

# DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Academic Year 2024 - 2025



BATCH: 2023 - 2027 CREDITS: 160 [2022 Scheme]



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[2022 Scheme]

3<sup>rd</sup> and 4<sup>th</sup> Semesters Scheme & Syllabus

> BATCH: 2023 - 2027 CREDITS: 160

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#### **INSTITUTION**

#### Vision

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

#### **Mission**

To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.

To encourage long-term interaction between the academia and industry through their involvement in the design of curriculum and its hands-on implementation.

To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

#### **Quality Policy**

To provide educational services of the highest quality both curricular and co-curricular to enable students integrate skills and serve the industry and society equally well at global level.

#### Values

- ✤ Academic Freedom
- Innovation
- ✤ Integrity

- Professionalism
- Inclusiveness
- Social Responsibility

#### **DEPARTMENT OF AI & ML**

#### Vision

To develop an outstanding AI and ML professionals with profound practical, research & managerial skills to meet ever changing Industrial Social and Technological needs of the Society

#### Mission

To disseminate strong theoretical and practical exposure to meet the emerging trends in the industry.

To promote a freethinking environment with innovative research and teaching-learning pedagogy.

To develop value based socially responsible professionals with high degree of leadership skills will support for betterment of the society.

#### Program Educational Objectives (PEOs)

PEO1	Develop and excel in their chosen profession on technical front and progress towards advanced continuing education or Inter-disciplinary Research and Entrepreneurship
PEO2	Become a reputed innovative solution provider- to complex system problems or towards research or challenges relevant to Artificial Intelligence and Machine learning
PEO3	Progress as skilled team members achieving leadership qualities with trust and professional ethics, pro-active citizens for progress and overall welfare of the society

#### **PEO to Mission Statement Mapping**

Mission Statements	PEO1	PEO2	PEO3
To disseminate strong theoretical and practical exposure to meet the emerging trends in the industry.	3	3	2
To promote a freethinking environment with innovative researchand teaching-learning pedagogy.	2	3	2
To develop value based socially responsible professionals with high degree of leadership skills will support for betterment of the society.	2	3	3

#### **Program Outcomes (POs) with Graduate Attributes**

- **PO1** Engineering knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems in Computer Engineering.
- **PO2 Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems in Computer Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
- **PO3 Design / Development of Solutions:** Design solutions for complex Engineering problems anddesign system components or processes of Computer Engineering that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
- **PO4 Conduct Investigations of Complex Problems:** Use research based knowledge and research methods including design of experiments in Computer Engineering, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **P05 Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modeling to complex Engineering activities in Computer Engineering with an understanding of the limitations.
- **P06 The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in Computer Engineering.
- **P07 Environment and Sustainability:** Understand the impact of the professional Engineering solutions of Computer Engineering in societal and Environmental contexts, demonstrate the knowledge of, and need for sustainable development.
- **P08 Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and normsof the Engineering practice.
- **P09** Individual and Team Work: Function effectively as an individual, and as a member or leaderin diverse teams, and in multidisciplinary settings.
- **P010 Communication Skills:** Communicate effectively on complex Engineering activities with the Engineering community and with society, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clearinstructions.
- **PO11 Project Management and Finance:** Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary Environments.
- **PO12** Life-long Learning: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

#### **Program Specific Outcomes (PSOs)**

#### A graduate of the Computer Engineering Program will demonstrate:

**PSO1**: Develop models in Data Science, Machine learning, Deep learning and Bigdata technologies, using acquired AI knowledge and modern tools.

**PSO2:** Formulate solutions for interdisciplinary problems through acquired programming knowledge in the respective domains complying with real-time constraints.

#### NEW HORIZON COLLEGE OF ENGINEERING

#### B.E. in Artificial Intelligence and Machine Learning

Scheme of Teaching and Examinations for 2023-2027 BATCH (2022 Scheme)

			III	Semester									
SI. No.	Course CourseC		CourseTitle	BoS	) Dist	Cre rib			'all lits	act rs		Mark	S
					L	Т	Р	S	Overall Credits	Contact Hours	CIE	SEE	Tota l
1	BSC	22MAC31	Mathematical Foundation for Computing Sciences	BS	2	1	0	0	3	4	50	50	100
2	РСС	22AIM32	Data Structures and Algorithms	AIML	3	0	0	0	3	3	50	50	100
3	PCCL	22AIL32	Data Structures and Algorithms Lab	AIML	0	0	1	0	1	2	50	50	100
4	РСС	22AIM33	Object Oriented Programming with Java	AIML	3	0	0	0	3	3	50	50	100
5	PCCL	22AIL33	Object Oriented Programming with Java Lab	AIML	0	0	1	0	1	2	50	50	100
6	PLC	22AIM34X	Programming Language Course	AIML	2	0	1	0	3	4	50	50	100
7	AEC	22AIM35X	Ability Enhancement Course –III	AIML	0	0	1	0	1	2	50	50	100
8	BSC	22BIK36	Bio Inspired Design and Innovation	Any Dept	3	0	0	0	3	3	50	50	100
9	UHV	22SCK37	Social Connect and Responsibility	AIML	0	0	1	0	1	2	50		50
10		22NSS30	National Service Scheme (NSS)	NSS coordinato r	0	0	0	0	0	2	50		50
10	NCMC	22PED30	Physical Education (PE) (Sports andAthletics)	PE Director	Ũ	0	0	U	0	2	50		30
		22YOG30	Yoga	Yoga Teacher									
			Total						19	27	500	400	900

11NCMC22DMAT31*Basic AppliedMathematics-I	BS	0	0	0	0	0	2	50		50	
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**BSC**: Basic Science Course, **PCC**: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **NCMC**: Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **L**: Lecture, **T**: Tutorial, **P**: Practical **S** : **SDA**: Self Study for Skill Development, **K**: This letter in the course code indicates common to all the stream of engineering. **ESC**: Engineering Science Course, **ETC**: Emerging Technology Course, **PLC**: Programming LanguageCourse, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation.

22DMAT31\*: This non-credit mandatory course to be offered with only CIE and no SEE to Lateral entry students.

	Programming Language Course (PLC)										
22AIM341	Linux Programming	22AIM344	Java Script Programming								
22AIM342	Perl Programming	22AIM345	AI for Robotics								
22AIM343	Programming for IoT										

#### Ability Enhancement Course-III (all are Laboratory Courses 0-0-1-0)

22AIM351	Problem solving using Prolog	22AIM354	Exploratory Data Analysis
22AIM352	Python for Data Analytics	22AIM355	Julia for Numerical Analysis
22AIM353	Data Analysis using MSExcel		

**National Service Scheme /Physical Education/Yoga:** All students have to register for any one of the coursesnamely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out betweenIII semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIEscore is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and thesame shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not beconsidered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courseismandatoryfortheawardofdegree.

Credit Definition:	03- Credits courses are to be designed for 40 hours in
1-hour Lecture (L) per week=1Credit2-hours	Teaching-Learning Session
Tutorial(T) per week=1 Credit	02- Credits courses are to be designed for 25 hours of
2-hours Practical/ Drawing(P)per week=1Credit	Teaching-Learning Session
2-hous Self Study for Skill Development (SDA)	01-Credit courses are to be designed for 15 hours of
per week= 1 Credit	Teaching-Learning Sessions

## NEW HORIZON COLLEGE OF ENGINEERING

### B.E.in Artificial Intelligence and Machine Learning Scheme of Teaching and Examinations for 2022-2026 BATCH (2022 Scheme)

			Sc.	IV emester										
Sl.	Course	e and	Course Title	BoS	( Dist	Cre crib		on	Over allCr	Cont		Marks		
No.	Course	e Code			L	Т	Р	S	VO all	CO)	CIE	SEE	Total	
	BSC/P CC	22MAC41	Discrete Mathematics and Graph Theory	BS	2	1	0	0	3	4	50	50	100	
2	PCC	22AIM42	Database Management System	AIML	3	0	0	0	3	3	50	50	100	
3	PCCL	22AIL42	Database Management System Lab	AIML	0	0	1	0	1	2	50	50	100	
4	РСС	22AIM43	Design and Analysis of Algorithm	AIML	3	0	0	0	3	3	50	50	100	
5	PCCL	22AIL43	Design and Analysis of Algorithm Lab	AIML	0	0	1	0	1	2	50	50	100	
6	РСС	22AIM44	Data Science	AIML	3	0	0	0	3	3	50	50	100	
7	PCCL	22AIL44	Data Science Lab	AIML	0	0	1	0	1	2	50	50	100	
8	PLC	22AIM45 X	Programming Language Course	AIML	2	0	1	0	3	4	50	50	100	
9	AEC	22AIM46X	Ability Enhancement Course –IV	AIML	0	0	1	0	1	2	50	50	100	
10	UHV	22UHK47	Universal Human Values and Life Skills	Any Dept	1	0	0	0	1	2	50	50	100	
11	PROJ	22AIM48	Mini Project-I	AIML	0	0	1	0	1	0	50	50	100	
10		22NSS40	National Service Scheme (NSS)	NSS coordinat or					0		-		-0	
12	NCMC	22PED40	Physical Education (PE) (Sports and Athletics)	PE Director	- 0	0	0	0	0	2	50		50	
		22YOG40	Yoga	Yog Teacher										
Total									21	29	600	550	1150	
13	NCMC	22DMAT41	* Basic Applied Mathematics-II	BS	0	0	0	0	0	2	50		50	

**BSC**: Basic Science Course, **PCC**: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **NCMC**: Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **PROJ**: Mini Project work, **L**: Lecture, **T**: Tutorial, **P**: Practical **S**: **SDA**: Self Study for Skill Development, **K**: This letter in the course code indicates common to all the stream of engineering. **ESC**: Engineering Science Course, **ETC**: Emerging Technology Course, **PLC**: Programming Language Course, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation.

22DMAT41\*: This non-credit mandatory course to be offered with only CIE and no SEE to Lateral entry

	Programming Language Course (PLC)											
22AIM451	Ruby Programming	22AIM454	Advanced Python Programming									
22AIM452	C #and.Net Framework	22AIM455	AI Powered Tools & Services									
22AIM453	R Programming											
	AbilityEnhancementCourse-IV (al	ll are Laborato	ory Courses 0-0-1-0)									
22AIM461	Database Programming using Cassandra	22AIM464	Haskell programming									
22AIM462	DataVisualization	22AIM465	Basics for Digital and Image Processing									
22AIM463	Golang Programming											

**Mini-project work:** Mini Project is a laboratory-oriented/hands on course that will provide a platform to studentsto enhance their practical knowledge and skills by the development of small systems/applications etc. Based on the ability/abilities of the student/s and recommendations of the mentor. A student can dominiprojectas

(i) A group of 2 if mini project work is single discipline (applicable to all IT allied branches)

(ii) Agroup of 2-4 if mini project work is single discipline (applicable to all Core Branches)

(iii) A group of 2 -4 students if the Mini Project work is a multi disciplinary (Applicable to all Branches) **CIEprocedureforMini-project**:

(i) **Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concernedDepartment and two faculty members of the Department, one of them being the Guide. The CIE marks awarded forthe Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all thebatchesmates.

(ii) **Interdisciplinary:** Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project.

TheCIEmarksawardedfortheMini-project, shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the percentage ratio of 50:25:25. The marks awarded

**National Service Scheme /Physical Education/Yoga:** All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried outbetween III semester to the VI semester (for 4 semesters). Successful completion of the registered course andrequisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA,

	ession as wen as for the calculation of barn and barn,
CreditDefinition:	03-Credits courses are to be designed for 40
1-hour Lecture (L) per week=1Credit2-hours	hours in Teaching-Learning Session
Tutorial(T) per week=1 Credit 2-hours Practical	02-Credits courses are to be designed for 25
/ Drawing (P) per week=1Credit	hours of Teaching-Learning Session
2-hours Self Study for Skill Development (SDA) per	01-Credit courses are to be designed for 15 hours of
week= 1 Credit	Teaching-Learning Sessions

# **III SEMESTER**

	]	МАТН	IEMA	<b>FICAL F</b>	OUNE	DATIO	N FOR	СОМР	UTIN	<b>G SCIEN</b>	CES	
Course Code	22MA							IE Ma				50
L:T:P:S	2:1:0:							EE Ma		50		
Hrs. / Week	4								Aarks			100
Credits	03								Hours			03
		s: At the end of the course, the student will be able to:										
22MAC31.1		Jse appropriate numerical methods to solve algebraic equations and transcendental										
	-	quations.										
22MAC31.2		live initial value problems using appropriate numerical methods and also Evaluate										
		finite integrals numerically.										
22MAC31.3		emonstrate the idea of Linear Dependence and Independence of sets in the vector space.										
22MAC31.4											eal time probl	
22MAC31.5											ng problems.	
22MAC31.6											about the hyp	othesis.
Mapping of C											F	
<b>F</b> F8	P01	P02		P04		P06		P08	P09	P010	P011	P012
22MAC31.1	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.2	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.3	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.4	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.5	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.6	3	3	-	-	-	-	-	-	-	-	-	-
MODULE-1 Numerical solu Method- Proble divided differen proofs)-Problen Case Study Text Book MODULE-2 Numerical solu Modified Euler' methods-Proble Applications Text Book MODULE-3 Vector Space d Independence, and Dimensior Text Book	tion of a ems. Int nce, Lag ms. Case s Text B NUME tion of o 's metho ems. No ms. Applic Text B VECT efinitio Linear n.	algebra erpola grange tudy of ook 1: <b>RICAI</b> ordina od and umeric ation ook 1: <b>OR SP</b> on and	aic an ation: 1 's form 28.2, 28.2, 28.2, 28.2, 19.2 19.2 10.2 10.2 10.2 10.2 10.2 10.2 10.2 10	d transo Newton nula and 28.3, 29 <b>HODS-</b> ferentia ge-Kutta egration nerical i 32.5, 33	cender 's forw d Lagra l Analy 9.6, 29 2 l equa metho n: Simp integra 2.7, 32 ubspace d Span	vard a ange's vsis. .10, 29 tions o od of f pson's ation t .9, 30. ces an ining S	nd back inverse 9.11, 29 of first o ourth-o 1/3 <sup>rd</sup> ru o veloci 7, 30.8, d Span	ward i e inter .13, Te order a rder-F ule, Sin ty of a 30.10, ning s	formul polatic ext Boo and of f Problem mpson partic , Text I ets, Li	lae for e on for un ok 2: 19 first deg ms. Milr 's 3/8 <sup>th</sup> cle and v Book 2: near De	equal intervals, nequal intervals, .2, 19.3. <b>22MAC31.2</b> gree: Taylor's s ne's predictor a rule, Weddle's volume of solic 19.5, 21.1. <b>22MAC31.3</b> ependence and	Newton ls (without <b>8 Hours</b> eries method and corrector rule (without ls. <b>8 Hours</b> d
MODULE-4							ITY DIS	STRIB	UTION	IS	22MAC31.4	8 Hours
Random variab												
Discrete Proba distribution: N Discrete and In Case Study	bility d ormal I depend	istribu Distrib ent ra	itions: oution ndom	: Binom s-Probl	ial an ems. C es. Exp	d Pois Concep	son Dis ot of joi	stribut nt pro	ions-P obabili	roblem ty-Joint	s. Continuous probability d	Probability
Text Book						611	26.12, 2	614 7	26.15	2616		
MODULE-5	SAMP				0.10, 2	0.11, /	20.12, 2	0.14, 2			22MAC31.6	8 Hours
					um c +l-		lange -	- 1-		•		
Sampling, Samp												
Inferences for v	anance	e and p	лороі	uon. Ce	entral	uuut t	neorem	(with	outpr	001J, CO	indence limits	tor means,

Student's t-distribution, F-distribution and Chi-square distribution for test of goodness of fit for small samples.

Case Study	Case Studies on sampling theory and significant measures of scores.
Text Book	Text Book 1: 27.2, 27.3, 27.4, 27.5, 27.6, 27.7, 27.8, 27.9, 27.10, 27.11, 27.12, 27.14, 27.15, 27.16, 27.19.

#### **CIE Assessment Pattern (50 Marks – Theory)**

			Marks Distribution	
	<b>RBT Levels</b>	Test (s) (25)	Qualitative Assessment (s) (15)	MCQ's (10)
L1	Remember	5	5	-
L2	Understand	5	5	-
L3	Apply	10	5	10
L4	Analyze	2.5	-	-
L5	Evaluate	2.5	-	-
L6	Create	-	-	-

#### SEE Assessment Pattern (50 Marks - Theory)

	<b>RBT Levels</b>	Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	5
L5	Evaluate	5
L6	Create	-

#### Suggested Learning Resources:

#### **Text Books:**

- 1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.
- 2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, Reprint 2016, ISBN: 9788126554232.
- 3) David C Lay, Linear Algebra and its applications, Addison-Wesley Publishers, Fourth Edition, 2012, ISBN: 9780321385178.

#### **Reference Books:**

- 1) Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.
- 2) B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.

3) H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.

4) N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

Web links and Video Lectures (e-Resources):
1)https://youtu.be/IgoJV4g_0LM?si=J01_bkIvMR8xlC0V
2)https://youtu.be/mIFwzg11uO4?si=Xd13dh0eNlmIswPS
3)https://youtu.be/74g5_3TC-tQ?si=yB2PHVGr4hxIlqPo
4)https://youtu.be/QQFIWwDA9NM?si=3wJrtlm1NdPSbXmB
5)https://youtu.be/5817fLmsTGE?si=Y70RyV2ETSCxZRAZ
6)https://youtu.be/q3xj16shDuw?si=ewdlKAC8UEc6oRQV
7)https://youtu.be/89Z0tOvHjNU?si=3jT-oriJZaC1kSzx
8)https://youtu.be/dOr0NKyD31Q?si=dMBU-BXGdGL6jIZy
9)https://youtu.be/BR1nN8DW2Vg?si=melzz97SqhK3wr
10)https://youtu.be/ugd4k3dC_8Y?si=xF5U2gjIgP0woDQt
11)https://youtu.be/z0Ry_3_qhDw?si=6IG2a65BZgdbaKsn
12)https://youtu.be/36cAE10vpq4?si=jfR8gkFmM0CkWNZ_

#### 13)https://youtu.be/vFz2FG65HBc?si=SCHi3Y1XuHWg-pPT 14)https://youtu.be/2Dsz1lZBJ3Y?si=8ATLUE-mkJSMewO3

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

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming Codes
  - > Organizing Group wise discussions on related topics
  - ➤ Seminars

				DA	TA S	TRUC			LGORIT	HMS				
Course Code		IM32	2				-	Marks			50			
L:T:P:S	3:0:	0:0					-	Marks			50			
Hrs / Week	3							al Marks			100			
Credits	03	1	1 0					m Hours			03			
Course outcon														
22AIM32.1					01					ir implen		ns		
22AIM32.2				-						time prob				
22AIM32.3	-								-	inear and				ture
22AIM32.4			0					-	0	ppropria			es.	
22AIM32.5	-				0		0			e solutior		-		
22AIM32.6	Prese struct			udy oi	n a rea	al-wor	ld sce	nario to	demonst	rate prob	olem-sol	ving usi	ng data	
Mapping of Co				to Pr	oora	m Out	tcom	as and F	Program	Snocifi	Outco	masi		
mapping of CC			PO3			P06		PO8	P09	PO10	P011		PSO1	DSU3
	101	102	105	104	105	100	107	100	109	1010	1011	1012	1 301	F 302
22AIM32.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM32.2	3	-	-	-	-	-	-	-	-	-	-	-	3	3
22AIM32.3	-	3	-	-	-	-	-	-	-	-	-	3	3	3
22AIM32.4	-	-	3	3	-	-	-	-	-	-	-	3	2	3
22AIM32.5	-	3	3	3		-	-	-	-	-	-	-	3	-
22AIM32.6	-	-	3	-	2	-	-	-	-	-	-	3	3	3
MODULE-1			DATA			22A	IM32	1, 22AIN	432.2, 22	AIM32.3			8 Hou	rs
			RES-I					1.	1.		150			0.1
Data structure				-								-		
Operation, State expression, rec														postrix
Text Book			$\frac{1}{3}$ : Cha				eprese	entation,	Circular	Queues,	Phoney	Queues.		
Text Dook			x 4: Cha											
MODULE-2			DATA				2	22AIM32	2.1, 22AII	M32.2, 22	AIM32.	3	8 Hou	rs
Linkod roproco	ntatio	n cin	alulin	rod lie	toring	ortion	(hogi	nning c	pocific pc	cition or	d) dala	tion (boy	inning	cnocific
Linked represent position, end), s														
position, end),														
List.	ucicii			ווס ננג	C 5 III	iiii <u>6</u> , 3]	Jeenne	posicio.	n, enaj, e	Incular II	incu iis	to, appir		n mikeu
Applications	Linke	ed list	repre	sentat	ion o	f real-v	world	queues ·	-Music pl	aver.				
Text Book	Text	book	x 3: Cha x 4: Cha	apter:	6			•	•					
MODULE-3						CTUR	ES-I	22AIM3	2.1, 22AI	M32.3, 22	2AIM32	.4	8 Hou	rs
Binary SearchT	rees: l	Basic	s, quer	ying a	ı Bina	ry sea	rch tr	ee, Inser	tion and	Deletion,	Heap-H	leap Ope	eration,	B-
Trees: Definitio	n of B	-tree	es, Basi	ic ope	ratior	is on B	-Tree	s: Deleti	ng a key	from a B-	Tree. Sp	olay Tree	es: Botte	om-Up
Splay Tree, Top														
Text Book			k 3: Ch k 4: Ch			, 13								
MODULE-4			EAR D			CTUR	ES-II	22AIM3 22AIM3		IM32.4, 2	2AIM32	2.5,	8 Hou	rs
Elementary Grap	h Alg	orith	ms: Re	prese	ntatic	ons of (	Graph	s, Bread	th-First S	earch, De	pth-Fir	st Search	n. Grap	h
coloring problen							e Bell	man-Foi	rd algorit	hm, Sing	e-Sourc	e Shorte	st path	s in
Directed Acyclic					rithm									
Case Study			cted G		1.5									
Text Book	Text	t Boo	k 1: Ch	apter	13									
							1	4						

	Text Book 3: 0 Text Book 4: 0			
MODUL		SORTING, AND HASHIN	G 22AIM32.2, 22AIM32.3, 22AIM32 22AIM32.6	2.5 8 Hours
Searchir	ıg: Linear Search, Bina	ry Search, Ternary Searc	ch. Sorting: Bubble Sort, Selection so	rt, Insertion sort,
			ng: Hash functions, separate chaining,	open Addressing,
Rehashi	ng. Introduction to NP.			
Case Stu	dy Different type	es of Hash Functions.		
Text Boo	Text Book 2 :	hapter: 7, 9, 18, 19 Chapter: 3, 4, 7 Chapter: 14, 15		
		<b>CIE Assessment Patter</b>	n (50 Marks – Theory)	
			Marks Distribution	
	<b>RBT Levels</b>	Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	5	-	5
L2	Understand	5	-	5
L3	Apply	10	5	
L4	Analyze	5	10	-
	Evaluate	-	-	-
L5	Livuluite			

\*Assessments are to be selected from the assessment list attached to Appendix A.

SEE Assessment Pattern (50 Marks – Theory)

	RBT Levels	Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	10
L5	Evaluate	-
L6	Create	-

# Suggested Learning Resources:

#### **Text Books:**

- 1) S.Sridhar, "Design and Analysis of Algorithms", Oxford University Press, 1st Edition, 2014. ISBN: 978-0198093695
- Anany Levitin "Design & Analysis of Algorithms" 2<sup>nd</sup> edition, Pearson Education. ISBN: 978-0321358288
- 3) Reema Thareja "Data Structures using C", Oxford University Press, 2<sup>nd</sup> Edition, 2014. ISBN: 978-0198099307
- 4) Aaron M.Tenenbaum, Yedidyah Langsam, Moshe J.Augenstein, "Data Structures Using C", Pearson 3<sup>rd</sup> Editon, 2020. ISBN: 9780130369970

#### **Reference Books:**

- 1) Adam Drozdex, "Data Structures and Algorithms in C++", Cengage Learning, 4th Edition, 2013. ISBN: 9781285415017
- 2) T. H. Cormen, C.E.Leiserson, R.L. Rivest and C.Stein, "Introduction to Algorithms", Prentice Hall ofIndia, 3rd Edition, 2012. IBN: 9780262033848
- 3) Mark Allen Weiss, "Data Structures and Algorithms in C++", Pearson Education, 3rd Edition, 2009. ISBN: 9780321441461

#### Web links and Video Lectures (e-Resources):

- https://archive.nptel.ac.in/courses/106/106/106106131/
- https://nptel.ac.in/courses/106/105/106105171/
- http://www.nptelvideos.com/lecture.php?id=5949
- https://www.youtube.com/watch?v=5Y8Lfsreeck&list=PL7DC83C6B3312DF1E

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

- Undo/ Redo Stacks in Excel.
- Group discussion on real-world problems.
- Contents-related activities (Activity-based discussions)

Organizing Group discussions on real-world problems Seminars

							TURE							
Course Code	22	2AIL3	82						CIE	Marks		50		
L:T:P:S	0:	:0:1:0								Marks		50		
Hrs / Week	3								Tota	al Mark	(S	100	)	
Credits	0									m Hour	'S	03		
Course outco	mes	: At th	ne en	d of th	e cour	se, the	e stude	ent wil	l be al	ole to:				
2AIL32.1	In	nplem	ient l	inear	and no	on-line	ear dat	ta struc	ctures	using a	link list			
22AIL32.2				olutio heaps		comp	uting p	problei	ns usi	ng data	structu	res stacl	ks, queues	s, trees,
2AIL32.3	D	evelo	p a so	olution	n for re	eal tim	ie prol	olem u	sing v	arious s	earchin	g and Ha	ashing tec	hniques.
22AIL32.4								re and lving s		thm to	address	a real-w	orld prob	olem,
Mapping of G	Cour	se Ou	itcon	nes to	) Prog	gram	Outco	mes a	nd Pr	ogram	Specifi	c Outco	mes:	
	P01	P02	<b>PO3</b>	P04	P05	P06	P07	P08	P09	P010	P011	P012	<b>PSO1</b>	PSO2
2AIL32.1	2	3	-	-	2	-	-	-	-	-	-	-	-	-
2AIL32.2		3	3	-	2	-	-	-	-	-	-	-	2	3
22AIL32.3	-	3	3	-	2	-	-	-	-	-	-	-	2	-
22AIL32.4	-	-	-	3	2	-	-	-	-	-	-	3	2	3
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Exp. No.														
/Pgm.				List	of Exp	erim	ents /	Progr	ams			Hours		COs
No.				D		i alta l	<b>F</b>		a / D-4		/ Dam	-		
							_		s / Pr	ograms	; / Dem	0		
	Bas	sic dat	a str	ucture	es conc	cepts/						2		NA
								PART-						
										onversi	ons,	2		IL32.1
	allov	ving u	sers	to easi	ily inp	ut and	l proce	ess exp	ressio	ons.				IL32.2
													22A	IL32.4
			ograi	n to in	nplem	ent th	e douł	oly link	ed list	deletic	on at	2	22A	IL32.1
	the e	end.										-		IL32.4
3	Deve	elop a	Prog	ram fo	or the	follow	ing or	eratio	ns on	the Bina	arv	0		
					intege		0 - 1				5	2		IL32.1
					Intege									IL32.2
							Preor	der and	<u>d Pos</u> t	order				IL32.4
		-	prog	gram t	o crea	te a N	Max he	eap usi	ng a g	given se	et of	2		IL32.1
	integ													IL32.4
							tivity S	Selectio	on Pro	blem u	sing	2		IL32.1
					strateg								-	IL32.4
										nage pri		2		IL32.1
										ogram s				IL32.2
										process			22A	IL32.4
	print	t them	i, and	nand	ie the	circula				ons effic	ciently.			
7	Impl	omore	tar	rogram	n that	omnl		PART-		list to -	nonogo	2	22.4	11 22 4
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										chedule		2	22A	IL32.4
											al Sort			
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	courses, ensuring all prerequisite courses are completed before enrolling in advanced ones.		
9	Implement a program using BFS to manage a social network where each user is a node, and friendships between users are edges. Find the shortest connection path between any two users in the network.	2	22AIL32.3 22AIL32.4
10	Develop a program for a city's public transportation system that helps commuters find the shortest travel time from a single bus stop to all other bus stops using Bellman-Ford.	2	22AIL32.2 22AIL32.3 22AIL32.4
11	Implement a hash function for an efficient data retrieval of a library's book database, with a focus on reducing search time for books via unique identifiers.	2	22AIL32.3 22AIL32.4
12	Design a data compression program using Huffman coding to minimize the storage space required for the given text by encoding characters based on their frequency of occurrence.	2	22AIL32.3 22AIL32.4

#### PART-C

# Beyond Syllabus Virtual Lab Content

#### (To be done during Lab but not to be included for CIE or SEE)

- 1. https://ds2-iiith.vlabs.ac.in/exp/min-spanning-trees/index.html
- 2. https://ds1-iiith.vlabs.ac.in/exp/poly-arithmetic/index.html
- **3.** https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/index.html
- 4. https://ds2-iiith.vlabs.ac.in/exp/red-black-tree/index.html
- 5. https://ds1-iiith.vlabs.ac.in/exp/heap-sort/index.html

#### CIE Assessment Pattern (50 Marks – Lab) Weekly Test **RBT Levels** Assessment **(s)** 20 (30 marks) marks L1 Remember --L2 Understand 5 10 L3 5 10 Apply L4 Analyze 5 5 L5 5 5 **Evaluate** L6 Create -

#### SEE Assessment Pattern (50 Marks - Lab)

	<b>RBT Levels</b>	Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	10
L4	Analyze	20
L5	Evaluate	10
L6	Create	-

#### Suggested Learning Resources:

#### **Reference Books:**

1. Lipschutz Seymour, "Data Structures Schaum's Outlines Series", Tata McGraw Hill, 3rd edition, 2014. ISBN: 9781259029967, 1259029964

2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.

3. http://www.coursera.org/specializations/data-structures-algorithms

<b>Course Code</b>						D PRU	GRAM		WITH JA	AVA	,		
			22AIM33	3				-	Marks			50	
L:T:P:S			3:0:0:0						Marks			50	
Hrs /Week			3						<u>al Mark</u>			100	
Credits			03						m Hour	S		03	
Course outco	mes: A	At the	end of the	course	e, the s	studer	nt will be	e able	to:				
22AIM33.1			Understa							1 0	0		
22AIM33.2			Apply the										
22AIM33.3			interface										1
			Analyze t		-					-	5	•	1 .
22AIM33.4			Examine					0			-	0	echnique
22AIM33.5			Evaluate										
22AIM33.6			Design co					ns, list	t interfa	ce, set i	nterface	and quei	le
Mapping of (	ource	<u>. 011</u>	interface					Drog	ram Sr	ocific	Outcom	061	
			PO3 PO4					P09		P011		PSO1	PSO2
22AIM33.1	2	-		-	-	-	-	-	-	-	-		
22AIM33.2	3	-		-	-	-	-	-	-	-	-	3	2
22AIM33.3	-	3		-	-	-	-	-	-	-	-	3	2
22AIM33.4	3	-		-	-	-	-	-	-	-	-	3	2
22AIM33.5	-	3	-	-	-	-	-	-	-	-	2	3	2
22AIM33.6	-	-	3 -	-	-	-	-	-	-	-	2	3	2
MODULE-1		IN	<b>FRODUCT</b>	ION T	0 00	Ps AN		1		22AII	M33.1		8 Hours
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Abstraction.						-		-			-	-	
Java methods					., peo,			)1111(01)		res incu		PCT1011. L	ooning.
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Project Case Study	Deve	rivate, lop a gn an	<u>protected</u> simple cale d build a "	), <u>Cons</u> culator Studer	tructo appli nt" cla	ses an ors and cation	nd obje d metho using b	cts. In ods. oasic o	stance perator	variable s and co	es and m	nethods,	
Project Case Study Text Book	Deve	rivate, lop a gn an Tex	protected simple cale d build a " ct Book1: 1	), Cons culator Studer ., 3, 4, 5	tructo appli nt" cla 5, 6	ses an ors and cation iss wi	nd objeo <u>d metho</u> using b th attrik	cts. In ods. oasic o outes a	stance perator	variable s and co thods	es and m	w.	Access
Project Case Study Text Book MODULE-2	Deve Desig	rivate, lop a gn an Tex <b>AB</b>	protected simple calo d build a " ct Book1: 1 STRACTIO	), Cons culator Studer ., 3, 4, 5 <b>DN AN</b>	tructo appli nt" cla 5, 6 <b>D PO</b>	ses an ors and cation iss wi	nd objed d metho using b th attrik	cts. In ods. oasic o outes a <b>M</b>	stance perator and met 22A	variable s and co thods IM33.1	ontrol flow	w. 33.2	Access 8 Hours
Project Case Study Text Book <b>MODULE-2</b> Static Variable	Deve Desig	rivate, lop a gn an Tex <b>AB</b> Metho	protected simple cald d build a " <u>st Book1: 1</u> STRACTIO ods, Metho	), Cons culator Studer ., 3, 4, 5 <b>ON AN</b> d Over	tructo appli nt" cla 5, 6 <b>D PO</b> loadin	ses an ors and cation iss wi LYMC ng, Pol	nd object d metho using b th attrik DRPHIS	cts. In ods. oasic o outes a <b>M</b> nic beh	stance perator and me 22A avior, D	variable s and co thods IM33.1 Dynamic	es and m ontrol floy ,22AIM3 c binding,	w. 33.2	Access 8 Hours
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	sessment Pattern		Marks Distribution	l	7	
	<b>RBT Levels</b>	Test (s)	Qualitative Assessment (s)	MCQ's		
		25	15	10		
.1	Remember	5	-	5		
2	Understand	5	-	5		
.3	Apply	10	5		_	
4	Analyze	5	10	-	_	
5	Evaluate	-	-	-	-	
6	Create	-	-	-		
			n the assessment list att	ached to Ap	pendix A.	
EE A	ssessment Patter	n (50Marks		1		
	RBTLevels		ExMarks Distributio	n (50)		
1	Remember		10			
.2	Understand		10			
.3	Apply		20			
L4 L5	Analyze Evaluate		10			
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9	Write a Java program to manage bank account transactions using		
	exception handling.	2	22AIL33.
10	Task 1: Creating Shared Resources:Define two shared resources (objects) that the threadswill contend for. Let's call them Resource A and ResourceB.	2	22AIL33.
	<b>Task 2: Implementing Threads:</b> Create two threads (Thread A and Thread B). Each thread will try to acquire locks on both Resource A and Resource B.		
	Main Program: Start both threads. Observe threads executions and write outputs.		
11	<ol> <li>Write a program to demonstrate ArrayListClass, Linked List Class.</li> <li>Create a Java program to manage books and users in a library using different packages.</li> </ol>	2	22AIL33.7
12	Wrtie a program to demonstrate eventhandling.	2	22AIL33.

#### PART-C Beyond Syllabus Virtual Lab Content

1. Overloading Concepts:https://java-iitd.vlabs.ac.in/exp/method-overloading/procedure.html https://java-iitd.vlabs.ac.in/exp/method-overloading/simulation.html.

2. 00Ps Concepts: https://java-iitd.vlabs.ac.in/exp/encapsulation/simulation.html

3. Threads Concepts: https://java-iitd.vlabs.ac.in/exp/life-cycle-thread/simulation.html

4. Exception-Handling Concepts: https://java-iitd.vlabs.ac.in/exp/exceptions/simulation.html

#### **CIE Assessment Pattern (50 Marks-Lab)**

	RBTLevels	Test(s)	Weekly Assessment
		20	30
L1	Remember	-	
L2	Understand	5	10
L3	Apply	5	10
L4	Analyze	10	10
L5	Evaluate	-	-
L6	Create	-	

#### SEE Assessment Pattern (50 Marks-Lab)

	RBTLevels	SEE Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	20
L4	Analyze	20
L5	Evaluate	-
L6	Create	-

### Suggested Learning Resources:

#### **ReferenceBooks:**

1) HerbertSchildt, Java<sup>™</sup>: The Complete Reference, McGraw-Hill, Tenth Edition,2018. ISBN: 9781259589348

2) CayS.Horstmann, CoreJava®SE9for the Impatient, Addison Wesley, Second Edition,2017. ISBN: 9780134694849

Course Code						LINUX	X PRO	GRAM	IMIN	IG				
Course Code	22	AIM	841							Marks		50		
L:T:P:S	2:0	0:1:0							SEE	Marks		50		
Hrs/Week	2+	·2							Tota	alMarks		100		
Credits	03								Exai	mHours		03		
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22AIM341.2	De	mons	strate t	he v	ariou	ıs file a	and di	rector	y rel	ated com	nmands			
22AIM341.3	An	alyse	variou	us ki	nds o	of filter	com	nands	and	regular e	express	ions tha	t can be	e used for
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22AIM341.3		3		-	-	-	-	-	-	-	-	-	-	3
22AIM341.4	3	-	-	-	-	-	-	-	-	-	-	-	-	3
22AIM341.5	-	3	-			-	-	-	-	-	-	-	-	3
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options, date w LaboratoryCo 1. Execute the Date with a 2. Execute the Unamewith 3. Execute the base to and Base (eg. E history, ali Self-study Text Book1 MODULE-2 File System an Application pro File Handling permissions-c access times a	vith of mpoond of the second s	option onent owin otions owin option owin optior o owin optior o owin optior o owin optior o owin optior o owin optior o owin optior o owin optior o owin optior o owin optior o optior optior optior option optior option op	ns, cal, g comm , cal, ca g comm ns g comm ecima ing rocedu r	nano aleno nano nano l, deo l, deo ure t ook1: ook1: ANE ntroo to Fi cat, c rship and	ndar, ls wi der, v ls wi ls, bc cimal <u>o Ins</u> <u>1.1,1</u> <b>D FIL</b> luctio les, I p, mv p-cho	th opt: vho, w th opt: with s to oct tall ub .2,1.10 E HAN on to I JNUX 7, rm, v wwn, ch	ions(i vhoam ions (i scale f cal, dec ountu ( 0,1.11 IDLIN LINUX kerne wc, od ngrp, u	no, scr fany) i, tty, s fany) actor, cimal t cimal t <u>on win</u> ,2,1to <b>G</b> filesys l supp , print umask, e of the	ipt, <u>p</u> tty, <u>o</u> Man, usin o he <u>dow</u> 2.15 stem ort fo f, pw tar, e file	clear and clear and , echo, wh g bc conv xa etc), p zs system 22AIM34 1.4 , inode, F or files 'd, mkdir gzip, du, with all d	l tput hatis, vert from basswor 41.2,22, fileType , rmdir, df, find	m one d, AIM34 es, FileA cd, file a , file mo	3 6 ttribute and dire	Hours es, ectory on and

2. Execute the	following directory related commands.		
	e directory, change the directory, print the current di	rectory.	
	disk space usage, compress the contentof the file and		
	commands used to change the permission of the use		
-	g symbolic octal, absolute formats, create the file usir	0	
	nodify the access time and modification time, change	the default	
	of the fileor directory using umask		
Text Book	Text Book1:3.1 to 3.25,4.1 to 4.11 Text Book2:6.1		
MODULE-3	SIMPLE FILTER AND REGULAR EXPRESSIONS	22AIM341.3,	6 Hours
		22AIM341.4	
Simple filters	and Regular Expressions: more, wc with options, o	d with options, pr	, cmp, diff, comm,
head, tail, cut, p	baste, sort, tr, uniq, nl, grep–searching for a pattern, g	rep options, regul	lar expressions,
egrep and fgre	0		-
LaboratoryCon			3 Hours
-	dent database of 10 records with five fields and use	the following	
	on the database to display the records accordingly		
	, cut, paste, sort, uniq, tee, nl and tr with allpossible c	ontions	
	tudent/employee database with 5 fields and apply th	-	
		• •	
	vith all options to display the pattern or records using	gregular	
expressions			
	different sorted files with some duplicate records an		
	nm commands to compare the file contents, count the	e words,	
	and lines using wc command		
Text Book1	TextBook1: 9.1, 9.13, 10.1 to 10.5		
MODULE-4	PROCESS	22AIM341.5	6 Hours
Process: Proce	ss, LINUX kernel support for processes, process attril	outes, process tab	le, viewing processes
	cesses, starting new processes, waiting for a process,		
	s, running jobs in background, nohup, job executio		
	ne or more command at specified time-at and	-	periodically-cron
	fork, vfork, exit, wait, waitpid, exec and sleep system	calls	0.11
LaboratoryCor	•		3 Hours
1 0	user process and system processes and kill the proce	ess using process	
ids			
2. Identify and	l use the command to execute the jobs in foreground	and background	
at the same	time		
Execute the	following commands nice, nohup, at, batch and cron		
Self-study	1.Usage of fork, vfork, wait and ait pid 2. Create zo	mbie process	
Text Book	Text Book1:7.1 to7.13 Text Book2:8.1	-	
MODULE-5	SHELL PROGRAMMING	22AIM341.6	6 Hours
	ming: Shellvariables, shellscripts, read, positional pa		
0	<b>J</b>	-	
	if conditional, test and [], case, expr, sleepand wait, w	while, until and fo	
LaboratoryCor	-		3 Hours
	ll script that takes pattern and file name as input fror	n the user to	
	ing in the file		
2. Write a she	ll script which will accept a filename, starting linenur	nber, ending	
line numbe	rs from the user and displays those lines fromthe giv	renfile.	
3. Write a she	ell script which displays a list of all the files in the cur	rent	
	o which you have read, write and execute permission		
	ell script which gets executed the moment the user lo		
display the		0 · · · · · · · ·	
	ing", "Good Afternoon", "Good Evening", depending u	non the time at	
	· · · ·	poir the time at	
I EXI ROOKT	1ext DU0K1:15.110 15.15		
which the u Text Book1	iser logs in. Text Book1:13.1to 13.13		

CIE As	sessment Pattern	(50 Marks-Theory an	d Lab)	
	RBTLevels	Test(s) (25)	Assessment(s)* (5)	Lab (20)
L1	Remember	5	-	
L2	Understand	5	5	5
L3	Apply	5	-	10
L4	Analyze	5	-	5
L5	Evaluate	5	-	-
L6	Create	-	-	-

\*Assessments are to be selected from the assessment list attached to **Appendix A**. **SFE Assessment Pattern (50Marks- Theory)** 

	JELA	ssessment i attern	(Jumai K3- Theory)
		RBTLevels	Exam Marks Distribution (50)
	L1	Remember	10
	L2	Understand	10
ſ	L3	Apply	10
	L4	Analyze	10
	L5	Evaluate	10
ſ	L6	Create	

#### Suggested Learning Resources:

#### **Text Books:**

- 1) Your UNIX/Linux The UltimateGuide Third Edition by sumitabha das Published byMcGraw-Hill, ISBN978-0-07-337620-2(alk. paper), ISBN-10: 0-07-337620-5 (alk. paper)
- 2) UNIX System Programming Using C++, Terrence Chan, Prentice-Hall of India Private Limited, ISBN 0-13-331562-2

#### **ReferenceBooks:**

- 1) UNIX–Concepts&Applications, SUMITABHA DAS, TATAMcGraw Hill Edition, Fourth edition,26<sup>th</sup> reprint 2015, McGraw Hill. ISBN: 9780070611085
- 2) Advanced Programming in the UNIX Environment, WRichard Stevens and Stephen A Rago, Addison Wesley Publications, Third Edition. ISBN: 9780321638007
- 3) UNIX and SHELL Programming, Richard F Gilberg and Behrouz A Forouzan,15<sup>th</sup> impression, 2015, Cengage Learning ISBN: 9780534951597.

#### Web links and Video Lectures(e-Resources):

- Linux Full Course In 5 Hours |Linux Tutorial For Beginners|Linux Training |Edureka-YouTube
- https://www.udemy.com/course/learn-linux-in-5-days/
- LinuxOperatingSystem -CrashCourseforBeginners-YouTube
- The Complete Linux Course: Beginner to Power User- YouTube
- https://nptel.ac.in/courses/117106113/

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

- Playing videos related to course content (Activity-based discussions)
- Team based learning
- Topics will be given to the student teams and each team should give demo or ppt presentation based on the activity

					PER	L PRO	GRAM	MIN	G				
<b>Course Code</b>	22AIN	1342						CIE	Marks			50	
L:T:P:S	2:0:1:	0						SEE	Marks			50	
Hrs/Week	2+2								alMark			100	
Credits	03								mHour			03	
Course out cor													
22AIM342.1					-	ots of p	-	0	0				
22AIM342.2	Apply	the C	lonce	ot of L	oops a	and co	ntrol st	atem	ents in S	Subrou	tine		
22AIM342.3	5			0		and De	0	-					
22AIM342.4	Exami	ne th	e ope	ration	of So	rt and	File I/0	).					
22AIM342.5	Desig	n a cla	ass in	volvin	g data	memb	oers an	d me	thods fo	or the gi	ven s	cenario.	
22AIM342.6	-					or real		-					
Mapping of Co													3:
РО	1 PO2	P03	P04	P05	P06	P07	P08	P09	P010	P011	P01	PSO1	PSO2
											2		
-	2.	-	-	-	-	-	-	-	-	-	-	3	3
	3 -	-	-	-	-	-	-	-	-	-	-	3	3
	3 <b>3</b>	-	-	-	-	-	-	-	-	-	-	3	3
	3 3	-	-	2	-	-	-	-	-	-	2	3	3
	3 3	3	-	2	-	-	-	-	-	-	2	3	3
22AIM342.6 3	3 3	3	-	2	-	-	-	-	-	-	2	3	3
<b>MODULE-1</b>	Intro	ducti	i <mark>on t</mark> o	) Perl	: Basi	cs				22AIM	342.1	6 H	lours
Operators-DataLaboratoryCo1.Write a sim2.Write a pro3.Write a pro4.Write a pro5.Write a pro	ple pro gram fo gram to gram us gram us	gram or con o prin sing T sing s	iverts t arra Type g sigils.	betwe y of el globs a	een ni emen	ımbers ts.	and st	-				3 H	lours
6. Write a pro Text Book	gram u			s k1:Ch1	123								
MODULE-2	Loops					ents			22AIN	M342.2		6 H	ours
Conditionals-L	oops-Su	<u>ıbrou</u>	tines	Creat	in <u>g s</u> u	ıb-rout	ines-S	ub-ro	utine ar	gumen	ts are		
<ol> <li>LaboratoryCo</li> <li>Write a sim code to be e</li> <li>Write a pro</li> <li>Write a pro not.</li> <li>Write a pro</li> </ol>	ple prog executed gram to gram us	gram d. o prin sing d	t sum lo-uni	of inte til stat	egers emen	using f ts for c	for loop heck tl	o stat 1e nu	ement.			3 Но	ours
Text Book	Text B											1	
MODULE-3	List a				ut				22AIN	M342.3		3 H	ours
Debug Output:													
as list-Assigning	0				n be p	assed	into su	brou	tines-Re	eturn lis	st fror	n subrouti	ne-Hash as
list-using array	refto p	ass ar	ray to	o sub									

LaboratoryCo	mponent	:					3 Hours
<ol> <li>Write a prog method.</li> </ol>	gram to di	splay the	output in specifie	d format	using Da	ata: Show	
2. Write a prog	gram to di	splay arr	aylis tvalue using I	Dumper.			
3. Write a prog	-			1			
			nents from subrou	tine			
Self-study/	Comman	d line ar	guments				
Text Book	Text Boo				-		
MODULE-4	Sort and					AIM342.4	6 Hours
							Opening a file hand
		a file-Wi	rite to a file-Use au	to die–R	ewind a	file handle-Rea	nding and writing
Gzip compresse							
LaboratoryCo							3 Hours
	-		nts using Lexical s		_		
	0		ent into a file using	,		l <b>.</b>	
<i>3.</i> Write a pro	gram to re	ead and v	write from/to com	pressed	file.		
Write a pro	gram usin	g perltor	e wind a file hand	le metho	d		
Self-study/	System F						
Text Book	Text Boo	k1:Ch11	and12				
MODULE-5	Object O	riented	Perl		22AIM3 <sup>,</sup> 2.6	42.5,22AIM34	6 Hours
Defining class e	din moder	n perl-C	reating Objects-De	fining Cl		neritance and r	nethods resolution-
Class and Objec			0,	0			
LaboratoryCo							3 Hours
1. Create a clas	ss and obj	ect using	perl				
2. Implement	inheritanc	e concep	t using perl				
3. Write a prog	gram for n	nethods i	resolution using pe	erl.			
Self-study	Perl Sym						
Text Book	Text Boo						
CIF Assessmen	t Pattern	(50Mar	ks-Theory and La	h)			
	Testí		Assessment(s)*		ab	]	
RBTLev	els 25 m	-	(5 marks)		narks)		
L1 Rememb		5	_				
L2 Understa		<u> </u>	-		5	-	
L3 Apply		5	5		.0	-	
L4 Analyze		5	•		5	-	
L5 Evaluate		5	-			-	
L6 Create		-	-				
			om the assessment	t list atta	ched to A	Appendix A.	
SEE Assessmen							
RBTLev	vels	Exan	n Marks Distribut	ion			
L1 Remem	han		<u>(50)</u> 10				
L2 Underst	ldIIU		10				
L3 Apply			10				
L4 Analyze			10				
L5 Evaluat	е		10				
L6 Create							
Suggested Lear	rning Res	ources:					
TextBooks:		-:				on Online	
			rom Stack Overflo sy Things Easy and				on by Randal
			nix, O'REILLY,2016				on by Nallual
2 2 11 1 4 CD, DT							

#### Web links and Video Lectures(e-Resources):

- https://digimat.in/nptel/courses/video/117106113/L20.html https://nptel.ac.in/courses/117106113 •
- •

# Activity-Based Learning (SuggestedActivitiesinClass)/Practical Based learning

- Video demonstration of latest version and updates related videos •
- Contents related activities (Activity-baseddiscussions) •
  - For active participation of students, instruct the students to prepare Handouts/Questions. ≻
  - Organizing Groupwise discussions.  $\triangleright$
  - $\triangleright$ Seminars

			]	PROG	RAMM	IING F	'OR IC	DT				
CourseCode	22AIM34	3					CIE	Marks		5	0	
L:T:P:S	2:0:1:0	•						Marks		5		
Hrs/Week	2+2							alMark	s		00	
Credits	03							m Hour		0		
Course outcor		end of	the coi	irse t	he stur	lent w	-		5		0	
22AIM343.1	Understa								ons.			
22AIM343.2	Apply a p									nt devi	ces.	
22AIM343.3	Identify d											
22AIM343.4	Analyze tl											oberrvni.
22AIM343.5	Develop a											poerryp.
22AIM343.6	Design an										aevicesi	
Mapping o fCo									Specific	Outco	mes:	
	01 P02 P03							P010		P012		PSO2
22AIM343.1	2		105	100	107	100	107	1010		1012	2	2
22AIM343.2	3	-	2	-	-	-	-	-	-	-	2	3
22AIM343.2 22AIM343.3		-		•	•	-	•	•	•	-		
	3 3 -	-	2	•	-	-	•	-	-	-	2	3
22AIM343.4	3 3 -		2	•	-	-	•	-	•	-	2	3
22AIM343.5	3 3 3	3	3	•	-	-	•	-	-	-	2	3
22AIM343.6	3 3 3 INTROD	3	3	-	-	-	•	-	-	-	2	3
Microprocesso design of IoT, I <u>Applications.</u> LaboratoryCo 1) Install IDE o 2) Interface LE 3).Interface RG WM. TextBook MODULE-2 Introduction to Creating an Ard devices, Adding LCD.	ogical designmponent: f Arduino and buzze B LED with Te IOT WIT o the Arduin duino progr	gn of Io (minin ad writt erwith A Aurdir ext Boo H ARD to, crea cam, Us	T, IoT mum3 e a pro Arduin to to ol k 1- Ch UINO ting ar ing Lib	Enabli expe ogram otobu otain o -2,3; 1 - Ardu oraries	rime Teo rimer using Izz for differe Fext Bo ino pr s, Worl	chnolo Its/pr Arduin a perio nt colo Dok 3- Ogram king w	gies, I ogran no IDE od of t ours an Ch- 1, ming ith Dig	oT leve ms) to blin ime. nd brigh 2,3 Enviror gital Int	ls &Dep k LED. htness u 22AIM3 hment, l erfaces	oloyme using 343.2 Jsing t , Interf	nt Templ 3 6 he Arduir acing wit n Motors,	Hours Hours Hours Hours Hours Hours Hours Hours Hours Hours Hours Hours Hours Hours
LaboratoryCo 1) a) Control a push button motorhasto b) Rotate St using Arduin 2) Write a prog information is a valid can Control any Text Book	servo motor (e.g: When rotate by15 epper moto no. gram to read on the disp rd then the l	r using the pu degree r either l the da lay boa LED sho rs cont	shbutt es). r clock uta fror urd usin ould be nected	onis p wise o n the l ng Arc e ON o	oressec or antic RFID ta luino a otherw	Ithe se clockw ag and and con ise OF	rvo ise at displa ntrol I F).	ʻn' num ay the LED (e.g	ber of s : if it	steps		3 Hours
MODULE-3	IOT SENS			CTUA	TORS			2AIM34 2AIM34			6 1	lours

Introduction, Sensor, Types of Sensors, Actuators, classification of Actuators.		
Technologies used in IoT: Bluetooth, Bluetooth Low Energy (BLE), WiFi, LiFi, Ce		
Wave, X-10, Sigfox, ZigBee, LoRaWAN, 6LowPAN, 5-G, LPWAN, RFID and NFC, V Protocols: CoAP, MQTT, XMPP, DDS, AMQP, REST, HTTP.		
Laboratory Component:	31	Hours
1) Interface analog/digital sensors with Arduino and analyse the corresponding	g	
readings. (Sensors like temperature, alcohol, humidity, pressure, gas, sound		
pollution, level, weight, flow, proximity, LDR, PIR, pulse, vibration, sound)		
2) Demonstration of setup & working of RaspberryPi. (Students have to prepare	e the	
report for the same).		
Interface RGB LED with Raspberry Pi to obtain different colours and brightne using PWM.	ess	
Text Book Text Book 3-Ch -5,6		
MODULE-4 IOT WITH RASPBERRY PI 22AIM3	343.5	6 Hours
PHYSICAL DEVICES&END POINTS: RaspberryPi, About the Board, Linux on Ras	pberryPi, Ras	pberryPi
Interfaces, Programming RaspberryPi with Python, Controlling LED with Raspb and Switch with RaspberryPi, Interfacing a Light Sensor.	perryPi, interfa	acing a LED
LaboratoryComponent:	3	Hours
1) a) Interface an ultrasonic sensor with Raspberry pi to print distance		
readings on the monitor when the sensor changes its position.		
b) Reading the data from an analog sensor with Raspberry using Arduino sen	rial	
portorADCMCP3208 usingSPI.		
2) Post/read the data to/from the cloud viaMQTT broker with a RaspberryPi.		
Send real-time sensor datato a smart phone using RaspberryPi on board Blue	etooth	
Text Book Text Book 1-Ch 4,5	etooth	
MODULE-5ASSOCIATED IOT TECHNOLOGIES22AIM3	343.6	6 Hours
Python Packages for IoT, WAMP-Auto BahnforIoT, Python Web Application Fra		
Web Services for IoT, SkyNet IoT messaging platform.		
LaboratoryComponent:		3 Hours
1) Interface Pi camera module using Raspberry Pi toper form operations of PiCa		
API or Open CV library.		
2) Implement an intruder alert system that alerts through email		
mplement remote monitoring of smoke alarm systems using Raspberry Pi.		
Text Book Text Book 1-Ch-3,4		
CIE Assassment Dattorn (EO Marting, Theory and I ab)		
LIE ASSESSIBEIL PALLETI JOU MARKS- I BEORY AND LAD		
	) (20 marks)	
RBTLevels         Test(s)         25 marks         Assessment(s)* (5 marks)         Lab	o (20 marks)	
RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5		
RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5L2Understand5	5	
RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5L2Understand5L3Apply555	5 10	
RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5L2Understand5L3Apply55-L4Analyze5	5	
L1Remember5-L2Understand5-L3Apply55L4Analyze5-L5Evaluate5-	5 10	
RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5L2Understand5L3Apply55-L4Analyze5L5Evaluate5L6Create	5 10 5	
RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5L2Understand5L3Apply55-L4Analyze5L5Evaluate5L6Create*Assessments are to be selected from the assessment list attached to AppendixSEE Assessment Pattern(50Marks-Theory)	5 10 5	
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RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5L2Understand5L3Apply55-L4Analyze5L5Evaluate5L6Create*Assessments are to be selected from the assessment list attached to AppendixSEE Assessment Pattern(50Marks-Theory)RBTLevelsExam Marks Distribution (50)L1Remember10L2Understand10L3Apply10L4Analyze10L5Evaluate10L6CreateSuggested Learning Resources:TextBooks:	5 10 5 x A.	
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RBTLevelsTest(s)25 marksAssessment(s)* (5 marks)LabL1Remember5L2Understand5L3Apply55-L4Analyze5L5Evaluate5L6Create*Assessments are to be selected from the assessment list attached to AppendixSEE Assessment Pattern(50Marks-Theory)RBTLevelsExam Marks Distribution (50)L1Remember10L2Understand10L3Apply10L4Analyze10L5Evaluate10L6CreateSuggested Learning Resources:TextBooks:	5 10 5 « <b>A</b> .	

#### 978-0672337123

3) Jain, Prof.Satish, Singh, Shashi, Internet of Things and itsApplications, 1st Edition, BPB, 2020. ISBN: 978-9389845761

#### **ReferenceBooks:**

- 1) Donald Norris, Internet of things\_do-it-yourself projects with Arduino, RaspberryPi, and BeagleBoneBlack, 1<sup>st</sup> Edition, McGraw-Hill, 2015. ISBN: 9780071835206
- 2) Adeal Javed Lake Zurich, Illinois, Building Arduino Projects for the Internet: Experiments with Real-WorldApplications, 1<sup>st</sup> Edition, USA, A press, 2016.ISBN: 9781484219393.
- 3) Yashavant Kanetkar, Shrirang Korde, 21 IOT Experiments, 1st Edition, BPB Publications, 2018. ISBN: 9789387284814,

4) Dr. Rajesh Singh, Dr. Anita Gehlot, Dr. Lovi Raj Gupta, Navjot Rathour, Mahendra Swain, Bhupendra Singh, IoT based Projects Realization with RaspberryPi, Node MCU and Arduino, 1<sup>st</sup> Edition,BPB Publications, 2020. ISBN: 9789389328523, 9389328527

#### Web links and Video Lectures(e-Resources):

- https://www.arduino.cc/reference/en
- https://create.arduino.cc/projecthub
- https://maker.pro/raspberry-pi/tutorial
- https://projects.raspberrypi.org/en/projects
- https://www.digikey.com/en/maker/blogs/2019/how-to-use-mqtt-with-the-raspberry-pi

#### Activity-Based Learning (SuggestedActivitiesinClass)/Practical Based learning

- Contents related activities (Activity-baseddiscussions)
  - > For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Groupwise discussions on issues
  - Seminars

Course Code	224IN	1344		JAV					Marks		5	0		
L: T:P:S	22AIM344 2:0:1:0							SEEMarks				50 50		
Hrs/Week	2:0:1:0											100		
Credits	2+2						TotalMarks ExamHours				03			
	<b>03</b> <b>mes:</b> At the end of the course, the student w									5	0.	03		
22AIM344.1								-	HTML v					
22AIM344.2	Apply the concepts of HTML, XHTML to construct the web pages								es					
22AIM344.3	Examine various attributes, values and types of CSS													
22AIM344.4	Analyse event handling mechanisms of Java Script.													
22AIM344.5	Evalua													
22AIM344.6												CSS tecl		
Mapping of Co			mes t	to Pro	ogran	n Outo	comes	and	Progra	m Spec	ific O			
P		PO   3	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO 2	
22AIM344.1	2 -	3	_	_		_	_	_	_	_	_		-	
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			rom the assessment l	ist attached	to Appendix	A.		
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#### Activity-Based Learning (Suggested Activities in Class)/Practical Based learning

- Develop simple GUI interfaces for a computer program to interact with users ٠ •
  - Contents related activities (Activity-baseddiscussions)
    - For active participation of students, instruct the students to prepare Flowcharts and Handouts ⊳
    - $\triangleright$ Organizing Groupwise discussions on issues.
    - ۶ Seminars

						AI fo	r Rob	otics							
<b>Course Code</b>	22	2AIM3	345					0	CIE Marks 5						
L:T:P:S	2:	2:0:1:0								SEE Marks			50		
Hrs / Week	2+2								Total Marks			100	100		
Credits													03		
Course outco	mes	: At th	e en	d of th	e cours	e, the s	studen	t will	be abl	e to:					
22AIM345.1	Unc	lersta	nd tł	ne fund	damenta	al conc	ents.	histori	ical ev	olution	of AI i	n Robo	otics, key A	AT I	
	Understand the fundamental concepts, historical evolution of AI in Ro algorithms and techniques used in robotic systems												-		
22AIM345.2	Apply various sensor technologies, computer vision and image pro- and sensor fusion methods for robust perception in robotic systems.												sing tech	niques,	
22AIM345.3	Evaluate path planning, motion control algorithms, navigation strate implications for robots operating.												s and the	ethical	
22AIM345.4								ement	learni	ing algo	rithms	s to en	able learni	ng,	
										interact				U,	
22AIM345.5		•			sing Nav	-									
22AIM345.6												robot	s in soci	ety by	
Manainaafi			0							cietal in					
Mapping of														DCOD	
	P01	P02	-	P04	P05	P06	P07	P08	P09	P010			PSO1	PSO2	
22AIM345.1	2		3								1	2			
	2	-	-	-	-	-	-	-	-	-	-	•	-	-	
22AIM345.2	3	-	•	-	-	-	-	-	-	-	-	2	-	-	
22AIM345.3	-	-	3	-	-	-	-	-	-	-	-	2	2	3	
22AIM345.4	3	-	0	-	-	-	-	-	-	-	-	2	2	3	
22AIM345.5	-	-	3	-	•	•	-	-	•	-	-	2	2	3	
22AIM345.6	-	-	3	-	3	-	-	-	-	-	-	2		3	
MODULE-1	For	Indat	ions	of AI i	n Robo	otics				22AIN	1345.1		6 Hour	·s	
							ution	of AI i	n Roh				epts of Robotics-AI		
Algorithms ar							ution	011111	11 1100	otics be		neepts		c5 / II	
Laboratory		•			00105.								3 Hours		
1. Obstacle				h a Sin	nple Ro	bot.							5 110015		
Objective:					-		nce alg	orithr	n usin	g AI					
techniques.	p							,		0					
Experimer	nt: Us	e sens	sors (	e.g., u	ltrasoni	c sens	ors) to	o dete	ct obst	acles ar	nd				
program a rol												;			
path planning		-	-			0	1		0	ĊŬ	,				
Text Book	,				x 2: ch:1	L-5									
MODULE-2	Perception and Sensing in Robotics22AIM345.2,22AIM345.3										2A	6 Hours			
Sensor Techn	nlagi	es and	l Inte	gratio	m-Com	niter V	lision	and Ir	nage F			ar and	Radar Sv	stems-	
Sensor Fusior	-			-	-				-	1000551	115 110	un une	riddar by	Jeenis	
Laboratory				Jeer D		ii uiiu	needs	muon					3 Hours		
1. Line Follo	-	-											5 110015		
Objective:				t that o	ran follo	w a li	ne usi	ng AI a	algorit	hms					
Experimer											round				
and program	a rob	ot to									,i ound				
follow the	iine i	ising a	a con	trol al	gorithn	1 (e.g.,	PID CO	ontrol	or fini	te state					
machine).	coar	ition	and	Manir	ulatio	n									
2. Object Re Objectives	•			-			t reco	gnitio	n and	manipu	lation				
by a robot.															

Experime	<b>nt:</b> Use a camera or depth sensor to detect objects, i	mplement a	
	on algorithm .		
Text Book	Textbook 1: ch:1-6		
MODULE-3	Robot Learning and Adaptation	22AIM345.4, 22AIM345.5	6 Hours
Machine Lear	ning for Robotics-Reinforcement Learning in Roboti	ics-Autonomous Lea	arning and
Adaptation-Ir	nitation Learning and Behavior Cloning.		-
Laboratory (	Component:		3 Hours
•	earning for Robotics: Line Following Robot		billouis
	e: Train a robot to follow a line using Machine Learn	ning techniques.	
	<b>ient:</b> Use a simulated or physical robot with line sen		
	obot following a line under different conditions (		
	s, curves). Train a Machine Learning model (e.g., Ne		
	Vector Machine) to predict motor commands based		
	the line. Test the trained model on new tracks to se		
follow th			
	nent Learning in Robotics: Robot Arm Manipulat	ion	
	<b>'e:</b> Teach a robot arm to reach a target using Reinfor		
	<b>ient:</b> Use a robot arm (physical or simulated) with a c		
	Define a reward function that rewards the robot for		
	t. Implement a Reinforcement Learning algorithm (e		
	Networks) to learn the optimal actions (joint ang		
	rain the robot arm using this algorithm and observe		
	reach the target.	no benavior as re	
	se Study/ Applications   Case Studies of Learning R	Pohots	
Text Book	Textbook 2: ch:7,8	00003	
MODULE-4	Planning and Navigation	22AIM345.5	6 Hours
	g Algorithms-Motion Planning and Control-Simultan		
	gation in Dynamic Environments-Multi-Robot Coord		
Laboratory			3 Hours
	ning Algorithms: Maze Solving Robot		5 110015
	Implement a robot that can navigate through a maze	a using Path	
Planning algo			
0 0	<b>It:</b> Use a simulated or physical robot with distance	sonsors Croate a	
-	alls and open spaces. Implement a Path Plannin		
	Search or A* algorithm) to find the shortest path fro		
	aze. Program the robot to follow this path, avoiding		
the sensor da		g obstacies using	
	n in Dynamic Environments: Dynamic Obstacle A	voidance	
	Develop a robot that can navigate in an environmen		
obstacles.	Develop a robot that can havigate in an environmen	e with moving	
	t: Use a robot with sensors to detect both sta	tic and dynamic	
-	eate a scenario where obstacles move rand	-	
	Implement a navigation algorithm that can dynamic		
	moving obstacles in real-time. Test the robot in this		
see how well	it can navigate while avoiding collisions with the r		
Text Book	Textbook 1: Ch-11,12	noving obstacles.	
MODULE-5	Human-Robot Interaction and Ethics	22AIM345.6	6 Hours
	Human-Robot InteractionDesigning User-Friendly		
Interaction M	odels-Ethical Considerations in AI and Robotics-Fut	ure Trends and Cha	illenges in Al for
Robotics.			-

Laboratory Component:	3 Hours
1. Principles of Human-Robot Interaction: Robot-Assisted Therapy	
<ul> <li>Task: Design a robot-assisted therapy session for patients with limited mobility or social interaction.</li> </ul>	
• <b>Description:</b> Develop a robot that can assist patients in performing physical or cognitive exercises. Design the interaction between the robot and the	
patient to be engaging, encouraging, and supportive. Implement sensors and	
algorithms that allow the robot to adapt its behavior based on the patient's responses and progress.	
2. Ethical Considerations in AI and Robotics: Designing an Ethical Robot	
• <b>Task:</b> Develop a set of ethical guidelines for a robot designed for home assistance.	
• <b>Description:</b> Consider ethical issues such as privacy, autonomy, and safety when designing the robot. Create guidelines that govern the robot's behavior in various situations, such as handling personal information, respecting user preferences, and ensuring the safety of both the user and others in the environment. Implement these guidelines into the robot's programming and behavior.	

#### Text Book **Textbook 1:ch 2,3,4**

#### CIE Assessment Pattern (50 Marks - Theory and Lab) **Marks Distribution RBT Levels** Test (s) **Qualitative Assessment** Lab 25 05 20 L1 Remember --L2 Understand 5 --10 L3 5 10 Apply L4 Analyze 10 10 -L5 Evaluate -L6 Create ---

#### SEE Assessment Pattern (50 Marks – Theory)

	<b>RBT Levels</b>	Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	10
L5	Evaluate	-
L6	Create	

#### Suggested Learning Resources:

#### **Text Books:**

- 1. "Robotics: Modelling, Planning and Control" by Bruno Siciliano, 2009. ISBN: 9781846286414, 1846286417.
- 2. "Principles of Robot Motion: Theory, Algorithms, and Implementations" by Howie Choset, 2005. ISBN: 9780262033275, 0262033275

#### **Reference Books:**

- 1. "Human-Robot Interaction: A Survey" by Bilge Mutlu, 2007. ISBN: 9781601980922
- 2. "Robot Ethics: The Ethical and Social Implications of Robotics" by Patrick Lin ,2012. ISBN: 978-0262016667

#### Web links and Video Lectures (e-Resources):

• https://www.bing.com/videos/riverview/relatedvideo?q=Ai+for+robotics+video+link&mi d=DEBFDAF89C4C784D2BCFDEBFDAF89C4C784D2BCF&FORM=VIRE

- https://www.bing.com/videos/riverview/relatedvideo?&q=motion+robotics+making+vid eo&&mid=AF51911F7619496982E3AF51911F7619496982E3&&FORM=VRDGAR
- https://www.bing.com/videos/riverview/relatedvideo?&q=7.%09Path+Planning+Algorit hms%3a+Maze+Solving+Robot+video&&mid=CB89ECB5BBDDFC875C63CB89ECB5BBDD FC875C63&&FORM

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

- ➤ Group discussion on real-world problems.
- > Contents-related activities (Activity-based discussions)
- Organizing Group discussions on real-world problems
- ➤ Seminars

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			Part B		
7	Write a program to	create a list	and perform length calculations,	2	22AIM351.1,
			end items in it using Prolog.		22AIM351.2,
	Note: Discuss List m	nanipulation	Functions in Prolog.		22AIM351.3,
		•			22AIM351.4
8	Write a program to	implement v	write (), read () and tab () predicate	in <b>2</b>	22AIM351.1,
	Prolog.	1	0, 0 01		22AIM351.2,
		oncepts of Fil	le Handling and Predicate in Prolog.		22AIM351.3,
					22AIM351.4
9	Develop a Prolog co	de that can i	read data from file and write data int	o 2	22AIM351.1,
,	it.				,22AIM351.2
					22AIM351.3,
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10	Develop 2 program	in Prolog to	demonstrate Atoms using predicate	5. 2	22AIM351.1,
10	Note: Discuss about			5. 2	22AIM351.1, 22AIM351.2,
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11			e and read the data from console an		22AIM351.1,
		n perform a	append operation in same file using	0	22AIM351.2,
	Prolog.			2	22AIM351.3,
10					22AIM351.4
12	Create a simple exp	ert system a	pplication using Prolog programmin	g. <b>2</b>	22AIM351.1,
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https://www.tutorialspoint.com/prolog/index.htm

## Activity-Based Learning /Practical Based Learning

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Groupwise discussions on issues
  - > Seminars

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#### **Reference Books:**

1. Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter, 3<sup>rd</sup> edition, by Wes McKinney,2022, ISBN: 978-9355421906.

#### WeblinksandVideoLectures(e-Resources):

- https://realpython.com/python-for-data-analysis/
- https://www.freecodecamp.org/news/learn-data-analysis-with-python-course/

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	sic Execl formulas a nctions/	nd functions: https://w	/ww.ablebits.com/office-addins-blog/	'basic-exc	cel-formulas-
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#### Suggested Learning Reources:

#### **Reference Book:**

1. Microsoft Excel Data Analysis and Business Modeling by Wayne Winston, 2017. ISBN : 9781509304219

#### Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=iG6lN9aBrcM
- https://www.youtube.com/watch?v=\_XfWkCsvbEU
- https://onlinecourses.nptel.ac.in/noc21\_ge21/

#### Activity-Based Learning /Practical Based learning

- > For active participation of students, instruct the students to prepare Flowcharts and Handouts
- Organizing Group wise discussions on issues
- ➤ Seminars

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22AIM354.2	Apply t	the cor	ncepts	s of de	escrip	tive st	atistic	s for d	ata pr	eparation	1.		
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11     Write a program to detect outlier and filtering.     2     22AIM35-22AIM3-22MIA-22I			22AIM354 22AIM354 22AIM354 22AIM354 22AIM354
b. Write a program to visualizing quartiles using python. c. Write a program to group datasets using group by () functions. Note: Discuss the distribution techniques. PART-C Beyond Syllabus Content/Virtual Lab 1. Steps in Exploatory Data Analysis: https://www.analyticsvidhya.com/blog/2022/07/st step-exploratory-data-analysis-eda-using-python/ 2. Data Analytics with Python: https://digimat.in/nptel/courses/video/106107220/L01.l IE Assessment Pattern (50 Marks-Lab) RBT Levels Test(s Weekly Assessment 20 30 L1 Remember L2 Understand 5 5 L3 Apply 5 10 L4 Analyze 10 10 L5 Evaluate - 5 L6 Create EE Assessment Pattern (50 Marks-Lab) RBT Levels Exam Marks Distribution (50) L1 Remember - L2 Understand 10 L3 Apply 10 L4 Analyze 20 L5 Evaluate 10 L6 Create - Suggested Learning Resources: TextBooks: 1. Hands-On Exploratory Data Analysis with Python, Suresh Kumar Mukhiya and Usman Al- Packt Publishing, 2020. ISBN: 978-1789537253 Weblinks and Video Lectures(e-Resources):	11 Write a program to detect outlier and filtering.	2	22AIM354 22AIM354 22AIM354 22AIM354 22AIM354
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<ul> <li>https://www.geeksforgeeks.org/exploratory-data-analysis-in-python/</li> <li>https://www.digitalocean.com/community/tutorials/exploratory-data-analysis-python</li> </ul>	TextBooks: 1. Hands-On Exploratory Data Analysis with Python, Suresh Kumar Mu Packt Publishing, 2020. ISBN: 978-1789537253 Veblinks and Video Lectures(e-Resources):		

https://www.digitalocean.com/community/tutorials/exploratory-data-analysis-python
 https://www.analyticsvidhya.com/blog/2022/02/exploratory-data-analysis-in-python/

#### Activity-Based Learning /Practical Based learning

- Contents related activities (Activity-based discussions)
   For active participation of students, instruct the students to prepare Handouts
  - Organizing Group wise discussions on use-cases.

						JULL	A FOR	NUM	ERICA	L ANA	LYSIS				
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	multip				-				in Julia	1			2	22.	AIM355.2
2	Note: 7													22	
2	-						-	a to fin	id the	root of	f a given	l	2		AIM355.1 AIM355.2
	functio	n wi	ithin a	a spec	cified i	interva	al.						2		AIM355.2 AIM355.3
3															AIM355.1
5	Perfor	m m	atrix r	multi	nlicati	on of t	wo m	atrices	s using	, Iulia.			2		AIM355.2
					P				2	,,					AIM355.4
4	<b>T</b> 1					1					<b>C</b>				AIM355.1
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	from g			-										22	AIM355.3
5	Impler	nent	Gaus	sian e	elimin	ation i	n Julia	a to so	lve a s	ystem	of linea	r		22	AIM355.1
	equation	ons.											2	22	AIM355.2
													۷	22	AIM355.3
														_	
6	Use Iul	ia to	annr	oxim	ate the	e deriv	vative	of a fu	nction	using	numeri	cal	-		AIM355.1
	differe									0		-	2		AIM355.2
								<b>D</b> 4	ח ד ד					22	AIM355.4
7								PA	RT-B					22	
7	Hea th	- + m -	nozał	azoidal rule in Julia to approvimate the integral of a function						nation	2		AIM355.1		
	use the	e u d	rapezoidal rule in Julia to approximate the integral of a function								metion	2		AIM355.2 AIM355.4	
0															
0			t Euler's method in Julia to solve a first-order ordinary									22AIM355 22AIM355			
	differe	ntial	tial equation (ODE).									2 22AIM355.2 22AIM355.3			
8							a to so	lve a f	irst-or	der or	dinary		2	22	AIM

9	Use the Newton-Raphson method in Julia to find the root of a nonlinear		22AIM355.1
	equation.	2	22AIM355.2
	equation.		22AIM355.4
10	Implement the power method in Julia to find the dominant eigenvalue		22AIM355.1
		2	22AIM355.2
	and eigenvector of a matrix.		22AIM355.3
11	Write a Julia program for high degree polynomial interpolation.	2	22AIM355.1
		2	22AIM355.2
12	Write a Julia program for countdown timer concept.	2	22AIM355.1
		2	22AIM355.2
	PART-C		
	Beyond Syllabus Virtual Lab Content		
	(To be done during Lab but not to be included for CIE or	SEE)	
1.	https://www.bing.com/videos/riverview/relatedvideo?q=julia+p	rogram	ming+video&
	mid=F2E185A4919F5F05AD7FF2E185A4919F5F05AD7F&F0RM=	VIRE	
2.	Julia Documentation - The official Julia documentation provides comprehe	nsive gui	des, tutorials,

- Julia Documentation The official Julia documentation provides comprehensive guides, tutorials and examples for using Julia for numerical analysis. https://docs.julialang.org/en/v1/stdlib/LinearAlgebra/
- 3. Julia Discourse The Julia Discourse forum is a great place to ask questions, share knowledge, and get help with using Julia for numerical analysis. https://discourse.julialang.org/
- 4. JuliaCon Videos JuliaCon is the annual conference for Julia users, and the videos from past conferences often include talks and workshops on numerical analysis topics. <u>https://juliacon.org/</u>
- 5. MIT OpenCourseWare MIT offers free online courses that cover numerical analysis topics. While not specific to Julia, these courses can provside valuable insights into numerical methods. https://ocw.mit.edu/index.htm

### CIE Assessment Pattern (50 Marks - Lab)

	<b>RBT Levels</b>	Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	5	10
L3	Apply	5	10
L4	Analyze	5	10
L5	Evaluate	5	
L6	Create	-	-

#### SEE Assessment Pattern (50 Marks - Lab)

	<b>RBT Levels</b>	Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	20
L4	Analyze	20
L5	Evaluate	-
L6	Create	-

## Suggested Learning Resources:

#### **Reference Books:**

- 1) "Numerical Analysis Using Julia" by Huijun Hu, 2021, ISBN-13: 978-1138614188.
- 2) "Julia Programming for Operations Research: A Primer on Computing" by Changhyun Kwon and Jeffrey S. Saltzman, 2016, ISBN-13: 978-1798205471.

	<u> </u>		<u>BIO IN</u>	SPIRE	<u>) DESI</u>	<u>GN A</u> P	<u>ID IN</u> N	UVAI	ION			
Course Code	22BIK	36					CIE I	Marks		50		
L: T:P:S	3:0:0:	0					SEE	Marks		50		
Hrs / Week	3						Tota	l Mark	S	10	0	
Credits	03						Exar	n Hour	S	03		
<b>Course outcon</b>	nes: At	the end	of the c	ourse, t	he stu	dent w	vill be a	able to:				
22BIK36.1	1								e needs	at that	momen	t.
22BIK36.2				erial pro								
22BIK36.3				÷	-						levelopi	nent
	princip	0					<i>co o y c</i>	, and a ch		Sir unia c	ievelop:	none
22BIK36.4		Investigate creative biobased solutions for socially vital issues with o								with cr	itical the	ought.
22BIK36.5		Analyze the bio computing optimization through research and experiential learning.										
22BIK36.6												ions and
	case st		inddinioi		ogrear	lacab		, per en		140 01 141	appnea	lono una
Mapping of Co			es to P	rogram	Outc	omes	and F	Program	m Spec	ific Ou	tcomes	:
	P01	P02	P03	<b>P04</b>		P06		P08	P09	P010		P012
22BIK36.1	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.2	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.3	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.4	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.5	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.6	3	3	3	3	2	-	-	-	1	1	-	2
Rawling's Class (self-healing, so Self Study Fext Book MODULE-2 Biomaterials, E (Hierarchy, fra Bio-Mechanics, Self Study	BIO MA Design of cture to	nbly). Inve- areas Text ATERIA f Forms ugh ma tions of	stigate s of scie Book 1: LS ANI - (Hexa tterials, Biomat	the Cha ence and 1.2, 1.3 D BIO H gonal un structu terials a	llenge d engi , 1.4, 1 IEALT nit cell ral col nd Bio	s of B neerir .13, 1. <b>HCAF</b> s, Intr ours, syste	io insp 1 <u>g</u> . 15, 1.1 <b>RE DES</b> insic c Actuat ms in l	bired de L6 SIGN lisorder Ling Ma Health d	esign, C 2 c, anisot terials, care .	ompare <b>2BIK3</b> tropy), l Bio-Cor	e with tr 6.2 Design c npatible	raditional <b>8 Hours</b> of materials
		hea	alth care	e applic	ations							
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MODULE-3 Innovations (purification, of spaces, des Case Study Text Book	in Ener , filtratic signs for Text B	rgy (Te on), Dev r megas Exp ook 2: 3	ermite w water structur plore th 3.1, 3.3,	mound • collect •es. e Bio in 3.5, 3.7,	inspirion system ion spirection 3.10	red sl stems l envi	, wate	r purifi	22 ls), Inn cation, nstruct	2BIK36 lovatior desalin cions an	<b>.4</b> ns in R ation, M	esource-Ai lanagemen opment.
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MODULE-3 Innovations (purification, of spaces, des Case Study Text Book MODULE-4 No Free Lunch and Mutation Intelligence- P Self Study	in Ener filtratic signs for Text B BIO Co Theore Operat article S	rgy (Te on), Dev r megas ook 2: 3 OMPU1 m, Bat 2 tions. 1 Swam 0 Scr	ermite w water structur <u>olore th</u> 3.1, 3.3, <b>FING AI</b> Algorith Bio-Insp ptimisa utinize	mound collect es. <u>e Bio in</u> 3.5, 3.7, <b>ND OP1</b> nm, Flow pired ( ation (P the Diff	inspired ion system <u>spired</u> <u>3.10</u> T <b>IMIS</b> wer Po Dptimi SO). ferent	red sl stems <u>l envir</u> <u>ATION</u> ollinat satior types	, wate ronme ion Al <sub>i</sub> a, Ant of Op	r purifi ental co gorithn Colon timizat	22 ls), Inn cation, nstruct 22 n, Gene y Opti ion tecl	2BIK36 ovatior desalin cions an 2BIK36 tic Algo misatio hniques	5.4 is in R ation, M id devel 5.5 rithm-0 on (ACC	esource-Ai lanagemen opment. 8 Hours Crossover
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Bioinspired innovations in– Automotive, Automation, Materials and Manufacturing, Sensors, Controllers, Communications, Healthcare, Agriculture, food production, and Sports, Environment infrastructure. Carbon Neutral Solutions (Coral Reefs, Eco-cements), Carbon Free Solutions (Lotus leaf inspired paints), eco-restorations (Eco-friendly pesticide).

Application	Survey on Bio inspired Innovations, design, applications and case studies of
	the same.

## Text Book Text Book 2: 12.1 to 12.10

		Marks Distribution						
<b>RBT Levels</b>		Test (s) (25)	MCQ's (10)					
L1	Remember	-	-	-				
L2	Understand	5	-	-				
L3	Apply	10	5	5				
L4	Analyze	5	5	5				
L5	Evaluate	5	5	-				
L6	Create	-	-	-				

#### SEE Assessment Pattern (50 Marks - Theory)

	<b>RBT Levels</b>	Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	

#### Suggested Learning Resources:

#### **Text Books:**

1) Helena Hashemi Farzaneh, Udo Lindemann, A Practical Guide to Bio-inspired Design, Springer Vieweg, 1st edition 2019, ISBN-10 : 366257683X, ISBN-13 : 978-3662576830

2) Torben A. Lenau, Akhlesh Lakhtakia, Biologically Inspired Design: A Primer (Synthesis Lectures on Engineering, Science, and Technology, Publisher: Morgan & Claypool Publishers, 2021, ISBN-10: 1636390471, ISBN-13: 978-1636390475

#### **Reference Books:**

1) French M, Invention and evolution: Design in Nature and Engineering, Publisher: Cambridge University Press, 2020

2) Pan L., Pang S., Song T. and Gong F. eds, Bio-Inspired Computing: Theories and Applications, 15th International Conference, BIC-TA 2020, Qingdao, China, October 23-25, 2020, Revised Selected Papers (Vol. 1363). Springer Nature, 2021

#### 3) Wann D, Bio Logic: Designing with nature to Protect the Environment, Wiley Publisher, 1994

#### Web links and Video Lectures (e-Resources):

- https://onlinecourses.nptel.ac.in/noc22\_ge24/preview
- https://biodesign.berkeley.edu/bioinspired-design-course/
- https://www.youtube.com/watch?v=cwxXY9Qe8ss
- https://www.youtube.com/watch?v=V2GvQXvjhLA
- https://nsf-gov-resources.nsf.gov/2023-03/Bio-inspired%20Design %20Workshop%20Report\_2232327\_October%202022\_Final.508.pdf

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

- Presenting students with bio-inspired design challenges and asking them to come up with solutions.
- > Create physical models or prototypes that mimic biological structures or functions.
- > Organizing Group wise discussions on issues
- > Seminars

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22SCK37.2 Unde							munity	and ir	nvolve t	hem ir	problen	n –solving
22SCK37.3 Deve												
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2SCK37.4 Deve											ies & gai	n skills in
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22SCK372	-	-	-	-	-	3	2	-	2	3	-	1
22SCK37.3	-	-	-	-	-	3	2	-	2	3	-	1
22SCK37.4	-	-	-	-	-	3	2	-	2	3	-	1
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Platform to connect to others and share the stories with others:

- $\circ$  Jamming session
- Open mic
- o Poetry
- Share the experience of Social Connect.
- Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

#### Pedagogy:

- The students will be divided into groups. Each group will be handled by faculty mentor.
- A total of 40 50 hrs engagement in the semester
- Faculty mentor will design the activities (particularly Jamming sessions, open mic and poetry)
- 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 for interactive sessions, open mic, reading group, storytelling sessions, and semester-longactivities conducted by faculty mentors.
- Students should present the progress of the activities as per the schedule in the prescribed practical session in the field.
- There should be positive progress in the vertical order for the benefit of society in general through activities.

#### Plan of Action:

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty mentor for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1<sup>st</sup> to 5<sup>th</sup>, compiled report should be submitted as per the instructions and scheme.
- Practice Session Description:
  - Lecture session in field to start activities
  - Students Presentation on Ideas
  - Commencement of activity and its progress
  - Execution of Activity
  - Case study-based Assessment, Individual performance
  - Sector/ Team wise study and its consolidation
  - Video based seminar for 10 minutes by each student at the end of semester with Report.

N	o Topic	Group	Location	Activity	Reporting	Evaluation of the
		size		execution		Торіс
1		individual or team	parks / Villages / roadside/ community area / College campus	Continuous <sup>'</sup> monitoring/	submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus
2	0	or team	monumentalplaces / Villages/ City Areas / Grama panchayat/ public associations	/Proper consultation/ Continuous monitoring/	submitted by	Evaluation as per the rubrics of scheme and syllabus
3	farming and	individual or team (3-5)	parks /Villages visits / roadside/	/ proper consultation / Continuous	submitted by	Evaluation as per the rubrics of scheme and syllabus

			College campus	Information board	authority	
-	conservatio	individual or team (3-5)	panchayat/ public associations/ Government Schemes officers /	proper consultation/ Continuous monitoring/	submitted by	Evaluation as per the rubrics of scheme and syllabus
	Practices in	individual or team (3-5)	Areas /Grama panchayat/ public associations/ Government Schemes officers/	/ proper consultation / Continuous monitoring /	submitted by	Evaluation as per the rubrics of scheme and syllabus

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		: At the end of the course, the student will be able to:									
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	. S. Grewal, Higher Er		Mathematics, K	hanna Publ	lishers, Foi	rty fou	urth Edition	, 2022	2,
ISBN: 9788193328491.									
2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, Reprint 2016, ISBN: 9788126554232.									
Refe	erence Books:								
-	lyn James, Advanced M 015, ISBN: 978027371		gineering Mather	natics, Pear	son Educat	ion, F	ourth Editio	n,	
	V. Ramana, Higher Ei		Mathematics, Mc	Graw Hill E	ducation (I	ndia)	Private Limi	ited,	
-	ourth Edition, 2017, IS	· ·			, c	,		•	
3) H	. K. Dass, Advanced Er	ngineering	Mathematics, S. (	Chand & Coi	npany Ltd.	, Twer	nty Second E	dition	, 2018,
IS	BN: 9789352533831								
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22NSS30.2	Analys for the			ental ar	nd socie	tal pro	blems/	'issues	s and v	will be ab	le to de	sign solutions
22NSS30.3	Evalua	ate the	existing							s for the s		r sustainable ield
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11. Govt. school Rejuvenation a	and helping them	to achieve	22NSS60.2	
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IE Assessment Pattern (50 Marks – Activity	v based) –			
CIE component for every semester	Marks			
Presentation - 1	10			
Selection of topic, PHASE - 1				
Commencement of activity and its progress	10			
- PHASE - 2				
Case study-based Assessment Individual	10			
performance	10			
Sector wise study and its consolidation	10			
Video based seminar for 10 minutes by each	10			
student at the end of semester with				
Report. Total marks for the course in each	<b>F</b> 0			
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eference Books: 1. NSS Course Manual, Published by NSS				
<ol> <li>Government of Karnataka, NSS cell, ac</li> <li><u>Government of India, NSS cell, Activiti</u></li> <li>re-requisites to take this Course:         <ol> <li>Students should have a service-oriented in</li> </ol> </li> </ol>	tivities reports and its es reports and its mindset and socia	nd its manu s manual. al concern.		
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<ul> <li>I. NSS Course Manual, Published by NSS</li> <li>2. Government of Karnataka, NSS cell, ac</li> <li>3. Government of India, NSS cell, Activiti</li> <li>re-requisites to take this Course: <ol> <li>Students should have a service-oriented in</li> <li>Students should have dedication to work a proper time management for the other</li> <li>Students should be ready to sacrifice some on time.</li> </ol> </li> <li>Pedagogy: <ol> <li>In every semester from 3rd semester to 6th scheme and syllabus.</li> <li>At the end of every semester student performactivity progress and its completion.</li> <li>At last, in 6th semester consolidated reportshould be submitted as per the instruction</li> </ol> </li> </ul>	tivities reports and es reports and its mindset and socia at any remote place works. e of the time and w h semester, each s rmance has to be e rt of all activities s. esent relevance in	nd its manu s manual. al concern. ce, anytime v vishes to ach tudent shoul evaluated by from 3rd to	vith available lieve service d do activitie the NSS offic 6th semeste	e-oriented targets es according to the cer for the assigned or, compiled report
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<ul> <li>I. NSS Course Manual, Published by NSS</li> <li>2. Government of Karnataka, NSS cell, ac</li> <li>3. Government of India, NSS cell, Activiti</li> <li>re-requisites to take this Course: <ol> <li>Students should have a service-oriented in</li> <li>Students should have dedication to work a proper time management for the other</li> <li>Students should be ready to sacrifice some on time.</li> </ol> </li> <li>Pedagogy: <ol> <li>In every semester from 3rd semester to 6th scheme and syllabus.</li> <li>At the end of every semester student performactivity progress and its completion.</li> <li>At last, in 6th semester consolidated reportshould be submitted as per the instruction</li> </ol> </li> </ul>	tivities reports as es reports and its mindset and socia at any remote place works. e of the time and v h semester, each s rmance has to be e rt of all activities s. esent relevance in mned activities. r assigning homev	nd its manu s manual. al concern. ce, anytime v vishes to ach tudent shoul evaluated by from 3rd to the society a vork, gradin	vith available nieve service d do activitie the NSS offic 6th semeste and provide n	e-oriented targets es according to the cer for the assigned er, compiled report real-life examples.
<ul> <li>Areference Books: <ol> <li>NSS Course Manual, Published by NSS</li> <li>Government of Karnataka, NSS cell, activities</li> <li>Government of India, NSS cell, Activities</li> </ol> </li> <li>Te-requisites to take this Course: <ol> <li>Students should have a service-oriented in</li> <li>Students should have dedication to work a proper time management for the other</li> <li>Students should be ready to sacrifice some on time.</li> </ol> </li> <li>Pedagogy: <ol> <li>In every semester from 3rd semester to 6th scheme and syllabus.</li> <li>At the end of every semester student performant activity progress and its completion.</li> <li>At last, in 6th semester consolidated reportshould be submitted as per the instruction</li> <li>State the need for NSS activities and its pression of the students for self-plae.</li> </ol> </li> </ul>	tivities reports as es reports and its mindset and socia at any remote place works. e of the time and v h semester, each s rmance has to be e rt of all activities s. esent relevance in inned activities. r assigning homev tivities in the field	nd its manu s manual. al concern. ce, anytime v vishes to ach tudent shoul evaluated by from 3rd to the society a work, gradin	vith available lieve service d do activitie the NSS offic 6th semeste and provide r g assignmen	e-oriented targets es according to the cer for the assigned er, compiled report real-life examples. ts and quizzes, and
<ul> <li>I. NSS Course Manual, Published by NSS</li> <li>2. Government of Karnataka, NSS cell, activitie</li> <li>3. Government of India, NSS cell, Activitie</li> <li>re-requisites to take this Course: <ol> <li>Students should have a service-oriented responsible for the other</li> <li>Students should have dedication to work a proper time management for the other</li> <li>Students should be ready to sacrifice some on time.</li> </ol> </li> <li>Pedagogy: <ol> <li>In every semester from 3rd semester to 6th scheme and syllabus.</li> <li>At the end of every semester student performative activity progress and its completion.</li> <li>At last, in 6th semester consolidated reports should be submitted as per the instruction</li> <li>State the need for NSS activities and its pressional syllabus for self-plates.</li> </ol> </li> </ul>	tivities reports as es reports and its mindset and socia at any remote place works. e of the time and v h semester, each s rmance has to be e rt of all activities s. esent relevance in inned activities. r assigning homev tivities in the field	nd its manu s manual. al concern. ce, anytime v vishes to ach tudent shoul evaluated by from 3rd to the society a work, gradin	vith available lieve service d do activitie the NSS offic 6th semeste and provide r g assignmen	e-oriented targets es according to the cer for the assigned er, compiled report real-life examples. ts and quizzes, and

- Student/s in individual or in a group Should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.
- At the end of every semester, activity report should be submitted for evaluation.
- Practice Session Description:
  - Lecture session by NSS Officer
  - Students Presentation on Topics
  - $\circ$  Presentation 1, Selection of topic, PHASE 1
  - $\circ$  Commencement of activity and its progress PHASE 2
  - Execution of Activity
  - Case study-based Assessment, Individual performance
  - $\circ$   $\,$  Sector/ Team wise study and its consolidation  $\,$
  - $\circ$   $\;$  Video based seminar for 10 minutes by each student at the end of semester with Report.

Sl No	Торіс	Groupsize	Location	Activity execution	Reporting	Evaluation of the Topic
1.	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmers land/Villages/ roadside / Community area / College campus	Site selection /proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
2.	Waste management– Public, Private and Govt organization, 5 R's.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers/ campus	Site selection /proper consultation/C ontinuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
3.	Setting of the information imparting club for women leading to contributionin social and economic issues.	May be individual or team	Women empowerme ntgroups/ Consulting NGOs & Govt Teams / College campus	Group selection/pro per consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer

4.	Water	May be	0 /	site selection	Report	Evaluation
_	Role of different stakeholders– Implementation	individual or team	associations/ Government Schemes officers/ campus	/ proper consultation/ Continuous monitoring/ Information board	should be submitted by individual to the concerned evaluation authority	as per the rubrics of scheme and syllabus by NSS officer
5.	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Grama panchayat/ public associations/ Government	Group selection/pro per consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
6.	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	May be individual or team	private/ aided schools/Govern ment Schemes officers		Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
7.	Developing Sustainable Water management system for rural areas and implementation approaches.	May be individual or team	City Areas / Grama panchayat/ public associations/	site selection/prop er consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
8.	any national	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government	Group selection/pro per consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer

			1	1				
ç	).	Spreading	May be	Villages/	Group	Report	Evaluation	
		public	individual	City Areas /	selection/pro	should be	as per the	
		awareness	or team	Grama	per	submitted	rubrics of	
		under rural		panchayat/	consultation/	by	scheme and	
		outreach		public	Continuous	individual	syllabus by	
		programs.		associations/	monitoring /	to the	NSS officer	
		(minimum5		Government	Information	concerned		
		programs)		Schemes	board	evaluation		
				officers/		authority		
				campus		5		
1		Organize	May be	Villages/	Place	Report	Evaluation	
		National	individual	City Areas /	selection/prop	should be	as per the	
		integration	or team	Grama	er	submitted	rubrics of	
		and social		panchayat/	consultation/	by	scheme and	
		harmony		public	Continuous	individual	syllabus by	
		events		associations/	monitoring /	to the	NSS officer	
		/ workshops		Government	Information	concerned		
		/ seminars.		Schemes	board	evaluation		
		(Minimum 02		officers/		authority		
		programs).		campus		-		
1	1.	Govt. school	May be	Villages/	Place	Report	Evaluation	
		Rejuvenation	individual	City Areas /	selection/prop	should be	as per the	
		andhelping	or team	Grama	er	submitted	rubrics of	
		them to achieve		panchayat/	consultation/	by	scheme and	
		good		public	Continuous	individual	syllabus by	
		infrastructure.		associations/	monitoring /	to the	NSS officer	
				Government	Information	concerned		
				Schemes	board	evaluation		
				officers/		authority		
				campus		5		

_			SICAL	EDUCA	TION	(PE) (			D ATH	LETICS	5)			
Course	22PE	D30					CIE M	arks semes	aton)	50				
Code L:T:P:S	0:0:0:	0					SEE M		sterj					
Hrs / Wee		0						Marks			x 4= 20	0		
Credits										02	<u>x <del>4</del> - 20</u>	0		
Course ou							LAUII	am Hours 02						
At the end		urse, the	e studen	t will be	e able to	:								
22PED30.1	Unders	tand the	fundan	nental c	oncepts	and s	kills of I	of Physical Education, Health, Nutrition and						
	Fitness				1			is of Filysical Education, Health, Nutrition and						
22PED30.2	Create	consciou	isness a	mong tł	ne stude	ents on	Health	, Fitnes	tness and Wellness in developing and					
	maintai							,						
22PED30.3					or athle	tics of	studen	ťs choi	ice and	particip	oate in t	he competition		
	at regio											-		
22PED30.4	Unders	tand the	roles a	nd resp	onsibili	ties of	organiz	ation a	ind adn	ninistrat	tion of s	ports and games		
Mapping of	of Course	Outcon	nes to	Progra	m Outo	omes	:							
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012		
22PED30.1	-	-	-	-	-	2	-	3	3	-	-	2		
22PED30.2	-	-	-	-	-	2	-	3	3	-	-	2		
22PED30.3	-	-	-	-	-	2	-	3	3	-	-	2		
22PED30.4	-	-	-	-	-	2	-	3	3	-	-	2		
Semeste	CONTENT									Os		HOURS		
r	Module	1. 0	ntation											
		Lifestyle		L										
		Fitness	~)						22PED30.1		E UDC			
			Nutritio	n					2205	, 10000		5 HRS		
	D.	Health &	& Wellne	ess					ZZPE	ED30.2				
			iess test											
	Module				-		s of Fiti	iess						
3RD			·	ree Han		ses)			0000					
22PED3			i – Push 30 Mtr	-up / Ρι Dach	ill-ups				ZZPE	ED30.2				
0		-	· Shuttle						22PF	, ED30.3	15 HRS			
				and Rea	ch				2211	1000.0				
				Endura		arvard	step Te	est						
	Module	3: Recr	eation	al Activ	rities									
			l deforn						22PE	ED30.3				
			nanagen	nent.					0000	,		10 HRS		
		Aerobic							ZZPE	ED30.4				
	Module		nal Gan		Jupe				2205	ED40.1				
			1 Sports		aiues				2211	2040.1		5 HRS		
			-	Sports	and Gar	nes			22PF	, ED40.2		0 1110		
4 TU	Module						selecte	d by						
4 <sup>тн</sup> 22PED40	the stud	-			v			5						
228ED40	A. Volle	-	Attack, E	Block, Se	rvice, U	pper H	land Pa	ss and	2200	ED40.3		20 HRS		
	Lowe	r hand								נ.טדעי		2011113		
					<u> </u>	attaal	- Mat D	0	1					
	B. Thro	wball – throw.	Service	, Receiv	re, Spin	attack	k, net L	rop &						

B. Rules and their interpretation and duties of officials.       22PED60.1         6 <sup>TH</sup> Athletics:       22PED60.1         22PED60       1. Track -110 Mtrs and 400Mtrs:       ,       Total 30 Hrs/	5 <sup>TH</sup> 22PED50	<ul> <li>C. Kabaddi - Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus.</li> <li>D. Kho-Kho - Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.</li> <li>E. Table Tennis - Service (Fore Hand &amp; Back Hand), Receive (Fore Hand &amp; Back Hand), Smash.</li> <li>F. Athletics (Track / Field Events) - Any event as per availability of Ground.</li> <li>Module 3: Role of Organization and administration</li> <li>Fitness Components: Meaning and Importance, Fit India Movement, Definition of fitness, Components of fitness, Benefits of fitness, Types of fitness and Fitness tips.</li> <li>Practical Components: Speed, Strength, Endurance, Flexibility, and Agility</li> <li>Athletics: <ol> <li>Track -Sprints:</li> <li>Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block.</li> <li>Acceleration with proper running techniques.</li> <li>Finishing technique: Run Through, Forward Lunging and Shoulder Shrug.</li> </ol> </li> <li>Jumps- Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick)and Landing</li> <li>Throws-Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique)</li> <li>Handball OR Ball Badminton</li> <li>Handball OR Ball Control,</li> <li>Goal Throws: Jumpshot, Centershot, Diveshot, Reverseshot.</li> <li>Dribbling: High and low.</li> <li>Attack and counter attack, simple counter attack, counter attack from two wings and center.</li> <li>Blocking, Goal Keeping and Defensive skills.</li> <li>Game practice with application of Rules and Regulations.</li> <li>Rules and their interpretations and duties of officials</li> </ul>	22PED50.1 22PED50.2 22PED50.3 22PED50.3 22PED50.4	5 HRS Total 30 Hrs/ Semester 2 Hrs/week
Hurdling Technique: Lead leg Technique, Trail leg 22PED60.2	_	Regulations. B. Rules and their interpretation and duties of officials. Athletics: 1. Track -110 Mtrs and 400Mtrs:	,	Total 30 Hrs/ Semester

Approach to First Hurdles, In Hurdles to Finishing.     2. Jumps- High jump: Approach				
2. Jumps- Tigit Jump. Approach Clearance (Straddle) and Landin 3. Throws- Discus Throw: Holdi Stance Primary Swing, Turn, (Rotation in the circle).	ng. ing the Discus, I	nitial		
Football OR Hoc	key			
<b>Football:</b> A. Fundamental Skills 1. Kicking: Kicking the ball with insid the ball with Full Instep of the foot, Inner Instep of the foot, Kicking the b of the foot and Lofted Kick.	Kicking the ball v	vith		
2. Trapping: Trapping- the Rolling b ball with sole of the foot.	oall, and the Bound	cing		
3. Dribbling: Dribbling the ball wit Dribbling the ball with Inner and Ou	-			
4. Heading: In standing, running and 5. Throw-in: Standing throw-in and 6. Feinting: With the lower limb an	Running throw-in	1.		
body. 7. Tackling: Simple Tackling, Slide T 8. Goal Keeping: Collection of Ball, B throwing and deflecting.	-	ing,		
9. Game practice with applicat Regulations.	ion of Rules	and		
A. Rules and their interpretation an	d duties of official	s.		
Hockey: A. Fundamental Skills 1. Passing: Short pass, Longpass, 2. Trapping. 3. Dribbling and Dozing	pushpass, hit			
4. Penalty stroke practice.				
5. Penalty corner practice.				
6. Tackling: Simple Tackling, Slide T		~		
7. Goal Keeping, Ball clearance- kick 8. Game practice with application of		<u> </u>		
Regulations.	indico unu			
B. Rules and their interpretation an	d duties of official	S		
CIE Assessment Pattern (50 Marks – Practical	D –			
CIE to be evaluated every semester end bas		emonstration of Spo	rts and	d Athletics
activities learn <u>t in the semester</u> .	-			7
CIE		Marks		
Participation of student in a	all the modules	10		
Quizzes – 2, each of 7.5 mar		15		
Final presentation / exhibit Participation	tion /	25		

	in competitions/ practical on specific		
	tasks assigned to the students		
	Total	50	
Suggested Lear	ning Resources:		
<b>Reference Boo</b>	ks:		
1. Saha, A.K. Sa	rir Siksher Ritiniti, Rana Publishing House, Kalyani.		
2. Bandopadhy	ay, K. Sarir Siksha Parichay, Classic Publishers, Kolk	ata.	
3. Petipus, et.al	., Athlete's Guide to Career Planning, Human Kinetic	CS.	
4. Dharma, P.N	. Fundamentals of Track and Field, Khel Sahitya Ker	ıdra, New Delhi.	
5. Jain, R. Play a	and Learn Cricket, Khel Sahitya Kendra, New Delhi.		
6. Vivek Thani,	Coaching Cricket, Khel Sahitya Kendra, New Delhi.		
7. Saha, A.K. Sa	rir Siksher Ritiniti, Rana Publishing House, Kalyani.		
8. Bandopadhy	yay, K. Sarir Siksha Parichay, Classic Publishers, Kolk	kata	
9. Naveen Jain,	Play and Learn Basketball, Khel Sahitya Kendra, Ne	w Delhi.	
	Basketball, Discovery Publishing House, New Delhi		
-	n, Teach Yourself Basketball, Sports Publication.		
	Power Pattern Offences for Winning basketball, Par	ker Publishing Co., New Y	/ork.
	lay and Learn Basketball, Khel Sahitya Kendra, New	0	
· · ·	paching Volleyball Successfully, Human Kinetics.		

						YOG	A					
Course	22Y00	G30					CIE M	larks		50		
L:T:P:S	0:0:0:	0					SEE N	larks				
Hrs / Week	2						Total	Mark	S	50	x 4 = 2	00
Credits	00						Exam	Hour	S	02		
Course out	comes:									-		
At the end o	f the cour	se, the s	student	will be a	able to:							
22Y0G30.1	Under	standin	g the or	igin, his	tory, ai	m and	objecti	ves of Y	loga			
22Y0G30.2	Becom	ne famil	iar with	an auth	entic fo	undat	ion of Y	'ogic pi	ractio	ces		
22Y0G30.3	Practio	ce differ	ent Yog	ic meth	ods suc	h as Su	iryanar	naskar	a, Pra	anayama a	and som	e of the Shat
22Y0G30.4				Patanjali			-			-		
Mapping of			-				:					
	P01	P02	P03	P04	P05	P06	P07	P08	PO	9 P010	P011	P012
22Y0G30.1	-	-	-	-	-	3	-	-	-	-	-	1
22Y0G30.2	-	-	-	-	-	3	-	-	-	-	-	1
22Y0G30.3	-	-	-	-	-	3	-	-	-	-	-	1
22Y0G30.4	-	-	-	-	-	3	-	-	-	-	-	1
								1				1
Semester /												
Course				CONT	ENT					COs		HOURS
Code												
3 <sup>rd</sup> 22YOG30	<ol> <li>Sury</li> <li>Differen</li> <li>Sitt</li> <li>Stat</li> <li>Pro</li> </ol>	ntroduc ractices and reg es by pr ception nce betw amaska yanama efits of yanama ing: Pac nding: None line:	ction of for com gulation actition ns of veen yo ara: skar pra skar pra skar 12 of Asan lmasana /rikshar Bhujan	f <b>yogic</b> imon m <b>is:</b> Rule er <b>yoga:</b> gic and ayer and amaskar count,2	practic an to pr s to be Yoga non-yog d its me c trounds cana, Su onasana Shalabl	es for omote follow its gic pra aning, khasar , Ardh nasana	r <b>comm</b> e positiv ved dur miscor ctices. Need, i na akati Cl	non ma ve heal ing yo nceptio mporta	an: th gic ns, ance	22YOG3 1, 22YOG3 2, 22YOG3 3, 22YOG3 4	0. 0.	Total 32 Hrs/ Semester 2 Hrs/week
4 <sup>тн</sup> 22YOG40	Vak 2. Star Has 3. Pro	roduct hati: Ro it types ing: Pas crasana, nding: F stapada ne line: bine line i's Ash	ion and evision of Asar chimott Aakarr Parshva sana Dhanu e: Karna tanga Y	l impor of Kapal nas: tanasan a Dhan Chakras rasana Peedas oga: As	tance o labhati a, Ardha urasana sana, Ur ana, Sar ana, Pra	f: 40stro a Ushtr dhva F vanga mayan	okes/m rasana, Hastoth sana, Cl na	in3rou anasar hakraa	ia, sana	22YOG4 1, 22YOG4 2, 22YOG4 3, 22YOG4 4	0. 0.	Total 32 Hrs/ Semester 2 Hrs/week

	<b>Kapalabhati:</b> Revision of Kapa <b>Brief introduction and impor</b> <b>Different types of Asanas</b> :	-	/min3rounds		
	1. Sitting: Yogamudra in Pac Paschimottanasana, Yoga			22YOG50. 1, 22YOG50.	
5 <sup>тн</sup>	2. Standing: Parivritta Triko Parshvakonasana	-	,	2,	Total 32 Hrs/ Semester
22YOG50	<ol> <li>Prone line: Padangushtha Bhujangasana / Rajakapo</li> </ol>		ma	22YOG50. 3,	2 Hrs/week
	<ol> <li>Supine line: Navasana/No Sarvangasana</li> </ol>		ıktasana,	22Y0G50.	
	Patanjali's Ashtanga Yoga: Pr Pranayama: Ujjayi, Sheetali, Sl	-		4	
	Kapalabhati: Revision of Kapa Brief introduction and impo	labhati – 80 strokes	/min3round		
	<b>Different types of Asanas</b> : 1. Sitting: Bakasana, Hanum			22YOG60. 1,	
6 <sup>тн</sup> 22YOG60	Rajakapotasana 2. Standing: Parivritta Triko Parshvakonasana	nasana, Utkatasana	,	22YOG60. 2,	Total 32 Hrs/ Semester
	<ol> <li>Supine line: Setubandhas</li> <li>Balancing: Sheershasana</li> </ol>		-	22YOG60. 3, 22YOG60.	2 Hrs/week
	Patanjali's AshtangaYoga: Dh Pranayama: Bhastrika, Bhram Shat Kriyas: Jalaneti and sutra	ari, Ujjai		4	
CIE Accocci	nent Pattern (50 Marks – Prac				
CIE to be	e evaluated every semester bas and internal tests (objective ty	sed on practical der	nonstration	of Yogasana	learnt in the
bennebte		CIE	Marks		
	Avg of Test 2	1 and Test 2 ion of Yogasana	25 25		
	Demonstrat	Total	<u> </u>		
<b>Reference</b> 4. Swa 5. Tiw 6. Ajitl	Learning Resources: Books: mi Kuvulyananda: Asma (Kava ari, O P: Asana Why and How cumar: Yoga Pravesha (Kannao mi Satyananda Saraswati: Asa	da)	-	(Bihar Scho	ol of yoga, Munger)
8. Swa 9. Nag 10. Tiru 11. Iyer	mi Satyananda Saraswati: Sur endra H R: The art and science ka: Shatkriyegalu (Kannada) gar B K S: Yoga Pradipika (Kan	ya Namaskar (Biha e of Pranayama nnada)			
	gar B K S: Light on Yoga (Engl nd Video Lectures (e-Resource				

# Web links and Video Lectures (e-Resources): https://youtu.be/KB-TYlgd1wE https://youtu.be/aa-TG0Wg1Ls

## **SEMESTER IV**

Course Code	0017	1011	פות	CKEIE		тема				THEORY		50
LEDC	22M/							CIE M				50
L: T:P:S	2:1:0	:0						SEE M		_		50
Hrs. / Week	4 03							Total				100
Credits				1	1			Exam		S		03
Course outcom										1		
22MAC41.1	-			ting tecl	nnique	es and	comb	inatori	ics by	using the	context of d	iscrete
221440412		ability		:	C T]		. J E	1				
22MAC41.2			-	nciple of								
22MAC41.3 22MAC41.4		<u> </u>		e princi						function		
22MAC41.4 22MAC41.5										function		
											echniques.	tables.
22MAC41.6		0	<u> </u>		<u> </u>	•		na pre	aicate	logic and	l from truth	tables.
Mapping of Co		PO2		PO4			PO7	DOO	DOO	DO10	D011	D012
22MAC41.1	3	3	PU3	P04	P05	P06		P08	P09	P010	P011	P012
22MAC41.1 22MAC41.2	3	3	-	-	-	-	-	-	-	-	-	-
	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.3 22MAC41.4	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.4 22MAC41.5	3	3		-	-	-	-	-	-	-	-	-
22MAC41.5 22MAC41.6	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.0	5	3	-	-	-	-	-	-	-	-	-	-
MODULE-1	MAT	UEMA	TICA	L LOGIO						21	2MAC41.1	8 Hours
						ດນັ່ງກ	d Con	tradic	tion I			he Laws of Logi
Converse, Inve											iivalence, i	lie Laws of Logi
Case Study				oles of l								
Text Book	1			2.2, 2.3	<u> </u>	i speci	incatic		Jiiput			
MODULE-2	1		-	COUNT						2	2MAC41.2	8 Hours
						imher	s and I	Rell Ni	ımher			clusion and Exclusion
												dden Positions.
Text Book				, 8.1, 8.2								
MODULE-3				D FUN						2	2MAC41.3	8 Hours
Cartesian Prod	ucts an	d Rela	tions,	One-to-	-One a	nd on	to fun	ctions.	The P	igeon hol	e Principle,	
Composition ar										•	-	
Text Book				, 5.2, 5.3								
MODULE-4		PH TH								2	2MAC41.4	8 Hours
Graphs-Definiti	ons ar	ıd exa	ample	s, Sub	graph	s, Wa	lks, Pa	aths, (	Circuit	s, Conne	ctedness, C	omponents, grap
isomorphism, E	luler gr	aphs,	Hami	ltonian	paths	and cy	vcles.					
Case Study	Case :	studie	s on N	letwork	Analy	vsis.						
Text Book									: 2.1, 2			2.7, 2.8, 2.9.
MODULE-5	TREF	ES, CO	NNE	CTIVIT	Y AND	) PLA	NARI	ГY			2MAC41.5	8 Hours
											2MAC41.6	
					-	-		0		-		
-		Netwo		ws: Kru	skaľs	algori	thm, F	lanar	graph	s, Dual of	planar grap	hs, Different
Fundamental ci					. 1	A 1						
Fundamental circle	of a pla	anar g	-			t Analı	ysis.					
Fundamental circle	of a pla Case s	anar g studie	s on S	ocial Ne								
Trees, Properti Fundamental ci representation Case Study Text Book	of a pla Case s	anar g studie	s on S				13.2, 7	Cext B	ook 2:	3.1, 3.5,	3.7, 4.1, 4.2	, 4.3, 4.4, 4.5
Fundamental c	of a pla Case s Text	anar g studie	es on S 1: 11.				13.2, 7	Text B	ook 2:	3.1, 3.5,	3.7, 4.1, 4.2	, 4.3, 4.4, 4.5, 4
Fundamental c representation Case Study	of a pla Case s Text	anar g studie Book	es on S 1: 11.				13.2, 7	Text B	ook 2:	3.1, 3.5,	3.7, 4.1, 4.2	, 4.3, 4.4, 4.5, 4.

	ssessment Pattern	·		tion	7
	RBT Levels	Test (s) 25	Iarks Distrib Qualitative Assessmen (s) 15	e MCQ's	-
L1	Remember	5	5		_
2	Understand	5	5		-
3	Apply	10	5	10	-
4	Analyze	2.5	-	-	_
5	Evaluate	2.5	-	-	_
5	Create	-	-	-	_
ΕA	Assessment Pattern	(50 Marks	s – Theory)		
	RBT Levels	Exam Distribu	Marks tion (50)		
$\frac{L1}{L2}$	Remember				
L2	Understand		LO 20		
L <u>3</u> L4	Apply		5		
. <u>4</u> .5	Analyze Evaluate		5 5		
.5 .6	Create		5		
Ba Un Ke Th D.S Th Th ISE	iversities Press, 201 nneth H. Rosen, Disc eory, McGraw Hill Ec S. Malik and M.K. Sen omson, 2004. ISBN:	6, ISBN: 97 rete Mathe lucation, Se , Discrete M 978061921 e Mathema	88173719998 matics and its eventh Edition Iathematical S .2858. tics with Appli	Applications , 2017, ISBN: ' tructures: The	matics – A Concept based ap with Combinatorics and Gra 9780070681880. eory and Applications, rier, First Edition 2005,
)http )http )http )http )http )http )http )http )http	os://youtu.be/04Qf os://youtu.be/Hbyjo os://youtu.be/7hLv os://youtu.be/7hLv os://youtu.be/6Z_ed os://youtu.be/fwSi7 os://youtu.be/iHC11 os://youtu.be/auvG os://youtu.be/auvG ps://youtu.be/GLHV ps://youtu.be/hrur ps://youtu.be/sWs	OSQKkZw? 6vEi7fY?si: m_4DNqs? m_4DNqs? engdMVE?s FaCs8KM?s ZdLdKjw?s QCoYdu4? Vih_RB38? nNRQwTV	si=1r9joVe2- =_GaCjUHBNd si=viYHH_fZD si=viYHH_fZD si=-ZlPy2xl18 si=wpZcCEG-p si=tuN-6pLqhl si=3ELSyG5g- si=FuoNQAzN 8?si=8o3hB11	V2MArP ZQ9Fmdw ZQ9Fmdw oMUwfR oNDuIPkS MWPN4Mb 475AN1_ IR2IIYpU0 3bFD-MCNXS	3

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

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming Codes
  - Organizing Group wise discussions on related topics
  - > Seminars

				]	DATA E	BASE N	/IANA(	GEMEN'	T SYS	ТЕМ				
<b>Course Code</b>	22	AIM	42							<b>/</b> larks		50		
L: T:P:S	3:0	:0:0							SEE I	Marks		50		
Hrs/Week	3								Tota	l Marl	KS	10	0	
Credits	03									n Hou		03	-	
Course outco		• At t	he end	lofth	e course	thes	tuden	t will be				00		
								nageme						
22AIM42.2	Desig	n El	R Diag	am fo	- r the va	rious	real-w	orld dat	a has	<b>ב</b>				
											II (Data	Maninul	ation I	anguage),
		(Data									Language			
	enha	nce t	he pre	ecision	and str	uctur	e of da	tabases			ormaliza		-	
	syste	ms.												database
22AIM42.6	Char	actei	rise dif	ferent	high-le	vel da	tabase	es and th	ie sele	ection	of the rig	ht datab	oase.	
Mapping of	Cour	se O	utcon	nes to	Progr	am O	utcom	es and	Prog	ram S	Specific	Outcon	ies:	
11 0	P01		-	P04	Ū	P06	-	P08		PO1 0	P011	P012	PS01	PSO2
22AIM42.1	2	-	-	-	-	-	-	_	-	-	-	-	3	2
22AIM42.2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
22AIM42.3	2	2	-	-	-	-	-	-	-	-	-	-	3	2
22AIM42.4	3	3	3		3		_	_		_	_	3	3	2
22AIM42.5	2	2	2	2	3						_	3	3	2
22AIM42.6	3	3	3	3	3		_			-	-	3	3	2
MODULE-1	5	_	0	-	TION T	- חאת ר	-	- -		- 22ΔΙΝ	 /142.1, 22	-	-	lours
Definition of when not to Abstraction; Designer- Da Types, Attrib Diagrams, Na Case Study	use a Thre tabas utes a ming	DBI e-sch e Ad and I Con	MS Dat nema dminis Keys; I ventio ct an I	tabase archite trator Relatic ns and E-R dia	Concep ecture - Datab onship t Design gram fo	ot and and d base U ypes, Issue or hos	Archi ata in sers. Roles s; Red pital m	tecture depend Introdu and Stru uction c	: Data lence; ction uctura of an E nent d	model Comp to En Il Cons <u>-R sch</u> atabas	ls, schem ponents tity-Rela straints;	as and i of a DI tionship Weak Ei elational	instanc 3MS- D Model ntity Ty Tables	es; Data atabase : Entity pes; ER
Text Book								book 2:	3.3-3.	1				
MODULE-2					ND REL						M42.1, 22			Hours
Domains, Attr SQL1: Overvi Enforcing bas NOT; Additio	ew of sic con n bas	SQL nstra ic op	langu ints in eratio	age; S( 1 SQL; ns; Set	)L Data Basic st operati	Defini ructur ons; A	ition a e of S( ggrega	nd Data QL quer ate func	Type: ies Joi tion	s; Sche ns; Lo	ema chan gical con	ge state nectives	ments i -AND, (	n SQL; DR and
Case Study	doo the and	tors hos l pat	in the pital, th ients d	hospi ne che lischar	tal. It al ck up of ged fro	lso ma patier	intain 1ts dor	s record ne by the	ls of t	he reg	ular pati	ents, pa	tients a	rooms, and dmitted ir 1 operated
Text Book					4.1-4.5								_ I _	
MODULE-3			ED SQ								/142.1, 22			Hours
Introduction			-				-	ries; Int	roduc	tion to	o Views: o	creation	, impler	nentation,
update of view														
Case														aling with
Study/Applica						-		-	-			-		
ion								-	-			-		ployee. A
	dep	bartn	nent m	lay pai	ticipate	e in no	ne/on	e/many	v proje	ects. At	least on	e depart	ment p	articipates
														ms consis

	of at least o	ne member.			
Text B	Book Text Book	l: Ch-4.2,5.3,5.4			
MODI	ULE-4 DATABASE	<b>DESIGN AND IN</b>	<b>IDEX STRUCTURES</b> 22AIM42.4,	22AIM42.5	8 Hours
			index; multi-level indexing; Hash Ba		
			it: Informal Design Guidelines for Re		
	-	ion on Relationa	ll Data Base:1NF, 2NF, 3NF, BCNF; T	ransaction Mana	agement: Th
ACID I Text B	Properties.	). Ch 15 1 15 7	10 1 10 5		
		2: Ch 15.1-15.7 ,1		IM42.6	8 Hours
	ULE-5 INTRODUCT				
	÷	-	Features OF NO SQL, CAP Th pes of NOSQL: Key-Value database-		•
			ase? Introduction to Cassandra: A		
			level and write process, read consis		
	tion, indexing, Tomb				
ase St		DynamoDB			
Гext В	Book Text Book	3:Ch 1.1,1.2, 2.1	-2.4,8.1,8.2,9.1,9.2,10.1,10.2 Textbo	ok 4: Ch 1,2	
IE Ass	sessment Pattern (5	0 Marks – The	ory)		
			<b>Marks Distribution</b>		
	RBT Levels	Test (s) (25)	Qualitative Assessment (s) (15)	MCQ's (10	))
L1	Remember	5	-	5	
L2	Understand	5	-	5	
L3	Apply	10	5		
L4	Analyze	5	10	-	
L5	Evaluate	-	-	-	
<u>L6</u>	Create	-	-	-	
	ssments are to be sel ssessment Pattern		ssessment list attached to Appendi	x A.	
JEE A		•	s Distribution (50)		
L1	RBTLevels Remember		10		
	Understand		10		
L2 L3	Apply		20		
L4	Analyze		10		
L5	Evaluate		-		
L6	Create		-		
	ested Learning Reso	urces:			
ext B					
1. A	braham Silberschatz	, Henry F. Korth	, S. Sudarshan," Database System C	oncepts", 6th Ed	ition, McGra
	Iill,2011. ISBN: 978-0				
2. R	amez Elmasri and Sl	namkant B. Nava	the: Fundamentals of Database Syst	ems, 6th Edition	n, Pearson,
	016. ISBN: 978-0136				
			e, Pearson Education, November 20		321826626.
			d edition, Nishant Neeraj, Packt pub	lishing, 2015.	
	SBN:978178439261	L			
	<b>nce Books:</b> Shannes Gehrke Rag	hu Ramabrichn	an, Database Management Systems 3	Rrd Edition McC	raw Hill
	cation,2014. ISBN: 9'		in, Database Management systems		1010 1111
	inks and Video Leo		irces):		
•		•	PLyqSpQzTE6M-xymXgqewlzcC3U4	lcdRoSu&si=I I≏	ktfE889cRb
•	1		=OR6Yv6SOVafWm74U		

- https://youtu.be/5TU7zH0Z8ps?si=QR6Yy6SQVqfWm74U
- https://youtu.be/o-PAdq64rk8?si=qaIId3P75507HLvG
- https://youtu.be/lyTPtoBfs9I?si=bPuQnOGDlOM6JTZJ

- https://youtu.be/aUPVpIYiLCc?si=dSdsnx9cWUkdEHKM
- https://youtu.be/s1xc1HVsRk0?si=tckBELRr00zjJhWL

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

- Video demonstration of latest trends in Database Technology
- Contents related activities (Activity-based discussions)
  - > For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Group wise discussions on issues

				D	ATAF	BASE N	IANA	GEMEN	T SY	STEM L	AB				
Course Code	e 2	22AIL	.42							Marks	112	50			
L: T:P:S		0:0:1:								Marks		50			
Hrs/Week		2							Tota	alMarks	5	10	0		
Credits	(	01							Exa	nHours	5	03			
Course outc	ome	es: At t	the e	nd of t	he cou	urse, tł	ie stu	lent w	ill be a	ableto:					
22AIL42.1	App	oly dat	ta ba	se mai	nagem	ient te	chniqu	ies to s	solve t	he real-	world p	oroblem	1		
22AIL42.2	Des	ign a	data	base f	or the	given	proble	em							
22AIL42.3						ne give									
22AIL42.4		duct o outpu			ts as ir	ndividı	ual/te	am by	using	My SQL	/Oracle	and pr	epare a	a rep	oort based
Mapping of	Cou	rse C	Jutco	mes											
		P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012			PSO2
22AIL42.1	3	-	-	-	-	-	-	-	-	-	-	-	3		2
22AIL42.2	3	3	3	-	-	-	-	-	-	-	-	-	3		2
22AIL42.3	3	3	3	-	-	-	-	-	-	-	-	-	3		2
22AIL42.4	3	3	3	3	3	-	-	-	2	2	-	-	3		2
Exp. No.								Progra				Hour	S		COs
				Pre	e-requ	isite l	xper	ment	s/ Pro	grams	/ Demo		r		
DrawE-I scenaric bank, co	o. Tw	o assi					edouti	.e. con	sider					2	22AIL42.1 22AIL42.2 22AIL42.3 22AIL42.4
							P	ART-A							
1 Write rela Viewing a Creating Inserting Saving (C	all da Tabl /Upo omn	itabas es (W lating nit) ar	es, C ith ai /Del id Un	reating ndWit eting t idoing	g a Da h outC ables (rollb	lonstra recorc	ints),	C	Table	s in a Da	atabase	,		2	22AIL42.1 22AIL42.2 22AIL42.3 22AIL42.4 22AIL42.1
Altering a Backingu	a Tab	ole, Dr	oppi	ng/Tr	uncati	ng/Re	namir	ıgTable	es,					2	22AIL42.2 22AIL42.3 22AIL42.4
ii. Find t Students iii. Find same tim	Γ (sn ame: ring ′ (fid orwa s en : Jun follo he na he n che n enro the e. the	um: in strin ) : inte rd; fo: rolled ior: JF owing ames ames olled. name	ntege g, me ger, s r exa l in t Retc) g quer of all of all s of a s of f	r, snar eetsat: fname mple, theclas ries in Junion classe ill stud	ne: str time, : strin Enroll ss. Lev SQL. N rs(leve es that lents v meml	ring, m room: ng, dep ed has vel is No dup el=JR) t either who ar oers w	ajor: : string tid: ir onero a two licate: who a r meet e enro ho tea	string, g, fid: in teger) ecord p -chara s shoul re enro in roo illed in ch in e	level: nteger The per stu cter c d be p blled i m R12 two c very r	string, a ) ENRO meaning ident-cl ode wit orinted i n a class 28 or ha lasses t	LLED (s gof thes ass pain th 4 dif an any o s taught we five hat mee which s	snum: in se relati such th fferent f the an by Prop or more et at the some cla	ions is nat the values swers f. ABC		22AIL42.1 22AIL42.2 22AIL42.3 22AIL42.4

		1	1
	Demonstrate how you increase the price of books published by a specific publisher by10%. PART-B		
	iv. Find the author of the book which has maximum sales.		
	publication is after 2000.		
	the books is greater than the average price of the books in the catalog and the year of		
	iii. Give the details of the authors who have 2 or more books in the catalog and the price of		
	i. Create the above tables by properly specifying the primary keys and the foreign keys. ii. Enter at least five tuples for each relation.		
	ORDER-DETAILS (order_no:int, book_id:int, quantity:int)		22AIL42.4
	CATEGORY (category_id:int, description: string)		22AIL42.3
	(book_id:int, title: string, author_id:int, publisher_id:int, category_id:int, year:int, price:int)		22AIL42.2
5		2	22AIL42.1
_	AUTHOR (author_id: int, name: string, city: string, country:string)		
	The following tables are maintained by abook dealer:		
	in the ORDER_ITEM table.		<u> </u>
	v. Demonstrate how you delete item# 10 from the ITEM table and make that field null		
	company has in a specific city.		
	iv. List the order # for orders that were shipped from all warehouses that the		
	amount for that customer.		
	is the total numbers of orders by the customer and the last column is the average order		22AIL42.4
	,,, _,	2	22AIL42.3
	Enterat least five tuples for each relation.	2	22AIL42.2
	keysand the foreignkeys.		22AIL42.1
	i. Create the above tables by properly specifying the primary keys and the foreign		00.477.15
	city: String) SHIPMENT (order#:int, warehouse #: int,ship-date:date)		
	ORDER-ITEM (order #: int, item #: int, qty: int) WAREHOUSE (warehouse #: int,		
	date, cust #: int, ord-Amt: int) ITEM (item#:int, unit-price: int)		
	CUSTOMER (CUST #: int, cname: String, city: String) ORDER (order #: int, odate:		
	company. CUSTOMER (CUST #, int. gramo, String, gity, String) ORDER (order #, int. odato)		
	Consider the following relations for an Order Processing database application in a		
	Find the names of pilots certified for some Boeing aircraft.		
	average salary of all pilots certified for thisaircraft. Find the names of pilots certified for some Boeing aircraft		
	iv. For all aircraft with cruising range over 1000 Kms, find the nameof the aircraft and the		
	thecheapestroutefromBengaluru to Frankfurt.		
	iii. Find the names of pilots whose salary is less than the price of		
	cruising range of the aircraft for which she or he is certified.		22AIL42.4
	ii. For each pilot who is certified for more than three aircrafts, find the eid and the maximum		22AIL42.
	than Rs.80,000.	2	22AIL42.3
	i. Find the names of aircraft such that all pilots certified to operate them have salariesmore		22AIL42.
	followingqueries in SOI		22AIL42.1
	pilot is certified for some aircraft, and onlypilotsare certified tofly. Write each of the		
	Note that the Employees relation describes pilots and other kinds of employees as well; Every		
	EMPLOYEE (eid: integer, ename: string, salary: integer)		
	AIRCRAFT (aid: integer, aname: string, cruising range: integer) CERTIFIED (eid: integer, aid: integer)		
	price: integer)		
	FLIGHTS (flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time,		

	Consider the following da	atabase of student er	rollment in courses and books adopted for		
	each course.				
	STUDENT (regno:String,ı	name:String,major:St	tring,bdate:date) COURSE(course #:int,		
	cname:String,dept:String	), ENROLL (regno: St	tring, course #: int, sem: int, marks: int)		
			ok-ISBN: int), TEXT(book-ISBN:int, book-		
	title:String, publisher:Str				
			ing the primary keys and the foreign keys.		
	Enterat least five tuples f				22AIL42.1
			to the database and make this book be	2	22AIL42.2
	adopted by some departr			2	22AIL42.3
			se #, Book-ISBN, Book-title) in the alphabetica	1	22AIL42.4
		-	ment that use more than two books.	1	
			d books published by a specific publisher.		
			FOR (Act_id, Act_Name, Act_Gender),		
			OVIES (Mov_id, Mov_Title, Mov_Year,		
	_ 0 ,	LASI (Act_10, MOV_	id, Role), RATING(Mov_id, Rev_Stars)		
	Write SQL queries to				
	i. List the titles of all mov	5			
			actors acted in two or more movies.		22AIL42.1
		ed in a movie before	2000 and in a movie after 2015 (use JOIN		22AIL42.1 22AIL42.2
	operation).			2	22AIL42.2 22AIL42.3
			rs for each movie that has at least one rating		22AIL42.3 22AIL42.4
	and find the highest num	ber of stars that mov	vie received. Sort the result by movie title.		ZZAIL42.4
	v. Update rating of all mo				
	Queries using aggregate fu	nctions (COUNT,AV	G,MIN,MAX,SUM),Group by,Orderby.		22AIL42.1
9	Employee(E_id, E_name, .	Age, Salary)		2	22AIL42.2
	1. Create Employee table c	containing all Records	E_id, E_name, Age, Salary.		22AIL42.3
	2. Count number of emplo	yee names from emple	oyee table		22AIL42.4
	3. Find the Maximum age	from employee table.			
	4. Find the Minimum age f	from employee table.			
	5. Find salaries of employe	e in Ascending Order	r.		
	6. Find grouped salaries of	employees			
10	Create a table and perform	the search operation	on table using indexing		22AIL42.1
	and non-indexing techniqu	_		2	22AIL42.2
	and non-indexing teeningu				22AIL42.3
					22AIL42.4
11	Design and develop Mong	oDB queries to imple	ment the CRUD operations		22AIL42.1
11	besign and develop mong	obb queries to imple	ment the error operations	2	22AIL42.2
				Ĺ	22AIL42.3
					22AIL42.4
12	Implement aggregation a	nd indexing using M	ongoDB	+	22AIL42.1
14	imprement aggi egation a	na maching using M	ou <sup>2</sup> 0DD	2	22AIL42.1 22AIL42.2
1				2	22AIL42.2 22AIL42.3
1					22AIL42.3 22AIL42.4
					<u>2271172.4</u>
		PART-C (Royand	Sullahus Virtual I ah Contont)		
	DDI Concon		Syllabus Virtual Lab Content) in /ylab /DBMS /Views Simulator html		
		ts:https://vsit.edu	.in/vlab/DBMS/Views_Simulator.html		
	E-R Modelin	ts: <b>https://vsit.edu</b> g: <b>http://vlabs.iitk</b>	.in/vlab/DBMS/Views_Simulator.html gp.ernet.in/se/4/theory/		
	E-R Modelin http://vlab	ts:https://vsit.edu g: http://vlabs.iitk ps.iitkgp.ernet.in/s	.in/vlab/DBMS/Views_Simulator.html gp.ernet.in/se/4/theory/		
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L5	Evaluate		
L6	Create	-	
EE As	sessment Pattern	(50 Marks-Lab)	
	RBTLevels	Exam Marks Distribution (50)	
L1	Remember	-	
L2	Understand	10	
L3	Apply	20	
L4	Analyze	20	
L5	Evaluate	-	
L6	Create		

**ReferenceBooks**:

1. Ramez Elmasri and Shamkant B.Navathe: Fundamentals of DatabaseSystems,7thEdition, Pearson,2016. ISBN: 978-0133970777

2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, "Database System Concepts", 6th Edition, McGrawHill, 2011. ISBN: 9781260084504

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Text Book		Text B						0			5			
<b>MODULE-2</b>	2	DIVID	E Al	ND CC	NQU	ER					22AIM	43.2	8	Hours
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# MODULE-5BACKTRACKING, BRANCH AND BOUND22AIM43.5,22AIM43.68 Hours

**Backtracking:** Introduction, N Queens problem, subset sum problem, **Branch and Bound:** Introduction, Travelling Salesman problem, Knapsack problem, Assignment problem, NP-Hard and NP-Complete problems: Basic concepts, non- deterministic algorithms.

Text Book Text Book 1: 12.1,12.2,12.3

## CIE Assessment Pattern (50 Marks - Theory)

			<b>Marks Distribution</b>	
	<b>RBT Levels</b>	Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	5	-	5
L2	Understand	5	-	5
L3	Apply	10	5	
L4	Analyze	5	10	-
L5	Evaluate	-	-	-
L6	Create	-	-	-

## \*Assessments are to be selected from the assessment list attached to **Appendix A**.

SEE A	ssessment Pattern	(50 Marks – Theory)
	<b>RBT Levels</b>	Exam Marks
	RDT LEVEIS	Distribution
		(50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	10
L5	Evaluate	-
L6	Create	

## Suggested Learning Resources:

## **Text Books:**

1. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 3<sup>rd</sup> Edition, PEARSON Education, 2012. ISBN: 978-9332585485

## **ReferenceBook:**

1. Thomas H Cormen, Charles E Leiserson, Ronald R Rivest & Clifford Stein, "Introduction to Algorithms", 3rd Edition, Eastern Economy Edition, 2009. ISBN: 9780262033848,

Web links and Video Lectures (e-Resources):

- 1. https://youtu.be/gY0MwGLq9W8
- 2. https://onlinecourses.nptel.ac.in/noc19\_cs47/preview

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

- Assign coding challenges or mini-projects that require students to apply programming concepts to real coding problems.
- Creating simple apps, design, and problem-solving skills.

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·	7	a knapsack w	ith a limited	l weight ca	pacity. Cho	e items to carry in oses the maximum	2	22AIL43.2 22AIL43.3
		number of no knapsack Gre		•	es from a set	t of activities using		
:	8					een two vertices in and computing the	2	22AIL43.2 22AIL43.3
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(	9					s, distribution of and find the time	2	22AIL43.2 22AIL43.3
		complexity us	ing Warsha	ll's Algoritl	ım.			
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		comes before			•	5		22AIL+3.5
1	11	•	-			a subset of a given	2	22AIL43.3
				-	0	e SUM is equal to a $5.6$ S and d = 0	2	22AIL43.4
						, 5, 6, 8} and d= 9, Display a suitable		
						ave a solution.		
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## Suggested Learning Resources: ReferenceBooks:

1.Thomas H Cormen, Charles E Leiserson, Ronald R Rivest & Clifford Stein, "Introduction to Algorithms", 3rd Edition, EasternEconomyEdition,2009. ISBN: 9780262033848,

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MODULE-3	]	DAT		<b>CLE</b> A	ANINO		AND	FEAT			22AIM 22AIM			8 Hours
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L2	Un	derstand		10				
L3	Ар	ply		20				
L4	An	alyze		10				
LT				10				

#### **Text Books:**

Create

L6

- 1) Jason Brownlee, "Data Preparation for Machine Learning" 2020.
- 2) RoxyPeck, Chris Olsen and Jay Devore, "Introduction to Statistics & Data Analysis "3<sup>rd</sup> Edition Thomson Higher Education,2015. ISBN: 1305445961, 9781305445963

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## **ReferenceBooks:**

- 1) Andrew Park, "DataScience For Beginners", 2021. ISBN: 9781914167997
- 2) Nitish Vig, "Statistics101" by David Borman,2018.
- 3) Norman Matloff, "Probability and Statistics for Data Science", CRC Press, 2019. ISBN: 9780429687112

### Weblinks and Video Lectures(e-Resources):

- 1) Data Science for Engineers: https://digimat.in/nptel/courses/video/106106179/L01.html
- 2) Statistics for DataScience: https://www.youtube.com/watch?v=V5fqShLVpoI

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4	<ul> <li>Perform the following methods in order to remove outliers</li> <li>a. Standard Deviation Method</li> <li>b. Interquartile Range Method</li> <li>c. Automatic outlier Detection</li> </ul>	2		22AIL44.1 22AIL44.2 22AIL44.3 22AIL44.4
	<ul> <li>Create a statistics_metrics.csv dataset with columns quarter, revenue, expenses and profit, and perform the following tasks:</li> <li>a. Identify and remove outliers using both the Standard Deviation method and the Interquartile Range (IQR) method.</li> <li>b. Compare the datasets before and after outlier removal using box plots and scatter plots.</li> </ul>			
5	Implement the program to avoid Data leakage with Naïve Data preparation. Select an appropriate data set for your experiment and validate the results	2		22AIL44.1 22AIL44.2 22AIL44.3 22AIL44.4
6	<ul> <li>Apply the following on for a given set of training data examples stored in a .CSV file</li> <li>Find the correlation matrix.</li> <li>a. Plot the correlation plot on dataset and visualize giving an overviewof relationships among data.</li> <li>b. Interpret the correlation matrix and identify any strong correlations between features and housing prices.</li> <li>c. Perform ANOVA to compare the means of the numerical features across different neighborhoods or zones in Boston</li> </ul>	2		22AIL44.1 22AIL44.2 22AIL44.3 22AIL44.4
7.	IntroductionImplement the following for a given set of training data examplesstored in a .CSV filea. Load data setb. Convert into Dataframec. Apply Scaler metd. Fit the Scaler Data into PCAe. Plot the visualization diagram forEvaluate the Dimensionality Reduction:a. Compare the performance of a machine learning algorithm (e.g.regression or k-nearest neighbors) on the original dataset versus thedimensional dataset using cross-validation or another suitable eventmetric.	PCA , logistic reduced-		22AIL44.7 22AIL44.2 22AIL44.3 22AIL44.4
8	For a given set of training data examples stored in a .CSV file a. Statistical Imputation b. KNN Imputation a. Iterative Imputation		2	22AIL44.1 22AIL44.2 22AIL44.3 22AIL44.4
9	<ul> <li>Implement the following Encoding methods for a given set of training d</li> <li>a. Ordinal Encoding</li> <li>b. One Hot Encoding</li> <li>c. Dummy Variable Encoding</li> </ul>	ata:	2	22AIL44.1 22AIL44.2 22AIL44.2 22AIL44.3 22AIL44.4
10	Implement the following Transform methods on a numerical dataset: Uniform Discretization Transform		2	22AIL44.2 22AIL44.2 22AIL44.3
11	Implement the following Transform methods on a numerical dataset: K Discretization Transform	C-Means	2	22AIL44.4 22AIL44.2 22AIL44.2 22AIL44.3

12	Write a program regression for give	-	y classification, Multi-classification and	2	22AIL44.1 22AIL44.2
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L5 L6	Create				
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L1	Remember		-		
L2	Understand		10		
L3	Apply		10		
L4	Analyze		20		
L5	Evaluate		10		

# Suggested Learning Resources: Textbooks:

1)Yanchang Zhao, "R and DataMining:Examples and CaseStudies", Elsevier, 1stEdition, 2012, ISBN: 9780123972712

## **Reference Books:**

1) Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers,2016. ISBN: 9780123814807

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

- Video demonstration of latest trends in Programming
- Contents related activities (Activity-baseddiscussions)
  - For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - > Organizing Groupwise discussions on issues
  - ➤ Seminars

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22AIM452.4	3	3	3	-	-	-	-	-	-	-	-	-	3	3
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Laboi	ratory Co	mponent:					3 Hours
			enerates an XML	document con	taining informatic	on about	
bo	oks, inclu	ding titles, a	uthors, and publ	lication years. S	Save this XML data	ı to a file	
2. W	rite a prog	ram to pars	se and display sp	ecific book deta	ails from the XML	file.	
		•	-		, such as a weathe	er forecast	
se	rvice or a	currency co	nversion service	·.			
MODU	JLE-4	Files and	Streams	22AIM4 2.4	52.2,22AIM452.3,7	22AIM45	6 Hours
Files a	and Stream	ns -Inspecti	ng Directories a	nd Files-Exami	ning Directories -	Manipula	ting File Paths -
					e Information-Cre		
					d Modifying Perm		
				Datawith Strea	ams-Reading, Writ	ting, and L	ocking Files
Text B		Text Book					1
		omponent					3 Hours
			eve data from the	e web service a	nd display it in a u	iser-	
	endly forn			· <b>c</b> · · · · · · · · · · · · ·			
			reate a file ,mod		ons.		
<u>3.</u> W MODI			tify the path in I		52.4,22AIM452.5,		6 Hours
ΜΟΠ	175-2	Windows	гогтя	22AIM4 22AIM4			οπούμες
Creati	ng a Wah	Annlingtion	Data Dinding M			oh onnlige	tiona Codo
					- ASP.NET and We		
		ung contro	is-server contro	is-Data Binding	g-Examining the C	oue-Addin	ig controls and
Events	S						
	N 1	Treat Deals	2 Ch 21 22				
			: 2: Ch-21,22				-
Laboi	ratory Co	mponent:					3 Hours
1. De	r <b>atory Co</b> esign a we	<b>mponent:</b> b form with		employ data bi	nding to display d	lynamic	3 Hours
Labor 1. De co	r <b>atory Co</b> esign a wel ntent usin	<b>mponent:</b> b form with g ASP.Net.	server controls,		<b>.</b>	-	3 Hours
Labor 1. De co 2. W	r <b>atory Co</b> esign a we ntent usin rite a code	<b>mponent:</b> b form with g ASP.Net. e-behind log	server controls, tic to handle user	interactions a	nd events using AS	SP.Net.	3 Hours
Laboi 1. De co 2. W 3. De	ratory Co esign a wel ntent usin rite a code esign a gra	<b>mponent:</b> b form with g ASP.Net. behind log phical user	server controls, ic to handle user interface, impler	interactions a nent data bindi	<b>.</b>	SP.Net.	3 Hours
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Labor 1. De co 2. W 3. De	ratory Co esign a we ntent usin rite a code esign a gra ssessmen	<b>mponent:</b> b form with g ASP.Net. behind log phical user	server controls, ic to handle user interface, impler	interactions a nent data bindi <b>ry and Lab)</b>	nd events using AS	SP.Net. oulation	
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#### **ReferenceBooks:**

1.Roger Villela Pro .NET Frame work with the Base Class Library Apress, First Edition, 2019. ISBN: 9781484241912

## Weblinks andVideo Lectures(e-Resources):

- 1. www.nlp.stanford.edu/IR-book/html/htmledition/irbook.html
- 2. www.text-analytics101.rxnlp.com/2014/11/what-are-n-grams.html
- 3. www.nptel.ac.in/courses/106105084/
- 4. www.nitttrchd.ac.in/sitenew1/nctel/ppt/CS0.ppt
- 5. www.pragimtech.com/c-sharp-video-tutorials.aspx

## Activity-Based Learning (SuggestedActivitiesinClass)/PracticalBasedlearning

- Contents related activities (Activity-baseddiscussions)
  - > For active participation of students, instruct the students to prepare web-based projects
  - > Organizing Group wise discussions on issues
  - ➤ Seminars

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Sug	geste	ed Learning F	Resources:				
Т	extBo	oks:					
1) S	Norn	nan Matloff, T	'he Art of H	R Programming, U	CDavis, 2009. ISBI	N: 978-1593273	842
2) R	Prog	ramming for	Data Scien	ice, Roger DPeng, I	Lean Publication, 2	2016. ISBN: 978	-1365056826
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MODULE-3	Exceptions and Database in python	22AIM454.3 22AIM454.4	6 hours
	thon: Using SQL with python, retrieving rows from a table,		
	om a table, updating rows in a table, creating database table	es through pyt	hon, Exception
handling in data	bases.		
	ython: Errors in a python program, compile&run-time error		
-	ling, types of exceptions, the except block, the assert state	ement, user-de	ennea exceptions,
logging the exce Laboratory Cor	·		3 Hours
-	on Program to work with databases in Python to perform of	perations	5 110015
such as	in rogram to work with databases in rythom to perform of		
Connecting to da	atabase		
•	opping tables Inserting and updating into tables.		
	n Program to demonstrate differently pes of exception han	ding.	
Text Book	Text Book1:15	8.	
	<b>Networking:</b> Protocols, server-client architecture, tcp/ip	22AIM454.4	6 Hours
	and udp communication Graphical user interface:	22AIM454.6	0 110 115
	Creating a GUI in python, Widget classes, Working with		
	Fonts and Colors, working with Frames, Layout manager,		
	Event handling <b>OOPs in python:</b> Features of Object-		
	Oriented Programming system(oops) – classes and		
	objects, encapsulation, abstraction inheritance,		
	polymorphism, constructors and destructors.		
LaboratoryC			3 Hours
-	Program in Python to design application that demonstrates	Different	
fonts and col	· · · · · ·		
	out Managers and Event Handling		
-	on program to create server-client and exchange basic info	mation	
	a program for constructors and desstructors concepts	mation.	
	Handle socket-related exceptions and errors effectively to	nrevent crashe	es and improve the
	application's robustness.		
Text Book	TextBook1:13 Textbook3:13		
MODULE-5	Object Oriented Concepts in Python	22AIM454.5	6 Hours
	jects: Creating a class, the self-variable, types of variables	namesnaces	types of methods
	ls, class methods, static methods, passing members of one cl	-	
	<b>id polymorphism:</b> Inheritance in python, types of i		
	tance, hierarchical inheritance, multiple inheritance, constr		
	ructors and methods, the super () method, method resolut		
	rator overloading, method overloading, method overriding		
	ostract method, Interfaces in python, abstract classes vs. Int		
LaboratoryCo			3 Hours
	am to Python program to implement concepts of OOP such	as	
a. Types of M			
b. Inheritanc	e		
c. Polymorph	nism		
	am to Python program to implement concepts of OOP such	as	
	ethods and classes		
b. Interfaces			
3. write a prog	ram for inner class using Python.		

CaseStu	CaseStudy Design the system using OOP principles to create modular, maintainable, and extensiblecode. Create classes for data collection, strategy implementation, risk management, trade execution, and portfolio management.												
Text Bo	ok	Text Book1:13											
<b>CIE Ass</b>	essment Pat	tern (50Marks	s– Theory and	Lab)									
	RBTLev s	el	Test(s) (25)	Assessment (s) * (5)	Lab 20 marks								
L1	Remembe	er	5	-									
L2	Understa	nd	5	-									
L3	Apply		5	5	10	7							
L4	Analyze		5	-	10	1							
L5	Evaluate		-	-		7							

#### \*Assessments are to be selected from the assessment list attached to **Appendix A**.

#### SEE Assessment Pattern (50Marks- Theory)

	RBTLevels	Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	

#### Suggested Learning Resources:

Create

#### Textbooks:

L6

 PaulGries, Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python3, Pragmatic Bookshelf, 3rdEdition, 2018. ISBN: 978-1680502688.
 Programming through Python, M.T Savaliya, R. K.Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020. ISBN: 978-8194736998.

# 3. Python: The Complete Reference, Martin C. Brown, McGrawHill, 2018. ISBN: 978-9387572942. AdditionalReferences:

- 1. Advanced Python Programming, Dr. Gabriele Lanaro, QuanNguyen, SakisKasampalis, PacktPublishing, 2019. ISBN: 9781838553692,
- 2. Programming in Python3, Mark Summerfield, Pearson Education,2ndEd,2018. ISBN: 9780321680563
- 3. Beginning Python: From Novice to Professional, Magnus LieHetland, Apress, 2017. ISBN: 9781484200285

#### Weblinks and Video Lectures(e-Resources):

- 1. https://www.w3schools.com/python/pandas/default.asp
- 2. https://matplotlib.org/stable/gallery/index.html
- 3. https://seaborn.pydata.org/examples/index.html
- 4. https://docs.scipy.org/doc/scipy/reference/linalg.html#module-scipy.linalg
- 5. https://scikit-learn.org/stable/auto\_examples/index.html
- 6. https://www.tutorialspoint.com/scipy/scipy\_integrate.htm\

#### Activity-Based Learning /PracticalBasedlearning

- Contents related activities (Activity-based discussions)
- Organizing Group wise discussions on issues
- Seminars

				AI P	OWER	RED TO	DOLS	AND S	ERVI	CES				
Course Code	22	AIM4	155						IE Ma			50		
L:T:P:S		):1:0							EE Ma			50		
Hrs / Week	2+2									Aarks		100		
Credits	03									Hours		03		
Course outco			end o	f the c	ourse	the st	udent					05		
22AIM455.1											anahilit	ios an	d benefit	s for
22AINI <del>1</del> 33.1			learnii			lation	II, IIICI	uuiiig	113 104	itui 03, 0	apabilit	ics, all	u benent	5 101
22AIM455.2										d manag achine l			Google A els.	Ι
22AIM455.3	Deve	elop c	optimi	zed m	achine	e learn	ing mo	odels o	on Goo	gle AI P	latform	1		
22AIM455.4	Depl	loy tr	ained	model	s on G	oogle	AI Pla	tform	for inf	erence				
22AIM455.5	-	•				•					source	usage (	of Google	AI
22AIM455.6				-						ing AI to		0	0	
Mapping of C	Course	Out	come	s to P	rogra	m Out	tcome	es and	l Prog	gram Sr	oecific	Outco	mes:	
			PO3				P07			P010			PS01	PSO2
				1	- 55	- 55	- 57	- 55				2		
22AIM455.1	2	-	-	-	-	-	-	-	-	-	-		-	-
22AIM455.2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
22AIM455.3	-	3	-	-	-	-	-	-	-	-	-	-	3	-
22AIM455.4	-	-	3	-	-	-	-	-	-	-	-	-	3	-
22AIM455.5	-	3	-	-	-	-	-	-	-	-	-	-	3	-
22AIM455.6	-	-	3	-	3	-	-	-	-	-	-	-	3	-
L														
MODULE-1	Intro	oduc	tion to	o Goo	gle AI	Platfo	orm			22AIN	1455.1		6 Hour	S
Overview of G								s of Go	ogle /			nefits o		
AI Platform for						F			0		-		0	
Laboratory C				<u> </u>		gle AI	Platfo	rm acc	count a	and acce	essing		3 Hours	
key features	P					5					8			
Text Book			Text	Book	1: 1.2.	1.3.1.	4, 1.13	3. 1.15	. 1.16					
MODULE-2	Data	a Pre	parat					, -		22AIM	1455.2		6 Hour	S
Preparing data			<u> </u>					and ma	anagin			oogle		
Data preproce						-			-	8 44 44	000 011 0	00810		
Laboratory C										or a mac	hine	3	Hours	
learning proje	-					na apr		,				0		
Text Book		Bool	k 1: 2.2	2. 2.3.	2.4 to	2.15								
MODULE-3			evelop				ng			22AIM 22AIM			6 Hour	S
Building and t	raining	mac	hinele	arnin	amod	als or	Googl	ΔΛΙΡ	latforr			right v	nodel	
architecture a					0									
Laboratory C													<u>e.</u> 3 Hour	c
using Google A	-		. Deve	nohin	5 anu 1	li allilli	ig a Illa	aciiiiie	iealii	ing moo	iei		5 HOUR	3
Text Book			k 1: 3.1	22	2527	7 2 1 0	1							
MODULE-4			eployi							22AIN	1455.4		6 hour	s
Deploying trai							or info	rence.	Scalin			ndle la		
inference requ				•						5 moue	5 10 1141	1410 14	-be scale	
Laboratory C										ite			3 Hours	2
performance.	ombo	nem	. I. DE	.proyii	ig a tí	ameu	mouel	anu u	coung	115			5 Hours	נ
Text Book	Tovt	Bool	k 1: 6.1	63	65 6'	7								
MODULE-5			ng, Lo				locho	oting		224IM	455.5,		6 Hour	S
MODOLE-2			пд, 10	seing	, anu	iioul	162110	oung			455.5, 1455.6		0 11001	3
<u> </u>									]		1733.0			

Monitoring model performance and resource usage-Logging and analyzing model predictions and errors-Troubleshooting common issues in model deployment and inference.

Laboratory Component:

Monitoring a deployed model, analyzing logs, and troubleshooting issues

3 Hours

Text Book Text Book 1: 12.1 to 12.10

## CIE Assessment Pattern (50 Marks – Theory and Lab)

			Marks Distribution							
	<b>RBT Levels</b>	Test (s)	Qualitative Assessment	Lab						
		25	05	20						
L1	Remember		-	5						
L2	Understand	5	-	5						
L3	Apply	10	5	5						
L4	Analyze	10	-	5						
L5	Evaluate	-	-	-						
L6	Create	-	-	-						
TEE Act	accoment Dettern (EO Meri	ra Theory								

## SEE Assessment Pattern (50 Marks - Theory)

	<b>RBT Levels</b>	Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	10
L5	Evaluate	-
L6	Create	

#### Suggested Learning Resources:

#### **Text Books:**

1" Machine Learning with Google Cloud Platform: Implementing and Deploying Machine Learning Models on Google Cloud Platform", Valliappa Lakshmanan, Jordan Tigani, Publisher: O'Reilly Media, 2022. ISBN-13:978-1492075526.

#### Web links and Video Lectures (e-Resources):

- Google AI Platform Documentation: https://cloud.google.com/ai-platform
- Google Cloud Platform Tutorials: https://cloud.google.com/docs/tutorials •
- Google Cloud Platform Blog: https://cloud.google.com/blog •
- TensorFlow Hub: <u>https://tfhub.dev/</u>
- Google Cloud Platform YouTube Channel: <u>https://www.youtube.com/user/googlecloudplatform</u>

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

- Video demonstration of latest trends in AI Tools
- Contents related activities (Activity-based discussions)
  - > For active participation of students, instruct the students to prepare reports.
  - Organizing Group wise discussions on issues  $\geq$
  - Seminars  $\triangleright$

				DATA	BAS	E PRC	GRA	MMIN	G USIN	IG CAS	SANDR	4					
Course Code	22	2AIM4	61						CIE M	larks		50					
L:T:P:S	0:	0:1:0							SEE N	<b>larks</b>		50					
Hrs/Week	2								Total	Mark	S	100	100				
Credits	0	01 Exam Hours 03															
Course outco	mes:	At the	e end o	of the o	cours	se, the	stude	ent will	be ab	le to:							
22AIM461.1	Ill	llustrate the concepts of Cassandra.															
22AIM461.2	A	Apply the basics of CQL for retrieval and management of data.															
22AIM461.3	D	evelop	prog	rams u	ising	CQL s	hell										
22AIM461.4	A	nalyze	pract	ical kn	lowle	edge ir	n CQL	function	ons an	d trigg	ers, mat	erialize	ed view	S.			
Mapping of C	Cour	se Out	come	s to Pr	rogra	am Ou	tcom	es and	Prog	ram Sp	ecific O	utcom	es:				
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2			
22AIM461.1	3		-	-		-	-	-			-	-	3	3			
22AIM461.2	3		-	-		-	-	-			-	-	3	3			
22AIM461.3	3	3		-		-	-	-			-	-	3	3			
22AIM461.4	3	3	3	3	3	-	-	-			-	-	3	3			

Pgm.	No. List of Experiments / Programs	Hours	COs
Ŭ	Prerequisite Experiments/Programs/ Dem	0	·
	Basics of Data base Conecpts and SQL Basics	2	NA
	PART-A		
1	Demonstrate the Cassandra Installations and service configuration.	2	22AIM461.1
2	Demonstrate the CQL Shell commands: help, capture, consistency and copy with sample data base. Note: Discuss the about the shell, DDC and DMC.	2	22AIM461.1 22AIM461.3
3	Write a CQL shell script to demonstrate the following commands: 1.expand 2.show 3. Source 4. Describe 5. Exit.	2	22AIM461.1 22AIM461.3
4	Write a CQL query using select, where and order by clauses using a sample data base. Note: Discuss the CQL Clauses.	2	22AIM461.2 22AIM461.3
5	Write a CQL query to demonstrate the Cassandra keyspace and Table index concepts: Create key space, alter keyspace and Drop Key space, Truncate Table. Note: Discuss the Keyspace, Table index in canssandra	. 2	22AIM461.1 22AIM461.2
6	Write a CQL query using set collection and List collection methods to display the data. Note: Discuss the Collection framework in canssandra PART B	2	22AIM461.1 22AIM461.2
7	Write a CQL query using Map operation to store and retrieve data from	1 2	22AIM461.1
,	data base. Note: Discuss the Map collection framework.		22AIM461.2 22AIM461.4
8	Demonstrate the scalar function and aggregate function using CQL query. Note: Discuss the CQL functions.	2	22AIM461.1 22AIM461.2 22AIM461.4
9	Demonstrate CQL Triggers concepts: a. Create the trigger b. drop the trigger Note: Discuss the importance of Triggers.	2	22AIM461.1 22AIM461.2 22AIM461.4
10	Write to demonstrate the materialized views using CQL: a. Create materialized view b. Alter materialized view	2	22AIM461.1 22AIM461.2 22AIM461.4
11	c. Drop materialized view Note: Discuss the materialized views in canssandra.		
11	Develop a small data base for real time data and manipulate data using basic DDL commands.	2	22AIM461.1 22AIM461.2 22AIM461.3 22AIM461.4

12	Develop a user define function for upadate and modify the database	2	22AIM461.1
	using CQL commands		22AIM461.2
			22AIM461.3
			22AIM461.4

#### PART-C Beyond Syllabus/ VirtualLab Content

CQL Commands: https://docs.datastax.com/en/dse/6.7/cql/cql\_using/cqlSyntax.html Triggers and Functions: https://cassandra.apache.org/doc/stable/cassandra/cql/triggers.html https://polandll.github.io/site/Cassandra/3.11/cassandra/cql/triggers.html

Advanced Topics: https://courses.cs.tau.ac.il/0368-3276/bigdata2022/slides/bigdata-08-02-cassandra-advanced.pdf

CIE Assessment Pattern (50 Marks-Lab)RBT LevelsTest(s)Weekly Assessment2030L1Remember-L2Understand55L3Apply510									
RBT	Levels	Test(s)	Weekly Assessment						
		20	30						
L1	Remember	_	-						
L2	Understand	5	5						
L3	Apply	5	10						
L4	Analyze	10	10						
L5	Evaluate	-	5						
L6	Create	-							

#### SEE Assessment Pattern (50 Marks-Lab)

RBT	' Levels	Exam Marks
		Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	10
L4	Analyze	20
L5	Evaluate	10
L6	Create	-

Suggested Learning Resources:

Reference Books:

1. Mastering Apache Cassandra, Second edition-Nishant Neeraj-Packt Publishing,2015. ISBN: 9781784396251

## Weblinks and Video Lectures (e-Resources):

- https://youtu.be/J-cSy5MeMOA
- https://youtu.be/iDhIjrJ7hG0
- https://youtu.be/\_UGxEMdPYVI

## Activity-Based Learning /Practical Based learning

- Video demonstration of Cassandra Installation.
- Contents related activities (Activity-based discussions)
- For active participation of students, instruct the students to prepare Handouts
- Organizing Group wise discussions on use-cases.

<b>Course Coo</b>	le 2	2AIM	462						CIE M	larks	50				
L:T:P:S	0	0:0:1:0							SEE N	larks	50				
Hrs /Week	2	2							Total	Marks	10	0			
Credits		)1								Hours	03				
Course out	come	s: At tł	ne end	of the	cour	se. the	e stude	nt will be	able to:		I				
22AIM462.								nology of		ver BI se	rvice.				
22AIM462.								charts and							
22AIM462.								ort data fr			and rer	orts			
22AIM462.								boards a					tiloc		
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mapping c	P01			P04			P07	P08		P010		P012		PSO2	
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22AIM462.2				-	-		-		-	_	_	_	3	3	
22AIM462.3	-	3	3	- 3	- 3	-	-			-	-	-	3	3	
22AIM462.4	0	3 3	3	3	3	-	-	-		-	-	-	3	3	
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Pgm. No.								Programs		D	Hours	5	COs		
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				Ва	SIC 01	t Data		e Algorith	ms and	Python		2		NA	
. L								RT-A				-		IN CASE	
							oar cha					2		IM462.	
								oosing ap						IM462.2	
								tion of ea		? (Stack	ed Bar)	2		22AIM462.1	
								e visualiza						22AIM462.2	
-								CSV into F		Ι		2		IM462.	
								rces in Po				2		AIM462.2	
								nported d				2		IM462.	
							d incor	nsistent da	ata					AIM462.3	
5 Crea	Create interactive report with filters								2		AIM462.2				
Note	Note: Discuss the inking visualizations through interactions												IM462.3		
6 Crea	Create a dashboard report for the given dataset									2		IM462.3			
Note	: Disc	uss the	e arrar	nging v	isual	s in da	ishboai	rds				2	22 <i>F</i>	AIM462.4	
						PAR	T-B								
7 Crea	te a ne	ew colu	imn o	r metri	ics ar	nd disp	olay in t	the report	-			2	22 <i>A</i>	IM462.3	
Note	: Disc	uss the	e Basic	DAX f	uncti	i <mark>ons</mark> ar	nd form	nulas						AIM462.	
8 Crea	te a re	port w	vith pa	ramet	ers w	vhich a	ccepts	user inpu	t			2	22 <i>A</i>	IM462.3	
Note	: Disc	uss the	e parai	meteri	zing	report	s for dy	namics a	nalysis				22A	IM462.4	
			-		<u> </u>	-		he report				2		IM462.3	
		uss the										2	22 <i>A</i>	AIM462.4	
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		uss the		-									22A	IM462.4	
11 Dem	onstra	te the	drillth	rough	repo	ort						2	22 <i>A</i>	IM462.4	
10 0									<b>.</b>					114460	
12 Crea	tive ef	fective	e repoi	rt for t	he giv	ven da	taset u	sing Visua	alizatior	n metho	ds.	2	ZZF	AIM462.4	
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RBTLevels		Test(s)	Weekly Assessments
11	Damaruhan	20 marks	( 30) marks
L1	Remember		
L2	Understand	5	5
L3	Apply	5	10
L4	Analyze	10	10
L5	Evaluate	-	5
L6	Create	-	
SEE A	ssessment Patter	n (50 Marks-	Lab)
<b>RBT Levels</b>		Exam Marks Distribution	
		(50)	
L1	Remember	-	
L2	Understand	10	
L3	Apply	10	
L4	Analyze	20	
L5	Evaluate	10	
L6	Create		•
10	Greate		
Sug	gested Learning R	esources:	
	rence Books:	esour eesi	

#### Weblinks and Video Lectures(e-Resources):

- https://www.datacamp.com/tutorial/tutorial-power-bi-for-beginners
- https://www.bing.com/videos/search?q=power+bi+tutorial+for+beginners&docid=603533498868 517438&mid=D73791A4A441F7A262C4D73791A4A441F7A262C4&view=detail&FORM =VIRE
- https://www.geeksforgeeks.org/power-bi-tutorial

	GOLANG PROGRAMMING	FO			
Course Cod		50			
L:T:P:S	0:0:1:0 SEE Marks	50			
Hrs /Week	2 Total Marks	100			
Credits	01 Exam Hours	03			
	comes: At the end of the course, the student will be able to:				
22AIM463.1	0 0 7				
22AIM463.2	2 Apply the concept of Go programming to solve real world pro	blem.			
22AIM463.3	<b>B</b> Analyze the concept of arrays and pointer sin Go programmin	g.			
22AIM463.4		-			
		0	_		
	Course Outcomes to Program Outcomes and Program Spe	ecific Ou			
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2AIM463.4	<b>3 3 3 - - - - - - - -</b>		3	3	
<b>D</b>				60	
Pgm. No.	List of Experiments / Programs	Hours		COs	
	Prerequisite Experiments/Programs/ De		1		
	C Program/C++ Program/Java Programming Concepts	2		NA	
	PART-A		-	0 A IN ( 4 C 0 - 1	
	<i>W</i> rite a GoLang program to find LCM and GCD of three numbers	2		2AIM463.1	
á	and demonstrate the basic standard arithmetic operations.			2AIM463.2	
				2AIM463.3 2AIM463.4	
2 a	a. Write a Golang program to print Floyd's Triangle.			2AIM403.4	
-		2		2AIM403.1	
	b. Write a Golang program to swap two numbers without using hird variable.	2	22AIM463.3		
l	niru variable.			2AIM463.4	
3	Write a Golang program to generate Fibonacci sequence up to a			2AIM463.1	
5	given number.	2		2AIM463.2	
	Siven number.			2AIM463.3	
				2AIM463.4	
4 V	<i>W</i> rite a Golang program to check whether given numbers is	2		2AIM463.1	
I I I I I I I I I I I I I I I I I I I	balindrome or not.	Z		2AIM463.2	
1	Note: Discuss the loop and decision-making statements syntax			2AIM463.3	
	and working methods.		2	2AIM463.4	
5	a. Write a Golang program to print Pyramid of numbers.			2AIM463.1	
	b. Write a program to sum of natural numbers.	2		2AIM463.2	
				2AIM463.3	
				2AIM463.4	
6	Write a program to demonstrate the string manipulation using	2		2AIM463.1	
	functions;	_		2AIM463.2 2AIM463.3	
	a. creation of string b. Find string length c. concatenation of			2AIM463.3 2AIM463.4	
	strings.			2111111103.1	
	Note: Discuss the functions and string.				
	PART B				
7	Write a Golang program to illustrate comparison of two arrays.	2	2	2AIM463.1	
			2	2AIM463.2	
				2AIM463.3	
				2AIM463.4	
8 I	Demonstrate the Working of Pointers in Golang			2AIM463.1	
		2		2AIM463.2	
				2AIM463.3	
				2AIM463.4	
9 1	write a Golang program to show how to declare and define the	2		2AIM463.1	
	structure.	· · · · · · · · · · · · · · · · · · ·		2AIM463.2	

	Note: Di	scuss the po	inter in Golang.		22AIM	463.3
		eedee dhe po			22AIM	
1	0 write a Gola	ng program	to demonstrate the Structure as	Functions	22AIM	
	Arguments.				22AIM	363.2
	in gamento.				2 22AIM	363.3
					22AIM	363.4
1	1 write a Gola	ng program	to show how to access the fields	s of	22AIM	363.1
	structure.	01 0			22AIM	363.2
				2	22AIM	363.3
				_	22AIM	363.4
1	2 Write a Gola	ng program	using Pointers to Structures.		22AIM	
		01 0	C		22AIM	363.2
				2	22AIM	
				_	22AIM	363.4
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	<b>RBT Levels</b>	Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	10
L4	Analyze	20
L5	Evaluate	10
L6	Create	-

# Suggested Learning Resources:

**Reference Books:** 

1. Hector Guerrero, "Excel Data Analysis Modeling and Simulation", Second Edition, Springer Nature Switzerland AG ,2019, ISBN: 9783030012809

# Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=iG6lN9aBrcM
- https://www.youtube.com/watch?v=\_XfWkCsvbEU
- https://onlinecourses.nptel.ac.in/noc21\_ge21/

# Activity-Based Learning /Practical Based learning

- For active participation of students, instruct the students to prepare Flowcharts and Handouts
- Organizing Group wise discussions on issues
- Presentation

Correct			22AIM	AGA			HASI	VELL I	PROGE		ING Marks		50			
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22AIM	464.1	3			-	-	-	-	-	-	-	-		-	3	-
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1	Write	a Ha	iskell r			<u> </u>		0		nd Re	gion c	oncepts.		2		1464.1
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2	Write	a Ha	iskell p	orogra	m to e	evalu	ate a e	expres	sions.							1464.1
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	Note	: Dis	cuss tl	ne List	and F	kecur	sive fi	inctio	ns.							/464.4
4	Write	a pr	ogram	in Ha	skell t	o im	nleme	nt Tur	les							/464.1
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5	Dem	onst	rate th	ie poly	vmorp	hism	and h	igher-	order	functi	ons us	ing Hask	ell			1464.1
			ming.											2		1464.2
	Note	: Dis	cuss tl	ne con	cepts	of Po	lymor	phism	and H	ligh-o	rder fi	unctions.				1464.3
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6	writ	e a p	rograi	n in H	askell	to in	nplem	ent Ma	ap and	niter	conce	pts.		2		/1464.1 /1464.2
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7														2	22AIM	1464.1
	Writ	e a p	rograi	n usin	g infir	nite li	st in F	laskell	l.						22AIN	1464.2
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																1464.4
8	Write	a Ha	skell I	Progra	m to r	ead	and w	rite th	e data	into fi	le.					1464.1
				5										2		1464.2
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_					-		•		suedi	115.						1464.4
9	Write	a Pr	ogram	in Ha	skell u	ising	Zippe	rs.						2		1464.1
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10	Write	<u>а Ца</u>	والمراء	roara	m for	Rala	ncod b	inarr	correl	tree						1464.4 1464.1
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L1 R L2 U				(2.2)		
L1 R L2 U	BTLevels	Test(s) (20)	Weekly Ass	sessment (30)		
	Remember	-		-		
10 -	Inderstand	5		5		
L3 A	pply	5	10			
	Inalyze	10		10		
	Evaluate	-		5		
	Create	-				
		n (50 Marks-Lab)				
RI	BT Levels	Exam Marks Distrib	bution			
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	nalyze	20				
	valuate	10				
	reate	-				
	ted Learning Re	SOURCES				
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978	0596554309	on Stewart, and John ( arn You a Haskell for G			-	
	N: 9781593272		n cai doou: A D	comments durue, N	Jai til I	1033,4011.
		ectures(e-Resources):				
		ourses.nptel.ac.in/noc20	0_cs79/preview	Ţ		
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		ages.dcc.ufmg.br/~car	•	ell.pdf		
• ]	https://www.c	mi.ac.in/~madhavan/j	papers/pdf/ha	•		
		g /Practical Based lead		-		
		d activities (Activity-ba		)		
	<ul><li>For active p</li></ul>	participation of students	s, instruct the st		Flowchart	s and Handouts
	<ul><li>Organizing</li></ul>	Group wise discussions	s on issues.			

<b>Course Cod</b>	le 22	2AIM4	65						CIE M	larks		50		
L:T:P:S	0:	0:1:0							SEE Marks			50		
Hrs /Week	2								Total	Marks		100		
Credits	1								Exam	Hours		03		
<b>Course out</b>	come	es: At t	he en	d of th	e coui	rse, tł	ne stud	dent w	ill be a	ble to:				
22AIM465.1	. Ur	nderst	and ba	asic th	e basi	c con	cepts	of Digi	tal Sign	als and	Image	Proces	sing S	ystem.
22AIM465.2	Ar	oply th	e diffe	erent t	echni	ques	of Ima	ige Pro	cessing	g to solv	re the p	roblem	1.	
22AIM465.3	Ar	nalyze	the In	nage P	roper	ties a	nd sig	nals w	rith diff	erent D	IP/Ima	ige Fun	ctions.	
22AIM465.4	. De	evelop	a new	v algor	ithm i	n Sig	nal an	d Imag	ge Proc	essing A	Applica	tions.		
Mapping o	f Cou	ırse O	utcor	nes to	o Prog	gram	Outo	comes	and P	rogran	1 Spec	ific Ou	tcom	es:
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIM465.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM465.2	3	-	-	-	-	-	-	-	-	-	-	-	2	-
22AIM465.3	-	3	-	-	-	-	-	-	-	-	-	-	2	-
22AIM465.4	-	-	3	3	-	-	-	-	-	-	-	-	2	2

Pgm. No.	List of Experiments / Programs	Hours	COs
	Prerequisite Experiments/Programs/ Demo		
	Basic C Programming Concepts	2	NA
1	Reading an image and display the gray scale, colour and B/W image using MATLAB/Python. Note: Discuss about the steps of Image Processing and its models.	2	22AIM465.1
2	Reading and RGB Image and extract the colour components using MATLAB/Python. Note: Discuss the Quantization, pixel Relationship.	2	22AIM465.1 22AIM465.2
3	Develop a program using MATLAB/Python for enhance the Brightness and Contrast of an image.	2	22AIM465.1 22AIM465.2
4	Develop a MATLAB/Python program for image smoothing and sharpening using different mask.	2	22AIM465.1 22AIM465.2
5	Develop a MATLAB/Python program for Image noising using different noise distribution.	2	22AIM465.1 22AIM465.2
6	Write a program using MATLAB/Python for De-noising the image using Arithmetic mean and median filter.	2	22AIM465.1 22AIM465.2
	PART-B		
7	Implement order statistics filter to De-nosing the image.	2	22AIM465.1 22AIM465.2
8	Write a MATLAB/Python program to generate signal.	2	22AIM465.3 22AIM465.4
9	Write a Program in MATLAB/Python for analysis the properties of the Z Transforms.	2	22AIM465.3 22AIM465.4
10	Write a program in MATLAB/Python for analysis of LTI system.	2	22AIM465.3 22AIM465.4
11	Write a program in MATLAB/Python for DFT.	2	22AIM465.3 22AIM465.4

PART-C         Beyond Syllabus/ Virtual Lab Content         https://cse19-iiith.vlabs.ac.in/exp/affinetransformation/simulation.html         https://cse19-iiith.vlabs.ac.in/exp/affinetransformation/simulation.html         https://cse19-iiith.vlabs.ac.in/exp/image-histogram/         https://cse19-iiith.vlabs.ac.in/exp/image-processing_introduction.html         https://cse19-iiith.vlabs.ac.in/exp/image-processing_introduction.html         https://cse19-iiith.vlabs.ac.in/exp/image-processing_introduction.html         (Image Processing Concepts)         IE Assessment Pattern (50 Marks-Lab)         RBTLevels       Test(s         20       30         L1       Remember         -       -         L2       Understand         5       5         L3       Apply         5       10         L4       Analyze         10       10         L5       Evaluate         6       Create         -       -         L4       Remember         -       -         L6       Create         -       -         L4       Analyze         L1       Remember         -       -	1	2 Write a p	rogram in MAT	LAB/Python for FF	Г and DIT.	2	22AIM465.3 22AIM465.4
Beyond Syllabus/ Virtual Lab Content         https://cse19-iiith.vlabs.ac.in/exp/affinetransformation/simulation.html         https://cse19-iiith.vlabs.ac.in/exp/image-histogram/         https://cse19-iiith.vlabs.ac.in/exp/image_histogram/         https://cse19-iiith.vlabs.ac.in/exp/image_histogram/         https://cse19-iiith.vlabs.ac.in/exp/image_histogram/         https://cse19-iiith.vlabs.ac.in/exp/image_processing_introduction.html         (Image Processing Concepts) <b>E E Assessment Pattern (50 Marks-Lab)</b> Test(s         20       30         L1       Remember       -         20       30         L2       Understand       5         L3       Apply       5       10         L4       Analyze       10       10         L5       Evaluate       -       5         L4       Remember       -       5         L6       Create       -       5         L1       Remember       -       5         L4       Analyze       10       10         L5       Evaluate       -       5         L6       Create       -       -         L1       Remember       -				PART	·C		
https://cse19-iiith.vlabs.ac.in/List%20of%20experiments.html https://cse19-iiith.vlabs.ac.in/exp/image-histogram/ https://www.tutorialspoint.com/dip/image_processing_introduction.htm [Image Processing Concepts] IE Assessment Pattern (50 Marks-Lab) RBTLevels Test(s Weekly 20 30 L1 Remember L2 Understand 5 5 L3 Apply 5 10 L4 Analyze 10 10 L5 Evaluate - 5 L6 Create - EE Assessment Pattern (50 Marks-Lab) EE Assessment Pattern (50 Marks-Lab) EE Assessment Pattern (50 Marks-Lab) EE Assessment Pattern (50 Marks-Lab) EE Assessment Pattern (50 Marks-Lab) L6 Create - L6 Create - L7 Understand 10 L1 Remember - L2 Understand 10 L3 Apply 10 L4 Analyze 20 L5 Evaluate 10 L5 Evaluate 10 L5 Evaluate 10 L6 Create 10 L7 Remember - L8 Descent 10 L9 Descent 10			Be				
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L4Analyze20L5Evaluate10	L2	Understand	10				
L5 Evaluate 10	L3	Apply	10				
	L4	Analyze	20				
L6 Create -	L5	Evaluate	10				
	L6	Create		-			
Reference Book:				E. Woods, "Digital	Image Processing	<sup>7</sup> 2nd Edition	i, Pearson Educati
LGonzalez, Rafael C., and Richard E. Woods, "Digital Image Processing" 2nd Edition, Pearson Educati	2002.	ISBN: 9788131	726952				
l.Gonzalez, Rafael C., and Richard E. Woods, "Digital Image Processing" 2nd Edition, Pearson Educati 2002.ISBN: 9788131726952	Web						
L.Gonzalez, Rafael C., and Richard E. Woods, "Digital Image Processing" 2nd Edition, Pearson Education 2002.ISBN: 9788131726952 Weblinks and Video Lectures (e-Resources):	•						
l.Gonzalez, Rafael C., and Richard E. Woods, "Digital Image Processing" 2nd Edition, Pearson Educati 2002.ISBN: 9788131726952		latter of / reverse					

• https://in.mathworks.com/videos/image-processing-made-easy-81718.html Activity-Based Learning /Practical Based learning

- Contents related activities (Activity-based discussions) •
  - > For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Group wise discussions on issues
  - > Seminars

Course Code	22UH						CIE M	LIFE S		50		
L:T:P:S	1:0:0:						SEE M			50		
Hrs / Week	2	0						Marks		10		
Credits	2 01							Hours		02		
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Course outcon												
22UHK47.1				=	-			kills and				
22UHK47.2	Develo	op Self-a	warene	ess and s	Self-m	anagem	ient sk	ills to p	romot	e perso	nal grov	wth.
22UHK47.3	Apply	Critical	and Cre	eative th	ninking	g and et	hical d	ecision	-makir	ng skills	in vari	ous contexts.
22UHK47.4	Promo	te team	work a	nd colla	borati	on whil	e resp	ecting d	iversi	v and i	nclusivi	tv.
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Mapping of Co	P01	PO2	P03	PO4	P05							
22UHK47.1	PUI	PUZ	P03	P04	P05	3		3	P09	2	PUII	2
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22UHK47.2	-	-	-	-	-	1		1	-	2	-	
22UHK47.3	-	-	-	-	•	3	1	3	1	2	-	2
22UHK47.4	-	-	-	-	-	2	2	1	3	3	-	3
MODULE 1	0.16			10.10-								0.11
MODULE-1	Self-A	waren	ess and	d Self-N	Manag	gement			UHK			3 Hours
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play	le	Under	h; parti	qualitie	s of Ro	ole Mod	lels, ex	xplore s esentati 22	elf and ons to 2UHK	d do SW come o <b>47.1</b>	/OT and	alysis for
Self-study / Ro play MODULE-2	le	Under growt	h; parti	qualitie	s of Ro	ole Mod	lels, ex	xplore s esentati 22	elf and ons to	d do SW come o <b>47.1</b>	/OT and	alysis for omfort zone
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		_		Marks Distribution			
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L2	Under	stand	7	6			
L3	Apply		8	7			
L4	Analyz		10	7			
L5	Evalua		-	5			
L6	Create		-	-			
SEE A	ssessme	nt Pattern		Froup Discussion)			
	<b>RBT</b> Lev	vels	Exam Marks	Distribution (50)			
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L2	Unders	tand		10			
L3	Apply			20			
L4	Analyz	e		10			
L5	Evaluat	te					
L6	Create						
Sugge	ested Lea	arning Res	sources:				
REF	ERENCE	BOOKS:					
1.				People, Stephen R Cove			
2.			•••	Teens, Convey Sean, N		eside Publi	shers, 1998.
3.		-		Coleman, Bantam Book,			
4.				ce people, Dale Carnegie			
5.	BHAGA	VADGITA	for college stu	dents, Sandeepa Guntre	eddy.		
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•	Partici	pate in rol	e plays and pr	esentations to come out	t of comfort	zone	
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- Use Mind maps to plan successful completion of semester
- Actively participate in Group Discussions and JAM sessions

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<b>Course outc</b>	omes	: At tł	ne end	of the	cours	e, the s	studer	nt will	be abl	e to:				
22AIM48.1	Undei	rstand	d the te	echnol	ogical	needs	and/	or soci	ietal n	eeds and	d sustai	nabilit	y of the	
	enviro													
22AIM48.2	Apply	prac	tical kr	nowled	dge an	d lates	st tool	s usag	e alon	g with p	roject d	evelop	ment.	
22AIM48.3	Analv	ze the	e outco	me of	the pr	oiect.	Desig	n appl	icatior	ı using I	Data Sci	ence co	oncepts	/
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22AIM10.5	3	3	3	-	-		-	-	_	-		3	3	2
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- Implementation strategies of the project (NSS work).
- The last report should be signed by NSS Officer, the HOD and principal.
- At last report should be evaluated by the NSSofficer of the institute.
- Finally, the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.

## Suggested Learning Resources:

## **Reference Books:**

- 13. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
- 14. Government of Karnataka, NSS cell, activities reports and its manual.

# 15. Government of India, NSS cell, Activities reports and its manual.

#### Pre-requisites to take this Course:

1. Students should have a service-oriented mindset and social concern.

2. Students should have dedication to work at any remote place, anytime with available resources and proper time management for the other works.

3. Students should be ready to sacrifice some of the time and wishes to achieve service-oriented targets on time.

# Pedagogy:

- In every semester from 3rd semester to 6th semester, each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last, in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.
- State the need for NSS activities and its present relevance in the society and provide real-life examples.
- Support and guide the students for self-planned activities.
- NSS coordinator will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills.

#### Plan of Action:

- Student/s in individual or in a group Should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.
- At the end of every semester, activity report should be submitted for evaluation.
- Practice Session Description:
  - Lecture session by NSS Officer
  - Students Presentation on Topics
  - Presentation 1, Selection of topic, PHASE 1
  - Commencement of activity and its progress PHASE 2
  - Execution of Activity
  - Case study-based Assessment, Individual performance
  - Sector/ Team wise study and its consolidation
  - Video based seminar for 10 minutes by each student at the end of semester with Report.

Sl No	1	Groupsize	Location	Activity execution	Reporting	Evaluation of the Topic
1.	Organic farming,	May be	Farmers	Site selection	Report	Evaluation as per
	IndianAgriculture	individual	land/Villages/	/proper	should be	the rubrics of
	(Past, Present and	or team	roadside	consultation/	submitted by	scheme and
	Future)		/ Community area	Continuous	individual to	syllabus by NSS
	Connectivity for		/	monitoring/	the	officer
	marketing.		College campus	Information	concerned	
				board	evaluation	
					authority	

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	Public, Private and Govtorganization, 5 R's.	individual or team	campus	Site selection /proper consultation/C ontinuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
	Setting of the information imparting club for women leading to contributionin social and economic issues.	individual	Women empowerment groups/ Consulting NGOs & Govt Teams / College campus	Group selection/pro per consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
4.	Water conservation techniques – Role of different stakeholders– Implementation.	or team	panchayat/ public associations/ Government Schemes officers/ campus	site selection / proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	individual or team	Schemes officers/	Group selection/pro per consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
		individual or team	schools/Governmen	selection/prop	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
	management system for rural areas and implementation approaches.	or team	campus	site selection/prop erconsultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
	Contribution to any national level initiative of		Villages/ City Areas /Grama panchayat/	Group selection/pro per	Report should be submitted by	Evaluation as per the rubrics of scheme and

	Government of India.For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme,Skill development programs etc.		public associations/ Government Schemes officers/ campus	consultation/ Continuous monitoring / Information board	individual to the concerned evaluation authority	syllabus by NSS officer
	Spreading public awareness under ruraloutreach programs. (minimum5 programs)	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection/pro per consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
-	Organize National integration and socialharmony events / workshops / seminars. (Minimum 02 programs).	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government	Place selection/prop er consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Place selection/prop er consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer

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Credits	00						Exam	Hour	s	02			
Course ou	tcomes: A	t the en	d of the	course,	the stu	dent w	vill be al	ole to:					
22PED40.1	Under	stand th	ne funda	mental	concep	ts and	skills o	f Physi	cal Edu	cation,	Health, I	Nutrition and	
	Fitnes	S											
22PED40.2	Create	e consci	ousness	among	the stu	dents o	on Heal	th, Fitn	less and	l Wellne	ess in de	veloping and	
	maintaining a healthy lifestyle												
22PED40.3	Perfor	Perform in the selected sports or athletics of student's choice and participate in the								the			
	compe	etition a	t region	al/state	e / natio	onal / i	nternat	ional l	evels.				
22PED40.4	Under	stand th	ne roles	and res	ponsibi	lities c	of organ	izatior	and ad	lministr	ation of	sports and	
	games	5											
Mapping of	of Course	Outcon	nes to 🛛	Program	m Outo	comes	:						
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	
22PED40.1		-	-	-	-	2	-	3	3	-	-	2	
22PED40.2		-	-	-	-	2	-	3	3	-	-	2	
22PED40.3		-	-	-	-	2	-	3	3	-	-	2	
22PED40.4	-	-	-	-	-	2	-	3	3	-	-	2	
0				<u></u>	NUT					0		HOUDO	
Semeste				CONTE	NT				C	Os		HOURS	
r	Module	1. Orio	ntation										
		Lifestyle		L									
		Fitness	~,						22PE	ED30.1			
		Food &	Nutritio	n					0005	, 5 HRS 22PED30.2		5 HRS	
		Health &							22PE				
	J.	Pre-Fitn	iess test										
	Module	2: Gene	eral Fit	ness &	Compo	onents	s of Fit	ness					
3 <sup>RD</sup>				ree Hano		ises)							
22PED3				-up / Pı	ıll-ups				22PE	ED30.2			
0		Speed –							2205	, 22PED30.3		15 HRS	
		Agility -		e Run and Rea	ch				ZZPE	2D30.3			
				Endurai		arvard	sten Tr	oct					
	Module						step n	.50					
		Postura			ities				22PF	ED30.3			
		Stress n								,		10 HRS	
		Aerobic							22PE	ED30.4			
		Traditio											
	Module				alues				22PE	ED40.1			
		Ethics in								,		5 HRS	
				Sports					22PE	ED40.2			
<b>4</b> тн	Module	-	ific Gai	nes (Ai	nyone	to be s	selecte	d by					
22PED40	the stud							-					
-	G. Volle	-		lock, Se	rvice, U	pper I	Hand Pa	iss and	22PE	ED40.3		20 HRS	
		er hand l		Daget		0++1	· Mat F						
	H. Thro		Service	, Keceiv	e, Spin	attacl	k, Net L	rop &					
	Jump	throw.											

<ol> <li>Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus.</li> <li>Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.</li> <li>Table Tennis – Service (Fore Hand &amp; Back Hand), Receive (Fore Hand &amp; Back Hand), Smash.</li> <li>Athletics (Track / Field Events) – Any event as per availability of Ground.</li> </ol>			
Module 3: Role of Organization and administration	22PED40.4	5	HRS
Assessment Pattern (50 Marks – Practical) – IE to be evaluated every semester end based on practical demonst ctivities learnt in the semester.	tration of Spoi		letics
CIE		Marks	
Participation of student in all the modules		10	
Quizzes – 2, each of 7.5 marks		15	
Final presentation / exhibition / Participation			
in competitions/ practical on specific tasks assigned to the studen	ts	25	
	Total	50	
gested Learning Resources:			
<b>rence Books:</b> Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolka Petipus, et.al., Athlete's Guide to Career Planning, Human Kinetics Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kend Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolka Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Dubey H.C., Basketball, Discovery Publishing House, New Delhi. Rachana Jain, Teach Yourself Basketball, Sports Publication.	Ira, New Delhi. ta 7 Delhi.	New York.	

					YOGA	4						
Course	22Y0	G30, 22	YOG40	, 22YOC	G50,	- 41	CIE M	arks		50		
Code	22Y0	G60					(each	Seme	ster)			
L:T:P:S	0:0:0:	0					SEE M	larks				
Hrs / Week	2						Total	Marks	5	50	x 4 = 2	00
Credits	00						Exam	Hours	S	02		
Course outc								ble to:				
22Y0G40.1		0	•	es in an								
22YOG40.2	Becom	ne famili	iar with	an auth	entic fo	oundat	ion of Y	ogic pi	actices	;		
22Y0G40.3	Practi	Practice different Yogic methods such as Suryanamaskara, Pranayama and some of the								e of the Shat		
		Kriyas										
22Y0G40.4	Use th	Use the teachings of Patanjali in daily life .										
Mapping of	Course	Outcor	nes to	Progra	m Out	omes	::					
	P01	P02	P03	P04	P05	P06		P08	P09	P010	P011	P012
22Y0G40.1	-	-	-	-	-	3	-	-	-	-	-	1
22Y0G40.2	-	-	-	-	-	3	-	-	-	-	-	1
22Y0G40.3	-	-	-	-	-	3	-	-	-	-	-	1
22Y0G40.4	-	-	-	-	-	3	-	-	-	-	-	1
Semester / Course Code				CON	ГЕМТ					COs		HOURS
3 <sup>rd</sup> 22YOG30	Brief man posit Rule yogic Misc Diffe 3. S b 4. S Differ 5. S 6. S 7. F	Yogic ive heal s and practic oncepti rence be anamas uryanan enefits uryanan enefits uryanan ent typ Sitting: F Standing Prone lin	duction praction regulat regulat ions o etween skara: maskar of Surya maskar of Surya maskar es of As Padmasa g: Vriksh ne: Bhuj	<b>of yo</b> ces for <b>ions:</b> R ractitior <b>f yoga</b> yogic ar prayer a anamasl 12 coun <b>sanas</b> : ana, Vaju nana, Tr angasa	commo ules to rer Yoga and non- <u>v</u> and its r car. t,2roun rasana, ikonasa a, Shala	on ma be fo its r yogic p neanir ds Sukha na, Ar abhasa	an to p ollowed nisconce oractices ng, Need sana dhakati ana	oromot durin eption: s. l, impo Chakr	e 22 22 g 22 s, 22 rta	YOG30.: YOG30.: YOG30.: YOG30.	2, 3,	Total 32 Hrs/ Semester 2 Hrs/week
4 <sup>тн</sup> 22YOG40	<ul> <li>6. Standing: Vrikshana, Trikonasana, Ardhakati Chakrasa</li> <li>7. Prone line: Bhujangasana, Shalabhasana</li> <li>8. Supineline: Utthitadvipadasana, Ardhahalasana, Halas</li> <li>Suryanamaskara: Suryanamaskar 12 count,4rounds</li> <li>Brief introduction and importance of: Kapalabhati: Revision of Kapalabhati -40strokes/min3rou</li> <li>Different types of Asanas:</li> <li>5. Sitting: Paschimottanasana, Ardha Ushtrasana, Vakrasana, Aakarna Dhanurasana</li> </ul>								Total 32 Hrs/ Semester 2 Hrs/week			

	Pranayama: C	handra Bhedana, Nadishodhana,	Surya Bhed		
5 <sup>тн</sup> 22YOG50	Brief introduc Different type 5. Sitting: Yo Paschimo 6. Standing: Parshvako 7. Prone line Bhujangas 8. Supine lin Sarvangas Patanjali's Ast	ogamudra in Padmasana, Vibhak ttanasana, Yogamudra in Vajrasa Parivritta Trikonasana, Utkatasa onasana e: Padangushtha Dhanurasana, P sana / Rajakapotasana ue: Navasana/Noukasana, Pavana	ta ana ana, oorna amuktasana,	22YOG50.1, 22YOG50.2, 22YOG50.3, 22YOG50.4	Total 32 Hrs/ Semester 2 Hrs/week
6 <sup>тн</sup> 22Y0G60	Brief introduc Different type 5. Sitting: Ba Rajakapot 6. Standing: Parshvaka 7. Supine lin posture) 8. Balancing Patanjali's Asl Pranayama: B	akasana, Hanumanasana, Ekapad tasana Parivritta Trikonasana, Utkatasa	ana, (Relaxation n), Samadhi	22YOG60.1, 22YOG60.2, 22YOG60.3, 22YOG60.4	Total 32 Hrs/ Semester 2 Hrs/week
CIE Assosam	ant Dattarn (EQ	Marka Drastical)			
CIE to be e	•	Marks - Practical) -	monstratio	n of Yogasana le	earnt in the
semestel a	and internal tests	semester based on practical de s (objective type)		_	
semestel (		s (objective type) CIE	Mark	S	
Semestel (		s (objective type) CIE Avg of Test 1 and Test 2	Mark 25	<u>S</u>	
Semestel (		s (objective type) CIE Avg of Test 1 and Test 2 Demonstration of Yogasana	<b>Mark</b> 25 25	<u>s</u>	
		s (objective type) CIE Avg of Test 1 and Test 2 Demonstration of Yogasana Total	Mark 25	<u>s</u>	
Suggested La Reference B 16. Swam 17. Tiwar 18. Ajitku 19. Swam 20. Swam 21. Nager 22. Tiruk 23. Iyeng 24. Iyeng	earning Resour cooks: ni Kuvulyananda ri, O P: Asana Wh umar: Yoga Pravo ni Satyananda Sa ni Satyananda Sa ndra H R: The ar ca: Shatkriyegalu gar B K S: Yoga Pi gar B K S: Light o	cie (objective type) <u>CIE</u> Avg of Test 1 and Test 2 Demonstration of Yogasana <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>Total</b> <b>T</b>	<u>Mark</u> 25 25 <b>50</b> ala)	a (Bihar Schoo	l of yoga, Munger)
Suggested La Reference B 16. Swam 17. Tiwar 18. Ajitku 19. Swam 20. Swam 20. Swam 21. Nager 22. Tiruk 23. Iyeng 24. Iyeng Web links an	earning Resour cooks: ni Kuvulyananda ri, O P: Asana Wh umar: Yoga Pravo ni Satyananda Sa ni Satyananda Sa ndra H R: The ar ca: Shatkriyegalu gar B K S: Yoga Pi gar B K S: Light o	s (objective type) CIE Avg of Test 1 and Test 2 Demonstration of Yogasana Total Total rces: a: Asma (Kavalyadhama, Lonava hy and How esha (Kannada) araswati: Asana Pranayama, Mu araswati: Surya Namaskar (Biha t and science of Pranayama (Kannada) radipika (Kannada) n Yoga (English) es (e-Resources):	<u>Mark</u> 25 25 <b>50</b> ala)	a (Bihar Schoo	l of yoga, Munger)

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Course Code	22DI	ΜΔΤΖ	11		(conn			TE Ma				50
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Hrs. / Week	2							otal N				50
Credits	00							Exam H				
Course outcom									10015			
At the end of the		e, the	stude	ent will	be abl	e to:						
22DMAT41.1	Gain	know	vledge	e of basi	c oper	ations	of vect	ors				
22DMAT41.2									ree di	mensio	15	
22DMAT41.3		Develop the ability to solve higher order Linear differential equations										
22DMAT41.4												
				-		-				sform r		
Mapping of Co					-		<u> </u>					
			P03	P04	·	P06		<b>P08</b>	P09	P010	P011	P012
	1											
22DMAT41.1	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT41.2	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT41.3	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT41.4	3	3	-	-	-	-	-	-	-	-	-	-
		U										
MODULE-1	VECT	FOR	5								22DMAT41.1	8 Hours
MODOLE-I												
				ctor ad	dition	Subtr	action					
Definition of sca	lar and	vect	or, Ve					roduct	. Orth	ogonal.	Co-planar and A	ngle betwee
Definition of sca and Multiplication	lar and	vect	or, Ve					roduct	. Orth	ogonal,	Co-planar and A	ngle betwee
Definition of sca and Multiplication vectors-Problem	lar and on-Dot is.	vecto prod	or, Ve uct, Cı	ross pro	duct,	Scalar	triple p			0	Co-planar and A	ngle betwee
Definition of sca and Multiplicatio vectors-Problem	lar and on-Dot is.	vecto prod	or, Ve uct, Cı	ross pro	duct,	Scalar				0	Co-planar and A	ngle betwee
Definition of sca and Multiplicatio vectors-Problem Text Book	lar and on-Dot is. Text	l vecto prodi Book	or, Ve uct, Ci : 1: 3.1	ross pro 1, 3.5, 3.	oduct, : 6, 3.9,	Scalar Text I	triple p			0	-	-
Definition of sca and Multiplication vectors-Problem Text Book MODULE-2	lar and on-Dot is. Text <b>VEC1</b>	vecto prod Book	or, Ve uct, Ci 1: 3.1 DIFFE	ross pro I, 3.5, 3. <b>RENTL</b>	oduct, : 6, 3.9, ATION	Scalar Text I N	triple p 300k 2:	7.1, 9.2	2, 9.3,	9.4.	22DMAT41.2	8 Hours
Definition of sca and Multiplicatio vectors-Problem Text Book <b>MODULE-2</b> Vector differenti	lar and on-Dot is. Text <b>VECT</b> ial oper	l vecto prodi Book FOR I	or, Ve uct, Cı 1: 3.1 <b>DIFFE</b> Gradi	ross pro I, 3.5, 3. <b>RENTI</b> ient of a	oduct, 5 6, 3.9, ATION scala	Scalar Text I <u>I</u> r funct	triple p Book 2:	7.1, 9.2 vergen	2, 9.3, ce of a	9.4.	22DMAT41.2	8 Hours
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	ssessment Pattern	-	Marks Distributio		]
	RBT Levels	Test (s)	Qualitative Assessment (s)	MCQ's	
		25	15	10	
L1	Remember	5	5	-	
L2	Understand	5	5	-	
L3	Apply	10	5	10	
L4	Analyze	2.5	-	-	
L5	Evaluate	2.5	-	-	
L6	Create	-	-	-	
ugge	ested Learning Re	sources:			
201	16, ISBN: 97881265		ering Mathematic	s, Wiley-In	dia Publishers, Tenth Edition, Reprint
Refei	rence Books:				
1) Gly	n James, Advanced	Modern En	gineering Mathem	atics, Pear	son Education, Fourth Edition,
201	15, ISBN: 97802737	19236.			
2) B. V	V. Ramana, Higher E	ngineering	Mathematics, Mc	Graw Hill E	ducation (India) Private Limited,
	urth Edition, 2017, I				
-			Mathematics, S. C	hand & Cor	npany Ltd., Twenty Second Edition, 2018,
	IN: 9789352533831				
-		-	-	ing Mathen	natics, Laxmi Publications (P) Ltd., Ninth
	tion, 2014, ISBN: 97				
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					actical Based Learning:
•	Contents related	activities (	Activity-based di	iscussions]	_
	➢ For active			-	instruct the students to prepar
	Algorithms/	Flowchart	s/Programming (		
	<ul> <li>Organizing G</li> <li>Seminars</li> </ul>	roup wise	discussions on r	elated topi	ics

# APPENDIX A

	List of Assessment Pattern		
SNO	Tasks	Bloomscategory/Level	Remarks
1	Assignments	Understand-L2, Apply- L3, Analyse-L4	Individual/ Group
2	GroupDiscussions	Apply-L3, Analyse-L4	Group
3	CaseStudies/CaseLets	Apply-L3, Analyse-L4, Evaluate-L5	Individual/ Group
4	Practical Orientation on Designthinking	Analyse-L4, Create-L6	Creativity&Innovation
5	Participatory & Industry- IntegratedLearning	Understand-L2, Apply- L3, Analyse-L4	Individual/ Group
6	Practicalactivities/Proble msolvingexercises	Apply-L3, Analyse-L4, Evaluate-L5	Individual/ Group
7	ClassPresentations	Understand-L2, Apply- L3, Analyse-L4	Individual/ Group
8	Analysis of Industry/ Technical /BusinessReports	Understand-L2, Apply- L3, Analyse-L4	Individual/ Group
9	Reports on IndustrialVisit	Understand-L2, Apply- L3, Analyse-L4	Individual/ Group
10	Industrial/Social/RuralProjects	Analyse-L4, Create-L6	Individual/ Group
11	Participation in external seminars/workshops	Understand-L2, Apply- L3, Analyse-L4	Individual/ Group
12	Any other academic activity	Understand-L2, Apply-L3, Analyse-L4	Individual/ Group
13	Online/ Offline Quizzes	Understand-L2, Apply-L3	
	Note:		
	1.The choice or selection of approproteor approproproteor (1997)	priate Tasks for each Assessm	ent Type by the course
	2.Assign/fix the marks for each As	sessment Type by course co-o	oridnator.
	3.Students either submitthe repor	t for Task or not, as determine	ed by th ecourse coordinator.
	4. Need to get final approval from allocations for Tasks and Assessme		finalising the mark

#### **APPENDIX B**

#### **Outcome Based Education**

Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience, each student should have achieved the goal. There is no specified style of teaching or assessmentin OBE; instead, classes, opportunities, and assessments should all help students achieve the specified outcomes.

There are three educational Outcomes as defined by the National Board of Accreditation: Program Educational Objectives: The Educational objectives of an engineering degreeprogram are the statements that describe the expected achievements of graduate in their are and in particular, what the graduates are expected to perform and achieve during thefirst few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

**Course Outcome:** The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

#### Mapping of Outcome:



#### **APPENDIX C**

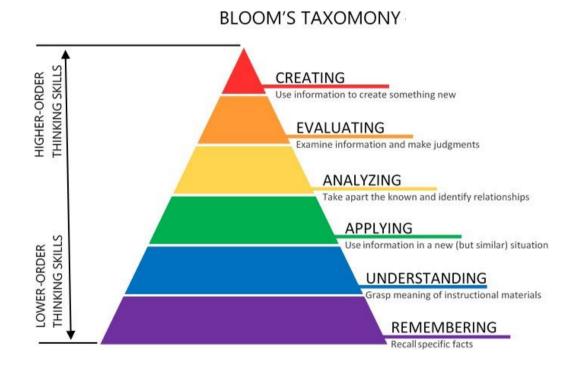
#### The Graduate Attributes of NBA

- **PO1** Engineering knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems in Computer Engineering.
- **PO2 Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems in Computer Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
- **PO3 Design / Development of Solutions:** Design solutions for complex Engineering problems and design system components or processes of Computer Engineering that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
- **PO4 Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments in Computer Engineering, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5 Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, andmodern Engineering and IT tools including prediction and modeling to complexEngineering activities in Computer Engineering with an understanding of the limitations.
- **PO6** The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in Computer Engineering.
- **P07 Environment and Sustainability:** Understand the impact of the professional Engineering solutions of Computer Engineering in societal and Environmental contexts, demonstrate the knowledge of, and need for sustainable development.
- **PO8 Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the Engineering practice.
- **PO9** Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10 Communication Skills:** Communicate effectively on complex Engineering activities with the Engineering community and with society, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11 Project Management and Finance:** Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary Environments.
- **PO12** Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **APPENDIX D**

#### **BLOOM'S TAXONOMY**

Bloom's taxonomy is a classification system used to define and distinguish different levels ofhuman cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and otherevaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.



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