastructure as Code (IaC)	with Terraform								

COURSE OUTCOMES								
Upon completion of this course, the students will be able to:								
CO No.	<b>Course Outcome Description</b>	Bloom's Taxonomy						



														Level
CO1	Dem	onstrate	e the app	plication	n of CI/C	CD Prin	ciples to	Web D	evelopn	nent Usi	ng Jenk	ins		CL3
CO2	Illust	rate var	ious Git	Comma	ands and	GitHub	Operat	ions thro	ough Co	llaborati	ive Cod	ing.		CL3
CO3	Exan Dock		ferent C	itLab C	Operation	ns and C	ontaine	rization	and App	lication	Deploy	ment wi	th	CL3
CO4	Dem	onstrate	CI/CD	pipeline	concept	ts using	Cloud P	latform	by creat	ing a Gi	itHub A	ccount		CL3
CO5	Use 7	Ferrafor	m for d	emonstr	ating Int	frastruct	ure as C	Code (Ia	C).					CL3
						CO-PO	D-PSO	MAPPI	ING					
CO No.	Programme Outcomes (PO) Programme Specific Outcome (PSO)													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2		2			2	2	1		2		
CO2	3	3	2		2			2	2	1		2		
CO3	3	3	2		2			2	2	1		2		
CO4	3	3	2		2			2	2	1		2		
CO5	3	3	2		2			2	2	1		2		
3	8: Subs	stantial	(High)			2: Mod	erate (N	/ledium	)			1: Poor	(Low)	

#### ASSESSMENT STRATEGY

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

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

#### **ASSESSMENT STRATEGY:**

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

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

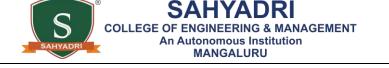
II. In Laboratory Courses where (C) is not a component of the assessment pattern, then (A) will have 50% weightage (25 Marks), and (B) will have 50% weightage (25 Marks).

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

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

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

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



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

# **SEE QUESTION PAPER PATTERN:**

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

- 1. https://nptel.ac.in/courses/128106012
- 2. https://www.youtube.com/watch?v=iIkhMPAiw14



	DATA VIS	UALIZATION	N USING R		
	(Effective fro	om the Academic Year	,		
C	0 - 1-	IV SEMESTER	CIA Marks		50
Course (		CS42297CC			50
	of Contact Hours/Week (L: T: P: S)	0:0:2:0	SEE Marks		50
Total Ho	ours of Pedagogy	20P	Exam Hours		03
COUR	SE PREREQUISITES:	CREDITS – 1			
	-				
	asic Knowledge R programming and data	manipulation concep	ts.		
COUR	SE OBJECTIVES:				
	nderstand the basic plots and major package		ting graphs in R.		
	o develop small applications using R Progr	amming			
TEACH	HING - LEARNING STRATEGY:				
Followin	ng are some sample strategies that can be ir	neorporate for the Co	ourse Delivery		
	Chalk and Talk Method/Blended Mode Mo	ethod			
	Power Point Presentation				
	Expert Talk/Webinar/Seminar				
	Video Streaming/Self-Study/Simulations Peer-to-Peer Activities				
	Activity/Problem Based Learning				
•					
•	Case Studies				
	Case Studies MOOC/NPTEL Courses				
•		et to the Course con	tents		
•	MOOC/NPTEL Courses	ect to the Course con	tents		
LIST C	MOOC/NPTEL Courses Any other innovative initiatives with respe <b>OF EXPERIMENTS</b>	ect to the Course con	tents		Bloom's
•	MOOC/NPTEL Courses Any other innovative initiatives with respe	ect to the Course con	tents	CO	Bloom's Taxonomy
• LIST C Exp.	MOOC/NPTEL Courses Any other innovative initiatives with respe <b>OF EXPERIMENTS</b>		tents	CO No.	
• LIST C Exp.	MOOC/NPTEL Courses Any other innovative initiatives with respe <b>OF EXPERIMENTS</b>	ect to the Course con	tents		Taxonomy
• LIST C Exp.	MOOC/NPTEL Courses Any other innovative initiatives with respe <b>OF EXPERIMENTS</b>	PART-A			Taxonomy
• LIST C Exp.	MOOC/NPTEL Courses Any other innovative initiatives with respe <b>DF EXPERIMENTS</b> Description	PART-A oles stored in a .CSV	V file, compute the Mean,	No.	Taxonomy Level
• LIST C Exp.	MOOC/NPTEL Courses Any other innovative initiatives with respe DF EXPERIMENTS Description For a given set of training data examp Median, Variance, Standard Deviation	PART-A oles stored in a .CSV	V file, compute the Mean,	No.	Taxonomy Level
• LIST C Exp.	MOOC/NPTEL Courses Any other innovative initiatives with respe <b>FEXPERIMENTS</b> For a given set of training data examp Median, Variance, Standard Deviation using R programming.	PART-A bles stored in a .CSV , Range and Quartil	✓ file, compute the Mean, es of one of the attributes	No.	Taxonomy Level
• LIST C Exp.	MOOC/NPTEL Courses Any other innovative initiatives with respe DF EXPERIMENTS Description For a given set of training data examp Median, Variance, Standard Deviation using R programming. Write an R program to perform the follow	PART-A oles stored in a .CS , Range and Quartil owing operations: Co	V file, compute the Mean, es of one of the attributes reate a file, Writing into a	No.	Taxonomy Level
• I • I LIST C Exp. No.	MOOC/NPTEL Courses Any other innovative initiatives with respec <b>DF EXPERIMENTS</b> Description For a given set of training data examp Median, Variance, Standard Deviation using R programming. Write an R program to perform the folle file, Renaming a file, Reading a file, Li Write an R program to perform the folle	PART-A oles stored in a .CSV , Range and Quartil powing operations: Cr sting all files, Copy a powing operations on	✓ file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two	No.	Taxonomy Level
• • • • • • • • • • • • • • • • • • •	MOOC/NPTEL Courses Any other innovative initiatives with respective <b>FEXPERIMENTS</b> Description For a given set of training data examp Median, Variance, Standard Deviation using R programming. Write an R program to perform the follo file, Renaming a file, Reading a file, Li Write an R program to perform the follo strings, compare two strings, Reverse the strings of	PART-A oles stored in a .CSV , Range and Quartil powing operations: Cr sting all files, Copy a powing operations on	✓ file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two	No. CO1 CO1	Taxonomy     Level       CL3
• • • • • • • • • • • • • • • • • • •	MOOC/NPTEL Courses Any other innovative initiatives with respective <b>FEXPERIMENTS</b>	PART-A oles stored in a .CSV , Range and Quartil owing operations: Cr sting all files, Copy a owing operations on he string and Check	V file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two if a given string is a	No. CO1 CO1 CO2	Taxonomy     Level       CL3       CL3
• • LIST C Exp. No. 1 2 3	MOOC/NPTEL Courses Any other innovative initiatives with respec <b>FEXPERIMENTS</b> Description For a given set of training data examp Median, Variance, Standard Deviation using R programming. Write an R program to perform the folle file, Renaming a file, Reading a file, Li Write an R program to perform the folle strings, compare two strings, Reverse th palindrome or not. Write an R program to demonstrate the strings of the str	PART-A oles stored in a .CSV , Range and Quartil owing operations: Cristing all files, Copy a owing operations on he string and Check a the use of the follo	V file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two if a given string is a wing String manipulation	No. CO1 CO1	Taxonomy     Level       CL3
• • • • • • • • • • • • • • • • • • •	MOOC/NPTEL Courses Any other innovative initiatives with respective <b>FEXPERIMENTS</b>	PART-A oles stored in a .CSV , Range and Quartil owing operations: Cristing all files, Copy a owing operations on the string and Check a the use of the follo r, substr, grep, past	V file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two if a given string is a wing String manipulation	No. CO1 CO1 CO2	Taxonomy     Level       CL3       CL3
• • LIST C Exp. No. 1 2 3	MOOC/NPTEL Courses Any other innovative initiatives with respective <b>FEXPERIMENTS</b> Description For a given set of training data examp Median, Variance, Standard Deviation using R programming. Write an R program to perform the follo file, Renaming a file, Reading a file, Li Write an R program to perform the follo strings, compare two strings, Reverse th palindrome or not. Write an R program to demonstrate of functions in R: nchar, toupper, tolower	PART-A oles stored in a .CSV , Range and Quartil owing operations: Cristing all files, Copy a owing operations on he string and Check a the use of the follo	V file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two if a given string is a wing String manipulation	No. CO1 CO1 CO2	Taxonomy     Level       CL3       CL3
• • LIST C Exp. No. 1 2 3 4	MOOC/NPTEL Courses Any other innovative initiatives with respective <b>FEXPERIMENTS</b> Description For a given set of training data examp Median, Variance, Standard Deviation using R programming. Write an R program to perform the follo file, Renaming a file, Reading a file, Li Write an R program to perform the follo strings, compare two strings, Reverse th palindrome or not. Write an R program to demonstrate of functions in R: nchar, toupper, tolower	PART-A oles stored in a .CSV , Range and Quartil owing operations: Cristing all files, Copy a owing operations on he string and Check a the use of the follo r, substr, grep, past PART-B	V file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two if a given string is a wing String manipulation e, strsplit, sprintf, cat and	No. CO1 CO1 CO2	Taxonomy     Level       CL3       CL3
• • LIST C Exp. No. 1 2 3	MOOC/NPTEL Courses Any other innovative initiatives with respec <b>DF EXPERIMENTS Description</b> For a given set of training data examp           Median, Variance, Standard Deviation           using R programming.           Write an R program to perform the follofile, Renaming a file, Reading a file, Li           Write an R program to perform the follofil strings, compare two strings, Reverse the palindrome or not.           Write an R program to demonstrate to functions in R: nchar, toupper, tolower sub functions.           Write an R program to create the folloplot and Histogram.	PART-A oles stored in a .CSV , Range and Quartil owing operations: Cristing all files, Copy a owing operations on he string and Check a the use of the follo or, substr, grep, past PART-B wing basic plots: Sc	V file, compute the Mean, es of one of the attributes reate a file, Writing into a a file. strings: Concatenate two if a given string is a wing String manipulation e, strsplit, sprintf, cat and atter plot, Line graph, Bar	No. CO1 CO2 CO2 CO3	Taxonomy     Level       CL3     CL3     CL3     CL3
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SAHYADRI COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution

4						ogram an	-			-	-	CO4		L3
5						nd lattice nd Densi		ge, write	an R pro	ogram to	o create	CO5	C	L3
6		ite an R						nd Level	Plot usi	ng lattic	ce package	CO5	C	L3
	1111					COUR	SE OU	TCOM	ES					
Upon cc	mpleti	on of thi	is course	e, the sti	idents w	vill be ab	le to:							
CO No.					Cou	rse Ou	tcome	Descrip	tion					Bloom's 'axonomy Level
CO1	Appl	Apply the concepts of R programming to read and write data files. Implement the string manipulation and data handling concepts.												CL3
CO2	Imple	ement th	e string	manipu	lation a	nd data h	andling	; concept	ts.					CL3
CO3	Illust	Illustrate the use of inbuilt functions in the creation and customization of graphs.											CL3	
CO4	Appl	y ggplot	2 Packa	ge for d	lata visu	alization								CL3
CO5	Dem	onstrate	the latti	ce grapl	hics and	control	styles us	sing the	lattice pa	ackage.				CL3
	1					CO-PC	D-PSO	MAPPI	NG					
CO No.	Programme							Dutcomes (PO)					Sp	gramme ecific me (PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	
CO1	3	3	2	1	2				1	1		2		
CO2	3	3	2	1	2				1	1		2		
CO3	3	3	2	1	2				1	1		2		
CO4	3	3	2	1	2				1			2		
CO5	3	3	2	1	2				1			2		
	3: Subs	tantial	(High)			2: Mode	erate (N	(ledium)	)		1: I	Poor (L	ow)	
А	ssessm	ent will	be both	CIA an		SSESSI Students				d using	Direct and	Indirec	t meth	ods:
SI. No.		As	sessmei	nt Desc	ription		V	Veighta	ge (%)		N	lax. M	arks	
1		inuous	Interna	l Assess				100	%			50		
			Vork (A)	)				50				25		
		ratory T	~ ~ ~		(:: D	t- (C)		<u>30</u> 20				15 10		
2			d Exan			ects (C)		100				<u> </u>		
-	Jenne	SUL EI	iu l'Aall	mation				100	/ U			50		

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

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



(25 Marks), and (B) will have 50% weightage (25 Marks).

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

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

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

- III. In Laboratory Courses where (C) is a component of the assessment pattern, then assessment will be done by considering the weightages given above, i.e. (A) 25 Marks (Weekly Assessment), (B) 15 Marks (Laboratory Examination), (C) 10 marks (Open Ended Experiments/Mini Projects)
  - The respective course instructor will design the assessment criteria for the said assessment components.
  - The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

#### **SEE QUESTION PAPER PATTERN:**

- 1. All laboratory experiments should be included for practical examination, from which students are allowed to pick one experiment from the lot.
- 2. SEE shall be conducted for 100 Marks and the marks will be scaled down to 50.
- 3. General Marks Distribution: Procedure + Conduction + Viva = 20% + 50% + 30%.

Change of experiment is allowed only once and 20% of the marks allotted to the Procedure will be made ZERO (if a question carries two experiments, both should be changed). The evaluation will be done for 80% of the total maximum marks.

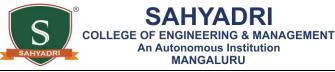
# **REFERENCE WEB LINKS AND VIDEO LECTURES (E – RESOURCES):**

1. Essentials of R with Data Analytics, Saroj Dahiya Ratnoo, Himmat Singh Ratnoo, Wiley (India), Low price edition.

2. https://elearn.nptel.ac.in/shop/iit-workshops/completed/data-visualization-with-r/



PYTHON DATA STRUCTURES AND ALGORITHMS (Effective from the Academic Year 2023 - 2024)         IV SEMESTER         Course Code       AM42297AD       CIA Marks       50         Number of Contact Hours/Week (L: T: P: S)       0:0:0:2:0       SEE Marks       50         TOTAL HOURS OF Pedagogy       20P       Exam Hours       03         COURSE PREREQUISITES:       Basic Knowledge of Python and concepts of Data Structures.         COURSE OBJECTIVES: <ul> <li>Basic Knowledge of Python and concepts of Data Structures.</li> <li>COURSE OBJECTIVES:</li> <li>To use different types of data structures, operations and algorithms</li> <li>Apply searching operations on files</li> <li>To use stack, Queue, Lists, Trees and Graphs in problem solving</li> <li>Apply sorting algorithms on files</li> <li>Implement all data structures in a high-level language for problem solving.</li> <li>TEACHING - LEARNING STRATEGY:</li> <li>Following are some sample strategies that can be incorporate for the Course Delivery</li> <li>Chalk and Talk Method/Blended Mode Method</li> <li>Power Point Presentation</li> <li>Expert Talk/Webinar/Seminar</li> <li>Video Streaming/Self-Study/Simulations</li> <li>Peer-to-Peer Activities</li> <li>Activity/Problem Based Learning</li> <li>Case Studies</li> <li>MOOC/NPTEL Courses</li> <li>Any other innovative initiatives with respect to the Course contents</li> <li>LIST OF EXPERIMENTS</li></ul>
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Develop a Python program to Implement the following searching techniques a. Linear Search b. Bin
Search.
Develop a Python program to implement the following sorting algorithms using user defined
2 functions: a. Bubble sort (Ascending order) b. Selection sort (Descending order).
Develop a Python Program implement STACK with the following operations
3 a. Push an Element onto Stack b. Pop an Element from Stack
4 Implement a Program in Python for converting an Infix Expression to Postfix Expression
5 Implement a Program in Python for evaluating a Postfix Expression.
Develop a Python program to simulate the working of a singly linked list providing the
6 following operations: a. Display & Insert b. Delete from the beginning/end c. Delete a given element
7 Obtain the Topological ordering of vertices in a given graph with the help of Python programming.
8 Check whether a given graph is connected or not using the DFS method using Python programming.
9 From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkst algorithm



# **COURSE OUTCOMES**

Upon co CO No.		on of the	is course	e, the stu			tcome	Descrip	otion					Bloom's Taxonomy Level
CO1	Desi	gn a sys	stem by	using d	ifferent	types o	f data st	ructures	s, operat	tions an	d algori	thms		CL3
CO2	Appl	y differe	ent types	s of sear	ching op	peration	S							CL3
CO3	Appl	y stack	, Queue	, Lists, '	Trees ar	nd Grap	hs in pr	oblem s	olving					CL3
CO4	Appl	y differe	ent types	s of sort	ing algo	rithms								CL3
CO5	Imple	ement al	ll data st	ructures	s in a hig	gh-level	languag	e for pro	oblem so	olving				CL3
						CO-P	O-PSO	MAPPI	ING					
COProgrammeProgrammeNo.Outcome (PSO)Outcome (PSO)														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3					2	2	1		
CO2	3	3	3	3	3					2	2	1		
CO3	3	3	3	3	3					2	2	1		
<b>CO4</b>	3	3	3	3	3					2	2	1		
CO5	3	3	3	3	3					2	2	1		
	3: Subs	stantial	(High)			2: Mod	erate (N	/ledium	)			1: Poor	(Low)	
		11 1 1 4		nd SEE			MENT		_	a Diraat	and Ind	liroot m	thoda	

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

#### **ASSESSMENT STRATEGY:**

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

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

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

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

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

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

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

COLLEGE OF ENGINEERING & MANAGEMENT An Autonomous Institution MANGALURU

Examination), (C) – 10 marks (Open Ended Experiments/Mini Projects)

- The respective course instructor will design the assessment criteria for the said assessment components.
- The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

In all the cases, the assessments will be done based on the criteria designed by the Course Coordinator.

# **SEE QUESTION PAPER PATTERN:**

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

- 1. https://jovian.com/learn/data-structures-and-algorithms-in-python
- 2. https://onlinecourses.nptel.ac.in/noc20\_cs70/preview
- 3. <u>https://online.vtu.ac.in/course-details/Programming-Data-Structures-And-Algorithms-Using-Python</u>
- 4. <u>https://www.edureka.co/blog/data-structures-in-python/</u>



SAHYADRI	MANGALU	IRU	
BIOLO	GY FOR ENGI	NEERS	
	m the Academic Year	2023 - 2024)	
	IV SEMESTER		
Course Code	HI422T8X	CIA Marks	50
Number of Contact Hours/Week (L: T: P: S)	2:0:0:0	SEE Marks	50
Total Hours of Pedagogy	30L	Exam Hours	03
	<b>CREDITS</b> – 2		
COURSE PREREQUISITES:			
Basic Concepts of Biology			
COURSE OBJECTIVES:			
• Implementation of new technology in medical	Science		
<ul> <li>Use modern technical skills to bring out innov</li> </ul>		eld	
TEACHING - LEARNING STRATEGY:	auons in medical n		
Following are some sample strategies that can be inc	corporate for the Co	urse Delivery	
Chalk and Talk Method/Blended Mode Met	thod		
Power Point Presentation			
• Expert Talk/Webinar/Seminar			
Video Streaming/Self-Study/Simulations			
Peer-to-Peer Activities			
Activity/Problem Based Learning			
Case Studies			
MOOC/NPTEL Courses			
• Any other innovative initiatives with respec	et to the Course cont	tents	
CO	URSE CONTEN	ГЅ	
	MODULE - I		
Basic Cell Biology- Introduction to Biology, Cell-T	The unit of life, Cell	Theory, Cell structure and Function-	6 Hours
Plant cell and Animal cell.			
Human Organ System-Brain as a CPU system - and			
transmission, EEG, Heart as the pump system- Doul	ble circulation of hu	man heart, ECG.	
	MODULE - II		
Common Diseases and Vaccination - Allergies, Co		-	6 Hours
the world, Vaccine for Rabies and RNA vaccines fo		• •	
technologies to detect heart diseases. Engineering so	olutions for Parkinso	on's disease. DNA fingerprinting.	
	MODULE - III		
Biosensors: Various components of biosensors, Tra		ors: Various types of transducers;	6 Hours
principles and applications, applications of biosenso			
Telemedicine: Block diagram of telemedicine syste	m, origin and devel	opment of Telemedicine, Benefits	
and limitations of Telemedicine.			
	<b>MODULE - IV</b>		1
Biomechanics of Joints: Skeletal Joints, Skeletal			6 Hours
joints, Mechanics of the Elbow, Shoulder, Spin	nal Column, Hip,	Knee and Ankle, Applications of	
prosthetics.			
Bio-fluid Mechanics: Circulatory System in the Hu	uman Body. Modeli	ng of Flow in Blood Vessels, Blood	
Flow Theory.			
, ,			
Biomaterials: Definition and classification of	biomaterials, bioc	compatibility and biodegradability,	



#### Biomedical Implants. **MODULE - V** Artificial intelligence for Medical Application: Introduction to Artificial intelligence and machine 6 Hours learning in medical Science. Application of AI in Imaging and Computer-aided Diagnosis, Neuroscience and drug discovery, Genetic algorithms. **COURSE OUTCOMES** Upon completion of this course, the students will be able to: **Bloom's** CO **Course Outcome Description** Taxonomy No. Level CO1 Interpret the basics of cell biology and brain functions. CL2 CL2 CO<sub>2</sub> Understand effect of common diseases, types of vaccination and general forensics. CO3 Summarize the application of biosensors and telemedicine in medical science. CL2 Visualize biomechanical joints, biofluid mechanics and bio materials in medical science. CO4 CL2 CL2 Contrast innovative methods of information technology in computer aided medical diagnosis. CO5 **CO-PO-PSO MAPPING** Programme Specific CO **Programme Outcomes (PO)** No. **Outcome (PSO)** 2 9 12 1 3 5 7 8 10 11 4 6 1 2 1 1 1 1 1 **CO1** 1 1 **CO2** 1 1 1 2 1 1 1 CO3 1 2 2 1 1 1 1 **CO4** 1 2 2 2 1 1 1 **CO5** 1 2 2 1 1 1 1 **3:** Substantial (High) 2: Moderate (Medium) 1: Poor (Low) ASSESSMENT STRATEGY Assessment will be both CIA and SEE. Students learning will be assessed using Direct and Indirect methods: Sl. No. **Assessment Description** Weightage (%) Max. Marks 100 % **Continuous Internal Assessment (CIA)** 50 1 Continuous Internal Evaluation (CIE) 60 % 30 Assignments 40 % 20 2 **Semester End Examination (SEE)** 100 % 50 **ASSESSMENT DETAILS** Continuous Internal Assessment (CIA) (50%) Semester End Exam (SEE) (50%) Assignment/ **Continuous Internal Evaluation (CIE) (60%)** Activities (40%) Ш Ι Π Syllabus Coverage Syllabus Coverage **Syllabus Coverage** 40% 30% 30% 100% 100% MI MI MI MII MII MII MII MIII MIII MIII MIV MIV MIV MV MV MV Note: For Examinations (both CIE and SEE), the question papers shall contain the questions mapped to the

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appropriate Bloom's Level. Any COs mapped with higher cognitive Bloom's Level may also be assessed through the



assignments.

# ASSIGNMENT TYPES WITH WEIGHTAGES

Sl. No.	Assignment Description	Max. Weightage (%)	Max. Marks	
1	Written Assignments	25 %	05	
2	Case Studies	25 %	05	
3	Seminar/Presentation	25 %	05	
4	Peer - to - Peer Learning	25 %	05	

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

# **SEE QUESTION PAPER PATTERN:**

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

## **TEXT BOOKS:**

- 1. Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012
- 2. Human Physiology, Stuart Fox, Krista Rompolski, McGraw-Hill eBook. 16th Edition, 2022.
- 3. Brian R Eggins Biosensors an Introduction, First edition, John Wiley & Sons Publishers, 1996.
- 4. R S Khandpur, "Telemedicine technology and applications", PHI Learning Pvt. Ltd, New Delhi, 2017.
- 5. N. Ozkaya and M. Nordin: Fundamentals of Biomechanics-Equilibrium, Motion and Deformation, Springer-Verlag,2nd Edition,1999.
- 6. Biomaterials Science and Tissue Engineering: Principles and Methods, by Bikramjit Basu, Cambridge IISc Series.

- 1. https://www.youtube.com/watch?v=96-u9s6D16k
- 2. https://www.youtube.com/watch?v=4\_emccqgYMs
- 3. https://onlinecourses.nptel.ac.in/noc22\_cs56/preview
- 4. https://onlinecourses.nptel.ac.in/noc22\_cs29/preview



# **UHV -2: UNDERSTANDING HARMONY and ETHICAL HUMAN CONDUCT**

(Effective from the Academic Year 2023 - 2024) SEMESTER - IV							
Course Code	HU42289X	CIA Marks	50				
Number of Contact Hours/Week (L: T: P: S)	1:0:0:0	SEE Marks	50				
Total Hours of Pedagogy	15	Exam Hours	03				
CREDITS – 1							

#### **COURSE PREREQUISITES:**

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

#### **COURSE OBJECTIVES:**

This course will enable students to:

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

# **TEACHING - LEARNING STRATEGY:**

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

- Chalk and Talk Method/Blended Mode Method
- Power Point Presentation
- Expert Talk/Webinar/Seminar
- Video Streaming/Self-Study/Simulations
- Peer-to-Peer Activities
- Activity/Problem Based Learning
- Case Studies

# **COURSE CONTENTS**

The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large. The course will engage students in interactive sessions, open mic, reading groups, storytelling sessions, and semester-long activities conducted by faculty mentors. In the following a set of activities planned for the course have been listed :

# MODULE - I

# Introduction to Value Education :

**3 Hours** 

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

						Μ	ODUL	E - II						
Harmon	ny in tl	he Hum	an Bein	g :										3 Hours
Understa Needs o Harmon	f the S	elf and t	he Body	, The B	ody as a	ın Instru	ment of	the Self	, Unders	standing		-		
	-			•			ODUL							
Harmon	ny in tl	he Fami	ily and S	Society	:									3 Hours
Harmon	y in ti	he Fam	ily – th	e Basic	Unit o	of Huma	an Intera	action,	'Trust' -	- the F	oundatio	onal Va	lue in	
Relation	iship, 'l	Respect'	– as the	Right H	Evaluatio	on, Othe	r Feelin	gs, Justi	ce in Hu	ıman-to	-Human	Relatio	nship,	
Underst	anding	Harmon	ny in the	Society	, Vision	for the	Univers	al Huma	an Order					
	• 4					M	ODUL	E - IV						
Harmon Understa the Four Harmon	anding r Order	Harmor rs of Na	ny in the	e Nature				•					•	3 Hours
Implica							ODUL							
Natural Educatio Holistic Transitio	on, Hu Techn	manisti ologies,	c Const Produc	itution tion Sys	and Un stems ar	iversal nd Mana	Human	Order,	Compe	tence ir	n Profes	ssional	Ethics	
						COUR	SE OU	тсом	IES					
Upon co	omplet	ion of t	his cour	se, the s	tudents	will be	able to:							
CO No.	Course Chiteome Description								]	Bloom's Taxonomy Level				
CO1	Understand value education to develop basic human aspirations through a holistic approach							ach	CL2					
CO2	Relate to the needs of self and body to establish co-existence leading to harmony in the human being.								CL2					
CO3	Recognize the importance of trust and respect to promote harmony in the family and society.								CL2					
CO4	Realize the existence as coexistence to establish harmony through mutual fulfillment among four orders of nature.							Ū.	CL2					
CO5		0	he needs		olistic ı	understa	nding o	f humar	n values	to deve	elop eth	ical and		CL2
1						CO-PC	D-PSO I	MAPPI	NG				Dmo	gramme
											<b>F</b> TO	gramme		
CO					Progr	amme	Juicon		)				S	pecific
CO No.	1	2	3	4	Progr 5	amme (	7	8	9	10	11	12	S	5
	1	2	3	4						10	11	<b>12</b> 2 2	Sj Outco	pecific ome (PSO)

CO1						1	1			2		
CO3				2	2	1	1			2		
CO4					2	1	1			2		
CO5					1	1				2		
3	: Substantial	(High)		2: Moder	ate (N	Iedium	)		1: Po	oor (Lo	ow)	
Assessm	ent will be bot	h CIA and	SEE. Stud	ASSESSM ents learning				Direct a	nd Indirec	t metho	ds:	
Sl. No.	As	sessment	Descriptio	n	V	Veighta	ge (%)		М	ax. Ma	rks	
1	Assessment Description Continuous Internal Assessment (CIA)				100 %				50			
			l Evaluatio			60	%			30		
	Assignments					40 %			20			
2	Semester En	d Examin	ation (SEI	E)		100	%			50		
			C	CO - ASSES	SME	NT MA	PPING					
		Conti	inuous Int	ernal Asses	ssmen	t (CIA)	(50%)	Sem	ester End	d Exan	n (SEE) (50%	
		Con	tinuous Ir	nternal		Assign	ment/					
Course	Outcomes	Evalu	ation (CII	E) ( <b>60%</b> )	Α	ctivitie	s ( <b>40%</b> )					
		Ι	II	III								
		Syl	labus Cov	erage	Syl	Syllabus Coverage			Sylla	bus Co	verage	
		40%	30%	30%		100%			100%			
	CO1	MI				MI			MI			
	CO2	MII	MII			M	I			MII		
	CO3		MIII			MI	II		MIII		[	
	CO4			MIV		MI	V			MIV		
	CO5			MV		MV			MV			
ASSIG	gnments. NMENT TYP							Maria	Waishtas	o (0/ )	Mar Mark	
Sl. No.			signment	Description	n			Max.	Weightag	e (%)	Max. Mark	
1	Written Assi	-							25 %		05	
2	Case Studies								25 %		05	
3	Seminar/Pre	sentation						25 %			05	
4	Peer - to - Pe	eer Learni	ng						25 %		05	
Note: T bands	he assignmen			e may be p	rovide	d appro	priately	to the s	students b	belongi	ng to differer	
a== -		DED DAT	ITERN:									
Theory 1. The q	JESTION PA SEE will be co juestion pape tudents have	onducted, er will hav	, with com re 50 ques	tions. Each	quest	ion is s	et for 01	marks.			rs)	
Theory 1. The c 2. The s	SEE will be co juestion pape	onducted, er will hav	, with com re 50 ques	tions. Each	quest	ion is s	et for 01	marks.			rs)	
Theory 1. The c 2. The s TEXT I	SEE will be co juestion pape tudents have BOOKS:	onducted, er will hav to answe	, with com re 50 ques r all the q	tions. Each uestions, se	quest	ion is s ig one f	et for 01 ull quest	marks. ion fror	n each me	odule		
Theory 1. The c 2. The s TEXT I 1.	SEE will be co juestion pape tudents have	onducted, er will hav to answe A Foundat	with com re 50 ques r all the q tion Course	tions. Each uestions, se e in Human Y	quest electin Values	ion is s ag one f and Pro	et for 01 ull quest fessional	marks. ion fror Ethics, l	n each me	odule		
Theory 1. The c 2. The s <b>TEXT I</b> 1. 2.	SEE will be co juestion pape tudents have BOOKS: The Textbook	er will hav to answe A Foundat Revised Ed	with com re 50 ques r all the q tion Course ition, Exce	tions. Each uestions, se e in Human ` l Books, Ne	quest electin Values w Delh	ion is s one f and Pro ii, 2019.	et for 01 ull quest fessional ISBN 97	marks. ion fror Ethics, 1 8-93-870	n each mo R R Gaur, 034- 47-1	odule R Asth	ana, G P	

- 6. The Story of My Experiments with Truth by Mohandas Karamchand Gandhi
- 7. Small is Beautiful E. F Schumacher.

8. Gandhi - Romain Rolland (English)

- 1. https://www.aicteindia.org/sites/default/files/Vol.%20II%20%20AICTE%20UG%20%20Curriculum.
- 2. https://www.youtube.com/channel/UCQxWr5QB\_eZUnwxSwxXEkQw
- $3. https://fdp-si.aicte-india.org/8dayUHV\_download.php$
- 4. https://www.youtube.com/watch?v=8ovkLRYXIjE