

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Academic Year 2024 - 2025



BATCH: 2022 - 2026 CREDITS: 160 [2022 Scheme]



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Academic Year 2024 - 2025

[2022 Scheme]

5th and 6th Semesters Scheme & Syllabus

> BATCH: 2022 - 2026 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.
- **PO5 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.

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

	Semester												
SI.	Cou	irse	CourseTitle	BoS io			Credit Distribut ion			tact urs	Marks		
NO.	Cod	e			L	Т	Р	S	0v6 Cre	Con Ho	CIE	SEE	Total
1	BSC	22MAC31	Mathematical Foundation for Computing Sciences	BS	3	0	0	0	3	3	50	50	100
2	РСС	22AIM32	Data Structure and Algorithms	AIML	3	0	0	0	3	3	50	50	100
3	PCCL	22AIL32	Data Structure and Algorithms Lab	AIML	0	0	1	0	1	2	50	50	100
4	PCC	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 coordin ator	0	0	0	0	0	2	50		50
10	NCMC	C 22PED30	Physical Education (PE) (Sports andAthletics)	PE Director	U	U	U		U	2	50		50
		22Y0G30	Yoga	Yoga Teacher									
	Total 19 26 500 400 900								19	26			

12	NCMC	22DMAT31*	Basic Applied Mathematics-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	22AIM 343	Programming for IoT						
22AIM342	Perl Programming	22AIM 344	Java Script Programming						
Ability Enhancement Course-III (all are Laboratory Courses 0-0-1-0)									
22AIM351	Problem solving using Prolog	22AIM353	Data Analysis using MSExcel						
22AIM352 Python for Data Analytics 22AIM354 Exploratory Data Analysis									

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-
1-hour Lecture (L) per week=1Credit2-hours	Creditscoursesaretobedesignedfor40hoursinTeaching-
Tutorial(T) per week=1 Credit	LearningSession
2-hoursPractical/ Drawing(P)per week=1Credit	02- Credits courses are to be designed for 25 hours of
2-hous Self Study for Skill Development (SDA)	Teaching-Learning Session
per week= 1 Credit	01-Credit courses are to be designed for 15 hours of
	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)

			IV Sem	lester									
Sl.	Course	and Course	Course Title		(Dist	Cre trit	dit outi	ion	er Cr	nt tH	Ма	rks	
No.	(Code		BoS	L	Т	Р	S	0v all	C0 ac	CIE	SEE	Total
1	BSC/P CC	22MAC41	Discrete Mathematics and Graph Theory	BS	3	0	0	0	3	3	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	PCC	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	PCC	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
11	UHV	22UHK47	Universal Human Values and Life Skills	Any Dept	1	0	0	0	1	2	50	50	100
12	PROJ	22AIM48	Mini Project-I	AIML	0	0	1	0	1	2	50	50	100
10	NOMO	22NSS40	National Service Scheme (NSS)	NSS coordi nator	0	0	0				-		-
12	NCMC	22PED40	Physical Education (PE) (Sports and Athletics)	PE Direct or	0	0	0	0	0	2	50		50
		22YOG40	Yoga	Yoga Teache r									
			Total						21	30	600	550	1150
40	NCMC	220147474	* D		1	r	1	<u> </u>		1			
13	NUMU	22DMA141	Basic Applied Mathematics-II	R2	0	0	0	0	0	2	50		50

2DMAT41*: This non-credit mandatory course to be offered with only CIE and no SEE to Lateral Students

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.

Programming Language Course (PLC)

22AIM451	Ruby Programming	22AIM453	R Programming
22AIM452	C#and.Net Framework	22AIM454	Advanced Python Programming

AbilityEnhancementCourse-IV (all are Laboratory Courses 0-0-1-0)									
22AIM461	Database Programming using Casandra	22AIM463	GoLang Programming						
22AIM462	DataVisualization	22AIM464	Haskell 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)

CIE procedure forMini-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 for the project reportshallbethe sameforallthebatchmates

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 and requisite 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, butcompletion of the course ismandatoryfor the award of degree.

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-hous Self Study for Skill Development (SDA) per	01-Credit courses are to be designed for 15 hours of
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)

			V S	Semester									
SI.	Сог	irse and	Course Title	BoS	Di	Cre istri	edit butio	on	all' dits	act	Marks		
No.	Cou	rse Code		205	L	Т	Р	S	Over Cre	Cont Hrs	CIE	SEE	Total
1	HSMS	22AIM51	Software Engineering and Project Management	AIML	3	0	0	0	3	3	50	50	100
2	PCC	22 AIM 52	Machine Learning	AIML	3	0	0	0	3	3	50	50	100
3	PCCL	22AIIL52	Machine Learning Lab	AIML	0	0	1	0	1	2	50	50	100
4	PCC	22 AIM 53	Natural Language Processing	AIML	3	0	0	0	3	3	50	50	100
5	PCCL	22AILL53	Natural Language Processing Lab	AIML	0	0	1	0	1	2	50	50	100
6	PEC	22AIM54X	Professional Elective Course-I	AIML	3	0	0	0	3	3	50	50	100
7	AEC	22RMK55	Research Methodology and IPR	AIML	1	1	0	0	2	3	50	50	100
8	AEC	22SDK56	Critical and Creative Thinking Skills	AIML	0	0	1	0	1	2	50		50
9	UHV	22ESK57	Environmental Studies	Any Dept	1	0	0	0	1	1	50	50	100
10	PROJ	22AIM58	Mini Project-II	AIML	0	0	1	0	1	0	50	50	100
		22NSS50	National Service Scheme (NSS)	NSS coordinator									
11	NCMC	22PED50	Physical Education (PE) (Sports and Athletics)	Physical Education Director	0	0	0	0	0	2	50		50
		22Y0G50	Yoga	Yoga Teacher									
			Total								550	450	1000

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **NCMC**: Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **PEC**: Professional Elective Course, **PROJ**: Mini Project work **L**: Lecture, **T**: Tutorial, **P**: Practical **S**: **SDA**: Self Study for Skill Development, **CIE**: Continuous Internal Evaluation, **SEE**:Semester End Evaluation

Professional Elective Course-I							
22AIM541	Architecting AI Systems & Operating	22AIM544	Information Storage and Retrieval				
	Systems						
22AIM542	Internet of Things (IoT)	22AIM545	Computational Intelligence				
22AIM543	Advanced Java Programming						

22XXX51(HSMS)- This course must be pertaining to economics and management of the concerned degree program. The course syllabus should have both economics and management topics and the course title should bear the word Management.

For IT allied Branches: Software Product Management

For Core Branches: Engineering Economics and Management / Industrial Management and Entrepreneurship

Mini-project work: Mini Project is a laboratory-oriented/hands on course that will provide a platform to students to 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 do mini project as

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

(ii) A group 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 multidisciplinary (Applicable to all Branches)

CIE procedure for Mini-project:

(i) **Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the 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 the batches mates.

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

The CIE marks awarded for the Mini-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 for the project report shall be the same for all the batch mates.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses can be added to supplement the latest trend and advanced technology in the selected stream of engineering.

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 out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite 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, but completion of the course is mandatory for the award of degree.

Credit Definition:	03-Credits courses are to be designed for 40 hrs. in
1-hr. Lecture (L) per week=1Credit	Teaching-Learning Session
2-hrs.Tutorial (T) per week=1Credit	02- Credits courses are to be designed for 25 hrs. of
2-hrs. 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 hrs. 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)

	VI Semester												
SI.	d. Course and		Course Title	BoS	Credit Distribution				erall dits	ntact Irs.	Marks		
No.	Coui	rse Code	course mile	005	L	Т	Р	S	0v6 Cre	Con H	CIE	SEE	Total
1	PCC	22AIM61	Deep Learning	AIML	3	0	0	0	3	3	50	50	100
2	PCCL	22AIL61	Deep Learning Lab	AIML	0	0	1	0	1	2	50	50	100
3	PCC	22AIM62	Big Data & Cloud Technologies	AIML	3	0	0	0	3	3	50	50	100
4	PCCL	22AIL62	Big Data & Cloud Technologies Lab	AIML	0	0	1	0	1	2	50	50	100
5	PCC	22AIM63	Ethical Cyber Security	AIML	2	1	0	0	3	4	50	50	100
6	PEC	22AIM64X	Professional Elective Course-II	AIML	3	0	0	0	3	3	50	50	100
7	PROJ	22AIM65	Project Phase I	AIML	0	0	2	0	2	0	50	50	100
8	AEC	22SDK66	Problem Solving Skills	AIML	0	0	1	0	1	2	50		50
9	AEC	22AIM67X	Ability Enhancement Course – V	AIML	0	0	1	0	1	2	50	50	100
10	OEC	23NHOP6X X	Industrial Open Elective Course-I	Offering Dept.	3	0	0	0	3	3	50	50	100
		22NSS60	National Service Scheme (NSS)	NSS coordina tor									
11	11 NCMC 22PEI	22PED60	Physical Education (PE) (Sports and Athletics)	PE Director	0	0	0	0 0	0	2	50		50
		22Y0G60	Yoga	Yoga Teacher									
			Total						21	26	550	450	1000

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **NCMC**: Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **PEC**: Professional Elective Course, **OEC**: Open Elective Course, **PROJ**: Project work, **L**: Lecture, **T**: Tutorial, **P**: Practical **S**: **SDA**: Self Study for Skill Development, CIE: Continuous Internal Evaluation, **SEE**:Semester End Evaluation.

	Professional Elective Course-II								
22AIM641	Computer Networks	22AIM644	Augmented and Virtual Reality						
22AIM642	Computer Vision	22AIM645	Randomized Algorithms						
22AIM643	Embedded Systems								

Ability Enhancement Course – V							
22AIM671	AI powered UI design	22AIM674	Mobile Application				
			Development				
22AIM672	API and Microservices	22AIM675	Software Testing and Quality				
			Assurance				
22AIM673	Web Frameworks						
Industrial Open Elective Courses-I: Credit for OEC is 03 (L: T:P:S) can be considered as (3:0:0:0). The							
teaching and	eaching and learning of these Courses will be based on hands-on. The Assessment will be based on CIE and						

SEE in practical mode. This Courses will be offered by Centre of Excellence to students of all the branches. Registration to Industrial open electives shall be documented and monitored on college level.

Project Phase-I: Students have to discuss with the mentor /guide and with their help he/she has to complete the literature survey and prepare the report and finally define the problem statement for the project work.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses can be added to supplement the latest trend and advanced technology in the selected stream of engineering.

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 out between III to VI semesters (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and 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, but completion of the course is mandatory for the award of degree.

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

V SEMESTER

			SOF	TWAR	E ENC	GINEEI	RING A	AND PR	OJECT M	ANA	GEMEN	T		
Course Code	2 2	2AIM5	51					CI	CIE Marks 50					
L:T:P:S	3	:0:0:0						SE	E Marks			50		
Hrs / Week	3	3					To	Total Marks				100		
Credits	0	3	1	6.1			1 /	<u>Ex</u>	am Hour	<u>'S</u>		03		
Course outco	omes	: At th	e end	of the c	course	, the st	udent	will be	able to:		at maan			red in
22AIM51.1	U d	naerst evelon	ana tr ing lai	ie prino	cipies i	of soft	ware E	inginee	ring and j	proje	ct man	ageme	nt invoi	ved in
22AIM51.2	A	pply a	comp	rehens	ive pro	oject p	lan an	d estim	ation stra	tegie	es.			
22AIM51.3	Il	lustrat	e the i	mporta	ance o	f Requ	ireme	nt Mang	gement p	roces	ss.			
22AIM51.4	D	esign i	nnova	tive so	ftware	e soluti	ions, u	tilizing	modeling	g and	all arcl	nitectu	re techi	niques.
22AIM51.5	E	valute	the pr	oject p	rogres	ss and	manag	ge using	different	t proj	ject & p	rocess	metric	s.
22AIM51.6	С	reate a	n app	ropriat	e risk	manag	gemen	t plan b	ased on r	isk r	egister.			
Mapping of	Cours	e Outo	comes	to Pro	ogram	Outco	omes a	and Pro	ogram Sp	ecifi	c Outco	omes:		
	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO	P011	P012	PSO1	PSO2
22AIM511	2	-		-	-	-	-		-	10	_	-	-	-
22AIM51.2	3	-	-	-	-	-	-	_	-	-	_	3	2	-
22AIM51.3	-	3	-	-	-	-	-	-	-	-	-	-	2	-
22AIM51.4	-	-	3-	-	3							3	2	-
22AIM51.5	-	3	-	-	-	-	-	-	-	-	-	3	2	-
22AIM51.6	-		3	-	3	-	-	-	-	-	-	-	2	-
	6	OFTIN		NCINE					T	224	INC1 1			0.11
MODULE-1	$\frac{\mathbf{S}}{\mathbf{S}}$	ur I W	Dofin	INGINE	Coftwo	u – IN rolifo			ioc Chall	ZZA	$\frac{1M51.1}{c \text{ in } Su}$	stom	Dovolor	B HOUFS
Software pro	ocess	mode	ls: W	aterfal	l, Pro	totypir	ng, sp	iral, an	id agile	mod	el, Sof	tware	develo	pment
Case Study				Invest	igate t	he Cha	allenge	es of Sys	stem Dev	elopr	nent, C	ompar	e any tv	vo
Text Book			Tovt	Model Book 2	rn soft	ware c	$\frac{1}{1}$	pment <u>ا</u> 6	paradigm	S				
MODULE-2			S	YSTEM	ENGI	NEERI	. <u>1 - 2.1</u> ING	0	22A	M51	.3. 22A	IM51.4		8 Hours
Requirement	- Engi	neerin	g - Ii	nitiatin	g the	Requi	remer	ts Eng	ineering	proc	ess El	iciting	Requir	ements
developing u	se cas	es, Bu	ilding	the ana	alysis	model,	Softw	are Red	juiremen	t Doo	cument	Syster	n Archi	tectural
design, Subs	ysten	ns dev	elopm	ient, S	ystem	integ	ration	testing	g and de	ploy	ment,	System	o config	guration
management	-													
Case Study				Invest	igate /	Archite	ectural	design	and com	pare	any tw	o testii	ng techr	niques
Text Book	Т	ext Bo	ok 2:3	<u>8.1 - 3.9</u>), 4.1 -	4.9								
MODULE-3	1 t	0	DO	MAIN	MODE	LLING	r 		his at Oh	22AI	M51.4		1	B Hours
Multiplicity of	Definition, Ubject-Urientation and Class diagram - class and object, Ubject and Attribute, Association, Multiplicity of Pole Aggregation, Inheritance and Polymorphism, Visualizing domain model													
Case Study Fynlore the class diagram for any domestic application development														
Explore tools for UML class diagram														
Text Book	0k Text Book 2: 5.1- 5.10													
MODULE-4MANAGING SOFTWARE PROJECT (MSP)22AIM51.2, 22AIM51.58 Hours					8 Hours									
Project Management Concepts, Process and Project Metrics-Estimation for Software Projects,														
Decomposition Techniques, Empirical Estimation models, Project Scheduling- Maintenance and														
Reengineering.														
Lase Study Numerical Problems and case studies on: 1 Pasic Effort Estimation 2 Function Points Estimation 2 CoCoMe II				ſ										
	I.Dasic Ellort Estimation 2. Function Points Estimation 3. CoCoMo II Estimation 4. Cost Renefit Analysis 5. Agile Estimation				L									
Text Book	Т	ext Bo	ok 4: (.9	3000		y						
							16							

ΜΟΟΙ							
Rick i	Risk identification - Assessment - Risk Planning - Risk Management - PERT technique - Monte Car						Monte Carlo
simul-	simulation – Resource Allocation – Creation of critical paths – Cost schedules						
Case	Case Study						
Cuse c	1 PERT/CPM 2 Monte Carlo Simulation						
Text F	Text Book Text Book 1: 7 1-7 14 11 1-11 9						
	CIF Assessment Pattern (50 Marks – Theory)						
	issessment i utte	Test	Assessment(s) *	N	100		
	RBT Levels	25	15		10		
L1	Remember	5	15		5		
12	Inderstand	5	-		5		
1.3	Annly	10	5		5		
14	Analyze	5	10				
15	Fyaluate	-					
L6	Create	-	-				
*Δ.	ssments are to be	selected from t	he assessment list att	ached to	Annendiv	Α	
SFF A	ssessment Datter	m (50 Marbe -	Theory)		- appendix	4 81	
	DRT Lovala	Fyam M	arks Distribution (5	0)			
14	KDT Levels			0)			
	Remember Understend		10				
	Annly		10				
	Apply		20				
	Allalyze		10				
	Croato		-				
	Liedle		-				
1. So 1. So 1. So 1. 2. Ob 1. 2. Ob 1. 3. So 0.1 4. So 0.0 Refer 1. "So: 2. Mai Reprint 3. Effect ISB 4.Soft 93528	 Suggested Learning Resources: Text Books: 1. Software Project Management by Bob Hughes, Mike Cotterell and Rajib Mall, Fifth Edition, Tata McGraw Hill, New Delhi, 2017. ISBN: 9780077122799, 0077122798 2. Object Oriented Software Engineering, By David Kung, McGraw Hill, 2013, ISBN: 9781259080791, 125908079X. 3. Software Engineering by Ian Sommerville,9th edition, 2016, PearsonEdu. ISBN: 9780133943030, 0133943038 4. Software Engineering – A Practitioner's Approach by Roger S Pressman,7thedition, 2014, ISBN: 007769774X, 9780077697747 Reference Books: 1. "Software Project Management: A Unified Framework" by Walker Royce,1998. ISBN: 9780321734020. 2. Managing Global Software Projects McGraw Hill Education (India), Gopalaswamy Ramesh, Fourteenth Reprint 2013. ISBN: 9781283922418 3. Effective Software Project Management by Robert K. Wysocki – Wiley Publication, 2011. ISBN: 9780470446539 4. Software Project Management in Practice by Pankaj Jalote, 5thedition 2015. ISBN: 9789352868827, 935286882X 						
 https://onlinecourses.nptel.ac.in/noc20_cs68/preview https://onlinecourses.nptel.ac.in/noc19_cs70/preview Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning: Visit to any software development organization 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 							
	17						

Machine Learning														
Course Code	22	AIM5	52				CIE Marks				50			
L:T:P:S	3:0	0:0:0					SEE	Marks	5			50		
Hrs / Week	3						Tota	l Mar	ks			100		
Credits	03	}					Exar	n Hou	rs			03		
Course outco	me	s: At t	he en	d of th	e cour	se, the s	studen	t will	be abl	e to:				
22AIM52.1 U	nde	rstan	d the f	fundar	nental	princip	oles of	Machi	ne Le	arning	and its	applica	tions.	
22AIM52.2 A	.pply 10de	y logis elling	stic reg binary	gressio z and r	on as a nulti-c	i classifi class cla	ication ssifica	algor tion p	ithm t roblei	to dem ms.	onstrat	e the pr	oficienc	y in
22AIM52.3 A	naly	ze th	e deci	sion tr	ee alg	orithm,	its str	ength	s and	weakn	esses in	modeli	ng com	plex
d	ecis	ion bo	ounda	ries ar	nd han	dling ca	ategori	cal an	d nun	nerical	data.		0	
22AIM52.4 E	valu	iate M	1L moo	del pei	forma	nce (su	pervis	ed an	d unsı	upervi	sed algo	rithms)	using a	dvanced
m	netri	ics su	ch as p	orecisi	on, re	call, F1	score,	and R	OC-AL	JC curv	ve for ef	fectiver	less and	
re	obus	stness	5.											
22AIM52.5 C	reat	e effe	ctive o	classifi	catior	ı model	s using	g supe	rvised	l and u	nsuper	vised al	gorithm	S.
22AIM52.6 S	ynth	nesize	ethica	al cons	sidera	tions in	Machi	ne Lea	arning	g (Algo	rithms)	, propos	sing stra	tegies to
a	ddre	ess fai	irness,	accou	intabil	ity, and	l trans	paren	cy in n	nodel	develop	ment	U	0
Mapping of C	Cou	rse O	utcon	nes to	Prog	ram O	utcon	les an	d Pro	ogram	Specif	ic Outc	omes:	
P	01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIM52.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM52.2	3	-	-	-	-	-	-	-	-	-	-	2	3	2
22AIM52.3	-	3	-	-	_	-	-	-	-	-	-	2	3	2
22AIM52.5		3	-		-	-	-	-	-	-	-	2	3	2
22AIM52.1	_	-	2	-	-	-	-	-	-	-	-	2	3	2
22AIM52.5			<u>ゝ</u>	3	2			2		_	_	2	3	-
	Int	rodu	5 ction	to Ma	chino	Loorni	- ng	3 22		$\frac{1}{21}$		2		Hours
MODULE-1 Undorstandin	α M	lochi		ornin		inition	and 7		of M	2.1, 22	Loarni	$\frac{2}{na}$	ication	of Machina
Learning Ma	g M chin		arning		g. Dei arithm	nnuon s. Sun	anu i	ypes d Ur		rvisod	and	Somi-Su	norviso	d Learning
Algorithms Ma	achi	nolo	arning	5 Mod	ols -M	ndel Fv	aluati	on \mathbf{M}	otrics	· Conf	usion M	latriv F	recision	n Recall F1
Score -ROC Cu	irve	and	AUC-I	ROC	Advan	ced Te	chnia	ues: 1	Featur	re Scal	ing and	l Norm	alization	-Encoding
Categorical Var	riahl	les-Tr	ain-te	st Snli	t and (Cross-v	alidati	on	cutui	e beu	ing un		unzació	Liebuing
Text Book	Te	xt Bo	ok 1: (2h 1.4	t and		anaan	0111						
MODULE-2	Sun	ervis	sed Le	arnin	g Reg	ression	and			22	AIM52	3	8	Hours
	Clas	ssific	ation	Algori	ithms	0001011	unu							
Regression: In	tro	ductic	on to R	egress	sion- F	Regressi	ion Mc	dels-	Linear	r Regre	ession. F	olvnom	nial Reg	ression
Decision Tree	s: In	itrodi	uction	to Dec	cision	Trees-T	'ree Co	nstru	ction.	Splitti	ng Crite	ria. and	Prunin	g-Handling
Missing Values	and	l Cate	gorica	l Feati	ures- (Gini Ind	ex-ID3	-CART	Γ.	- F	0	-,	- (5 0
Case study	Pre	dictin	g sala	ries w	ith De	cision T	'ree.							
Text Book	Text Book Text Book 1: Ch 4													
MODULE-3	Sim	ilarit	ty bas	ed Mo	dels				-	22AIM	52.4, 22	AIM52.	5 8 I	lours
k-Nearest Neighbors (k-NN). Introduction to k-Nearest Neighbors Algorithm-Distance Metrics and														
Choosing 'k' -k-NN for Classification. Logistic Regression- Multiclass Classification with Logistic Regression.														
Text Book Text book 1: Ch 8														
MODULE-4	Probabilistic based Models 22AIM52.5. 22AIM52.6 8 Hours													
Naive Baves: I	ntro	ducti	on to	Naive	Baves	Classifi	er-Bay	ves' Th	leorer	n and (Conditio	onal Pro	bability	-Gaussian
Multinomial. ar	nd B	ernoi	ılli Na	ive Ba	ves. B	avesian	Belief	Netw	ork-E	M algo	rithm.		Sasiney	200001011)
Text Book	Text Book Text Book 1: Ch 6													
MODULE-5	Uns	super	vised	Algor	ithms	;		22AIN	152.5,	22AIN	152.6		81	lours
1		F		0					,				1	

Introduction to Rule Based learning and Association rules- Apriori Algorithm, FP-Growth. Introduction to unsupervised Algorithms- types of clustering algorithms- k-means clustering algorithms-DBSCAN clustering algorithm.

Case Study	Using Super market dataset, analysis the frequent Item sets (Association Rules algorithms)
Text Book	Text Book 1: Ch 6. Text Book 2: Ch 4,6

CIE Assessment Pattern (50 Marks – Theory)

			Marks Distribution						
	RBT Levels	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	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. Tom Mitchell, "Machine Learning", McGraw Hill, 1997. ISBN 9780071154673, 0071154671
- 2. Charu C. Aggarwal, "Data Mining", Springer, 2015. ISBN: 9783319141428, 3319141422

Reference Books:

- 1. Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Müller and Sarah Guido, 2016. ISBN: 9781449369903
- 2. Charu C. Aggarwal, "Data Mining", Springer, 2015. ISBN: 9783319141428

Web links and Video Lectures (e-Resources):

- https://towardsdatascience.com/the-fp-growth-algorithm-1ffa20e839b8
- https://www.analyticsvidhya.com/blog/2021/08/decision-tree-algorithm/
- https://ocw.mit.edu/courses/15-097-prediction-machine-learning-and-statistics-spring-2012/eb02afbd0a9c32637dd64cdb6b76c2f1_MIT15_097S12_lec01.pdf

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

						MAC	HINE	LEAR	VING	LAB						
Course Cod	е	22AIL	.52						CIE	Marks		50				
L:T:P:S		0:0:1:	0						SEE	Marks		50				
Hrs. / Week		2							Tot	al Mark	S	100				
Credits		1							Exa	m Hour	S	03				
Course outo	come	es: At	the e	nd of t	he cou	ırse, tl	he stu	dent w	vill be	able to:						
22AIL52.1		Under	stan	d the i	mplen	nentat	ion of	proce	dures	for mac	hine lea	rning a	lgorithn	15.		
22AIL52.2	Analyze various machine learning models with appropriate data sets to improve the accuracy in real world problem.										ove the					
22AIL52.3		Evalua	ate th	ie perf	ormai	nce of	differe	ent Lea	arning	models						
22AIL52.4		Desig	ı Java	a/Pyth	on pr	ogram	s for v	various	s Lear	ning alg	orithms	5.				
Mapping of	ΈΟι	irse C	outco	mes	to Pro	ogram	n Outo	comes	and	Progra	m Spec	ific Ou	tcomes	:		
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2		
22AIL52.1	2	-	-	-	-	-	-	-	-	-	-	3	3	3		
22AIL52.2		3	-	-	-	-	-	-	-	-	-	3	3	3		
22AIL52.3		3	3	-	3	-	-	-	-	-	-	3	3	3		
22AIL52.4			3	-	3	-	-	-	-	-	-	3	3	3		
Pgm. No.				List	of Ex	perim	ents /	/ Prog	rams			Hours		COs		
				Pre	requi	site F	vneri	monto	/ Pro	orams	/ Demo					
	•	Rasic	Duth	on nr	aram	using	librar	ioc	, 110	gi ani s	/ Deme	,				
		Read	and	write :	a CSV f	file usi	$\frac{1101 a}{100 nv}$	thon				2		NA		
1	IANI-A Develop a python program to perform binary elaceification a								ion and		22411	52.1				
1	eva	aluate	a py neri	formai	ices i	ni to p nsing	Confi	in Dina Ision	matri	x ROC	Curve	L	22AIL	52.1, 52.2		
	Pre	cision	Rec	all and	l F1 Sc	ore fo	or any	given	datase	n, nou	Guive	2	22AIL	52.3.		
	110		, 100	un un			, any	8., 611	aatabt				22AIL	52.4		
2	5	,	,	1 6	D · 1			1.7			6		22AIL	52.1.		
	Dev	velopi	mode	els for	Ridge	regree	ssion a	and La	sso re	gressior	i for	2	22AIL	52.2,		
	the	given	aata	set an	a evai	uate n	s peri	ormar	ice the	en comp	are	2	22AIL	52.3,		
	abc	ovetw	o me	thous.									22AIL	52.4		
3													22AIL	52.1,		
	Dev	velop	a mu	ltiple	regres	ssion i	model	for th	ne give	en data	set and	2	22AIL	52.2,		
	eva	aluate	its pe	erform	ance							2	22AIL	52.3,		
													22AIL	52.4		
4	Wr	ite a p	rogr	am to	demo	nstrate	e the v	vorkin	ig of th	ne decis	ion tree		22AIL	52.1,		
	Bas	sed CA	ART a	lgorit	hm. U	se an	appro	priate	data	set for t	ouilding	2	22AIL	52.2,		
	the	decis	sion	tree a	nd ap	ply th	iis kn	owled	ge to	classify	a new		ZZAIL	52.3,		
	Sar	nple.											ZZAIL	52.4		
5	Der	volon		~~~~	for loo	istics			a dal i	forthoo				52.1,		
	Develop a program for logistics regression model for the given 2 22AIL52.2,									52.2, 52.2						
	data and compare performance with other regression model									52.5, 52.4						
6	Wr	ite o n	rogr	am to a	demor	nstrate	tho th	Jorkin	σ of th	e decisi	on tree		22AIL	52. 4 52.1		
	has	ree a p sed ID	3 ala	orith	n IIca	an an	nronr	iate da	ata set	for huil	ding		22411	52.2		
	the	decis	ion ti	ee and	l annl	v this	knowl	edge t	n class	sify a ne	w	2	22AIL	52.2,		
	san	nple.	.511 (1		a appi	,		cuge t	o cius.	ing a ne	••		22AIL	52.4		
	541	.г. с					P	ART-	В			1				
7	Wr	ite a p	rogra	am to i	mplei	nent k	-Near	est Ne	ighbo	ur algor	ithm to	_	22AIL	52.1,		
	clas	ssify tl	<u>ne</u> da	ta set.	Print	both c	orrect	t and v	vrong	predicti	ons.	2	22AIL	52.2,		

	Java/Python ML library classes can be used for this problem.		22AIL52.3,
			22AIL52.4
8	Assuming a set of documents that need to be classified, use the		22AIL52.1,
	naïve Bayesian Classifier model to perform this task. Built-in	2	22AIL52.2,
	Java classes/API can be used to write the program. Calculate the	Z	22AIL52.3,
	accuracy, precision, and recall for your data set.		22AIL52.4
9	Write a program to construct a Payosian network for given		22AIL52.1,
	dataset Java / Duthen ML library classes / ADL can be used to	2	22AIL52.2,
	udiasel. Java/Pytholi ML horary classes/API call be used to	Z	22AIL52.3,
			22AIL52.4
10	Write a program to implement the paive Devecien classifier		22AIL52.1,
	for a completraining data set stored as a CSU file Compute the	2	22AIL52.2,
	for a sample training data set stored as a .c.sv me. compute the		22AIL52.3,
			22AIL52.4
11	Apply & means and DRSCAN Clustering algorithms to generate		22AIL52.1,
	Apply K-means and DDSCAN clustering algorithms to generate	С	22AIL52.2,
	compare	Z	22AIL52.3,
	compare.		22AIL52.4
12	Write a Python program to implement the Apriori algorithm using		22AIL52.1,
	a given transaction dataset stored as a .CSV file. Identify frequent	Э	22AIL52.2,
	item sets and association rules from data file.	2	22AIL52.3,
			22AIL52.4

PART-C Beyond Syllabus Virtual Lab Content

1. K-means algorithm: https://vlab.spit.ac.in/ai/#/experiments/3

2. Linear Regressions methods: https://vlab.spit.ac.in/ai/#/experiments/10

3. K-nearest neighbors (KNN) algorithm: https://vlab.spit.ac.in/ai/#/experiments/4

4. Logistics Regression method: https://vlab.spit.ac.in/ai/#/experiments/11

CIE As	CIE Assessment Pattern (50 Marks – Lab)								
RBT Levels		Test (s) (20)	Weekly Assessment (30)						
L1	Remember	-	-						
L2	Understand	5	10						
L3	Apply	5	10						
L4	Analyze	10	10						
L5	Evaluate	-	-]					
L6 Create -									
SEE As	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.Tom Mitchell, "Machine Learning", McGraw Hill, 1997 ISBN: 9780071154673

2. E. Alpaydin, "Introduction to Machine Learning", MIT Press, 2020. ISBN: 9780262043793

				NAT	URAL	LANG	UAGE	PROC	ESSIN	IG				
Course Code	22AI	M53						CI	E Mar	ks		50		
L:T:P:S	3:0:0	0:0						SE	E Mai	'ks		50		
Hrs. / Week	3							To	otal M	arks		100		
Credits	03	03 Exam Hours 03												
Course outcon	nes: At	s: At the end of the course, the student will be able to:												
22AIM53.1	Unde	erstan	d bas	ics of	linguis	stics, p	robab	ility a	nd stat	tistics a	ssociate	d with l	NLP.	
22AIM53.2	Analy	yze th	e sem	antic	of nat	ural la	nguag	e.						
22AIM53.3	Desig and r	gn an e nodel	end-t -builc	o-end ling te	NLP a echniq	pplica ues.	tion b	y integ	grating	g prepro	ocessing	, featur	e extra	ction,
22AIM53.4	Evalu vario	iate th ous NL	ne pei P tas	form ks suc	ance o ch as te	f adva ext cla	nced t ssifica	ransfo tion, s	ormer : umma	models rizatior	(e.g., BE 1, and to	ERT, GP pic mod	Г-З) in deling.	
22AIM53.5	Demo	onstra	ate th	e wor	king of	fsequ	ence n	nodels	for te	xt proce	essing.	•	U	
22AIM53.6	Imple	ement	t the I	NLP a	pplicat	ions o	n eme	rging	trends	s with e	thical in	nplicatio	ons.	
Manning of Co	nirse	Outco	omes	to P	rnora	m Ou	tcome	s and	l Prog	ram Si	necific (Outcon	nes	
	P01	P02	PO3	P04	P05	P06	P07	POR	P09	P010	P011	P012	PS01	PSO2
22AIM53.1	2	-	-	-	-	-	-	-	-	-	-	-		-
22AIM53.2	-	3	-	-	-	-	-	-	-	-	-	2	3	2
22AIM53.3	-	-	3	-	-	-	-	-	-	-	-	2	3	2
22AIM53.4	-	-	3	-		-	-	-	-	-	-	2	3	2
22AIM53.5	-	-	3	-		-	-	-	-	-	-	2	3	2
22AIM53.6	-	-	3	-	3	-	-	2		-	-	2	3	2
MODULE-1 Natural Language Processing 22AIM53.1								8 I	Hours					
Components - Basics of Linguistics and Probability and Statistics - Words-Tokenization-Morphology:														
Inflectional Mo	orphol	ogy -	Der	ivatio	nal M	lorpho	ology.	Finite	e-State	Morpl	nologica	ıl Parsi	ng -	Porter
Stemmer.			Car	-										
Lase Study			Las	e stud	$\frac{1000}{1000}$	$\frac{NLPa}{224}$	opiicat	.10NS 1	n vario	bus indi	istries.			
MODILI F-2	Some	antic	Analı		K 1. UI	2,3,4	2 24	IM23.	2				81	Jours
Representing N	Meanin	ng-Me	aning	Stru	cture	of Lar		-First	<u>-</u> Orde	r Predi	cate Cal	lculus F	lenres	enting
Linguistically F	Relevai	nt Cor	ncept	s -Svi	itax-D	riven	Semar	itic Ai	nalvsis	s - Sem	antic At	ttachme	ents -S	vntax-
Driven Analyze	er. Rol	bust A	Analy	sis -	Lexen	nes an	d The	eir Sei	nses -	Intern	al Struc	cture -	Word	Sense
Disambiguation	ı -Info	rmatio	on Re	trieva	ıl									
Text Book	Text	Book	1:13	8,14,1	8									
MODULE-3	WOR	ND RE	PRES	ENTA	TION		8 H						Hours	
N	AND	PART	COF S	SPEEC	<u>H</u>		ZZAI	M53.2	., 22AI	M53.3		1		N
N-grams and		age n	node	is –Sn ticc	noothi TE IDI	ng - Ex	aluati	ng La	nguag	e Mode	I - Text (classific	ation-	Naive
dayes classifier days classifier $dayes classifier days days days days days days days days$	veo	Sneed	eman sh Ts	ucs –	IT-IDI	г — VV(101 Би	ли Еff htities	_Nor	nigs: V red Fr	voruzv ntity Ta	ec, GIOV agging_C	e anu Fa 'onditio	ast rex nal Pr	indom
Fields(CRFs)	urt OI	Speed	.11 10	551118	, -ivall		innes	-ivail	icu El	11119 10	ssing-C	Jonuitio	παι Για	muoili
Text Book	Text	Book	1: Ch	1 4,5,1	10,17,1	19	22.47		22.47					T
MODULE-4	Transformer and Topic 22AIM53.4, 22AIM53.5 Models							81	lours					
Introduction	Introduction to transformer architecture-BERT (Bidirectional Encoder Representations from							from						
Transformers)-GPT-3 (Generative Pre-trained Transformer 3)-Fine-tuning transformer models for NLP														
tasks. Topic M	tasks. Topic Modeling: Introduction to topic modeling-Latent Dirichlet Allocation (LDA)-Non-Negative							gative						
Toxt Pools	Matrix Factorization (NMF).													
	1 ext	DUUK	1:10, ne ar	10 10 Fr	turo		2211	M22 5	221	M23 6			QI	Joure
	Dire	ctions	s in N	LP	LUIC			14133.3	, 2271	1133.0				10013
Applications	and	Imple	emen	tatio	n of	NLP:	Sent	i <u>me</u> nt	Anal	ysis -	Text	<u>Class</u> ific	cation-	Text

Summarization- Named Entity Recognition code- Chatbots and Dialogue systems. **Future Trends in NLP-**Emerging trends and research areas-AI-driven NLP tools and services.

Case Study Using NLP for Healthcare summaries

Text BookText Book 1: 17-20

CIE Assessment Pattern (50 Marks – Theory)

	RBT Levels	Test	Assessment(s) *	MCQ
		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	SEE Assessment Pattern (50 Marks – Theory)								
	DDT Lovala	Exam Marks							
	RD1 Levels	Distribution (50)							
L1	Remember	10							
L2	Understand	10							
L3	Apply	20							
L4	Analyze	10							
L5	Evaluate	-							
L6	Create	-							

Suggested Learning Resources: Text Books:

1) Daniel Jurafsky and James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition (Prentice Hall Series in Artificial Intelligence), 2017. ISBN: 0133252930, 9780133252934

2) Jacob Eisenstein. "Natural Language Processing ", MIT Press, 2019. ISBN: 9780262042840 https://web.stanford.edu/~jurafsky/slp3/(Updated Text book content available link)

Reference Books:

- 1) Samuel Burns "Natural Language Processing: A Quick Introduction to NLP with Python and NLTK, 2019. ISBN: 9781699028452, 1699028451
- 2) Christopher Manning, "Foundations of Statistical Natural Language Processing", MIT Press, 2009. ISBN: 9780262303798, 0262303795

Web links and Video Lectures (e-Resources):

- https://archive.nptel.ac.in/courses/106/106/106106211/
- https://www.nptelvideos.com/course.php?id=424
- https://www.youtube.com/watch?v=rmVRLeJRkl4

- Online Class using Jeopardy
- Contents related activities (Activity-based discussions)
 - > For active participation of students, instruct the students to read research topics on NLP
 - Class Presentation.

					NA	TURA	L LAN	NGUA	GE PR	OCESS	SING LA	B				
Cou	irse Co	de	22AII	.5 3						CIE	Marks			50		
L:T	:P:S		0:0:1:	: 0						SEE	Marks			50		
Hrs	5. / Wee	k	2							Tot	al Mark	S		10	0	
Cre	dits		1							Exa	m Hour	'S		03		
Coι	irse ou	tcome	es: At	the e	nd of t	the cou	urse, ti	he stu	dent w	vill be	able to:					
22AI	L53.1	Appl (NLT	y the 'K).	conce	ept of 1	natura	al lang	uage p	rocess	sing (N	NLP) usi	ng Nat	ural	Lan	guage T	oolkit
22AI	L53.2	Build text corpora with tokenization, Stemming, Lemmatization using visualization														
22AI	L53.3	Utiliz	itilize word embedding models (e.g., Word2Vec, GloVe), part-of-speech tagging, named													
		entit	y reco	gniti	on to	captur	e ling	uistic f	eature	es and	semant	ic relat	tions	ships	in text	
22AI	L53.4	Appl	y adva	ance	1 NLP	model	ls, tran	storm	ers an	d topi	c model	ing tec	hnic	jues,	to perf	orm text
		class	ificati	on, s	umma	rizatio	on, and	l topic	disco	very, a	and inte	grate ti	hese	met	chods in	to end-
Ma		to-er		P app	nicatic	ons.					D-+	C	-: C		•	
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22/		201	PUZ	PU3	P04	P05	P06	P07	P08	P09	P010	PUI		210	2501	P502
221	$\frac{1153.1}{1153.2}$	3	•	-	-	•	-	-	-	-	-	-		2	3	2
221	AIL53.2	-	3	-	•	•	-	-	-	-	-	-		2	3	2
221	$\frac{1153.3}{1152.4}$	-	-	-	3	3	-	-	-	-	-	-		2	3	2
	$\frac{11253.4}{2}$	3	-	-	- Lict	- of Ev	- nonim	·	- / Drog	-	-	-	Ц	2	3	<u> </u>
гgi	II. NO.				Duona		per m to Evr	ients /	riug	I dills Drogs	ama / I	Jama	п	Juis		LUS
	D	-l T			riere	quisi	te Exp		ents /	Flogi	allis / I	Jeino				
	• Py		rogra	immi moto	ng/ Ba	asic Pa	аскаде	es					2		N	A
	• Da	SICS OI	Auto	mata	Theo	ry con	cepts	DA								
1	Chasse	E			J J	h.			KI-A	1:00				22		
T		e an E	ngiisn	wor	a, ana dan a	see no	JW IT IS	s usea	in the	amer	ent exai	npie		221		,
	lexis D	у шак	ang co	oncoi	Tuance	es.							2	221		,
														221		,
2	Counti	ngVo	cabul	aru										221	411.5.5.4	
2	a) How	ing vu v man	u wor	ary. de (t	obone	aro tl	horo ir	n tho σ	ivon ta	vt				22/	AIL53.1	,
	h) Hov	v man	y wor v diffe	us (u pront	word	s (tyne	nere n sel are	i there	in the	σiven	tevt		2	22/	AIL53.2	,
	c) How	i man	y time	s do	es the	word	the oc	cur in	the tex	given zt	ICAL		2	22/	AIL53.3	,
	d) Wh:	at is th	nis as :	a ner	centag	voru ve of a	ll the s	words	in the	text?				22/	AIL53.4	
3	~y			- PCI	June	, u	1		010					22.	AIL53.1	
	Write	a prog	ram t	o pei	·form '	Token	izatio	n, sten	nming	to car	rv out tl	ne	~	22/	AIL53.2	,
	analys	is witl	n text	corp	ora.			,	- 0		<i>,</i>	-	2	22/	AIL53.3	,
	5			1										22/	AIL53.4	,
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	write	a code	e to re	move	estop	woras	s with	NLIK	in Pyti	ion			Ζ	22/	AIL53.3	,
														22/	AIL53.4	
5					-	-	-	-	-					22/	AIL53.1	,
	Write	a nroo	ram f	or N	aram	modol	with		in Dutl	lon			2	22/	AIL53.2	,
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6			_		_						_			22	AIL53.1	,
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														22/	AIL53.4	
1								PA	RT-B							

7	Develop a python prog given word corpus.	gram f	bedding using Word2Vec for a	2	22AIL53.1, 22AIL53.2, 22AIL53.3, 22AIL53.4					
8	Develop a python prog text.	gram t	o implemen	2	22AIL53.4 22AIL53.1, 22AIL53.2, 22AIL53.3, 22AIL53.4					
9	Develop a program to (Simple abstractive te	imple xt sun	ment text su nmarization	ummarization methods)	2	22AIL53.1, 22AIL53.2, 22AIL53.3, 22AIL53.4				
10	Develop a python prog classification task.	a BERT model for text	2	22AIL53.1, 22AIL53.2, 22AIL53.3, 22AIL53.4						
11	Build Bag of Words mo	P using Python	2	22AIL53.1, 22AIL53.2, 22AIL53.3, 22AIL53.4						
12	Build language transla	2	22AIL53.1, 22AIL53.2, 22AIL53.3, 22AIL53.4							
1. 2. 3. 4. 5.	Word Analysis : https:/ Word Generation: https Morphology : https://n N-grams: https://nlp-ii N-grams smoothing: ht	/nlp-i s://nlp lp-iiit ith.vla tps://	iith.vlabs.ac o-iiith.vlabs. h.vlabs.ac.in lbs.ac.in/exj nlp-iiith.vla	in/exp/word-analysis/ .ac.in/exp/word-generation/ a/exp/morphology/ p/n-grams/ bs.ac.in/exp/n-grams-smoothing	g/					
CIE	Assessment Pattern (50 M	arks – Labj		7					
	RBT Levels	Test	(s)(20)	Weekly Assessment (30)						
L1	Remember		-	-						
L2	Understand		5	10						
L3	Apply		5	10						
	Analyze		10	10						
	Evaluate		-	-	4					
	create			-						
SEE	SEE Assessment Pattern (50 Marks - Lab)									
	RBT LevelsExam Marks Distribution (50)									
L1	L1 Remember -									
L2	L2 Understand 10 L2 Apply 20									
	Apply			20	_					
	Analyze			20						
	Evaluate			-	_					
	LO Create -									
Sug Ref 1. "?	Suggested Learning Resources: Reference Books: 1. "Speech and Language Processing" by Daniel Jurafsky and James H. Martin, Pearson, 2 nd Edition, 2014.									

ISBN: 0133252930, 9780133252934

		A	RCHI	ГЕСТ	ING A	I SYST	EMS	AND	OPERA	TING S	YSTEMS	5	
Course Code	22AI	M541				CIE	Marks	5			50	-	
L:T:P:S	3:0:0):0				SEE	Mark	S			50		
Hrs / Week	3					Tota	l Mar	·ks					
Credits	03 Exam Hours 03												
Course outco	mes: A	At the e	nd of	the c	ourse,	the st	udent	will k	be able	to:			
22AIM541.1	Under	stand t	he Ba	sics o	of AI Sy	vstem .	Archit	tectur	e and C)peratir	ig Syster	ns conc	epts.
22AIM541.2	Explai	n how i	nstru	ction	level,	data le	evel a	nd th	read lev	vel para	llelism i	s utilize	d in architecture.
22AIM541.3	Optim	izing th	e cac	he pe	rform	ance u	sing v	variou	s techn	iques.			
22AIM541.4	Analyz	ze comr	nunic	ation	betw	een int	ter pr	ocess	commı	inicatio	n, deadl	ocks an	d
22AIM541 5	Syncin Imnlei	ment Cl	PILScl	redul	ing alg	orith	n Pag	e Rer	laceme	ent algo	rithm ar	nd mem	ory management
22111.10 11.0	proble	ems.	0 001	icuui	ing ui	Jorrein	, i ug		Jacom	int algo	i i di ili di	iu mem	ory management
22AIM541.6	Evalua	ate the p	perfor	man	ce virt	ual me	emory	v and	disk sto	orage de	evices w	ith diffe	rent methods.
Mapping of C	Course	e Outco	omes	to P	rogra	m Out	tcom	es an	d Prog	ram Sp	oecific ()utcom	es:
	PO PC)2 PO3	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
	1												
22AIM541.1	3 -	-	-	-	-	-	-	-	-	-	-	-	
22AIM541.2	- 3	-	-	-	-	-	-	-	-	-	2	-	2
22AIM541.3		3	-	-	-	-	-	-	-	-	2	-	-
22AIM541.4	- 3	-	-	3	-	-	-	-	-	-	2	-	-
22AIM541.5		-	3	3	-	-	-	-	-	-	2	-	-
22AIM541.6		-	3	3	-	-	-	-	-	-	2	-	-
MODULE-1	Basics	s for Sy	stem	Arch	itectu	ire	2	2AIM	541.1, 2	22AIM5	41.3	8 H	ours
Introduction to	archit	ecture-	CISC	and R	ISC Ar	chitec	ture-l	nstru	ction s	et: Instr	uction S	et Archi	tecture. Instruction
formats, Instru	ction s	set cate	gories	s - Ad	dressi	ing mo	des. I	Perfor	mance	metrics	s: Execut	tion tim	e calculation, MIPS,
MFLOPS. Mem	orv sv	stems l	ierar	chv:	Desig	n of so	calable	e mei	norv u	sing RA	M's- RO	M's chi	ps. Cache memory:
principles. Cacl	ne mer	norv m	anage	emen	t tech	niques	. Tvp	es of	caches.	caches	misses.	Mean n	nemory access time
evaluation of ca	ache.	- 5	0			1	, ,,		····,		,		,
Text Book	Text	Book 1	: Ch 2										
MODULE-2	Para	llelism					22	AIM5	41.2			8 H	ours
Parallelism: In	structi	ion -Le	vels P	aralle	elism:	Conce	pts a	nd Ch	allenge	s- Basio	c Compi	ler Tech	inique for Exposing
ILP-overcomin	g Data	a Hazar	·ds w	ith D)vnam	ic Sch	edulii	ng. D	ata-Lev	el para	llelism:	Vector	Architecture-SIMD
instruction Set	Exten	sions fo	or Mu	ltime	edia- G	raphic	cs Pro	cessi	ng Unit	s Archit	tectures	. Thread	d-Level parallelism:
Centralized Sha	ared-M	lemorv	Archi	tectu	re-Dis	tribut	ed Sha	ared-	Memor	v and D	irectorv	-Based	Coherence.
Text Book	Text	Book 1	Ch 3	4,5							J		
Case Study	TPU	Archite	cture										
MODULE-3	Opera	ting S	Syster	ns -	Pro	cess ²²	2AIM5	541.1,	22AIM	541.4		8 Ho	ours
	Mana	gemen	t										
Operating Syst	ems S	ervices	- use	r and	l Oper	ating	systei	m int	erface-	System	n call- S	ystem s	ervices-Linker and
Loader- Operat	ing Sys	stem St	ructu	re. Pr	ocess:	Proce	ss Cor	icept-	Operat	tion on l	Processe	es-Proce	ess Scheduling- CPU
Scheduling: Pre	e-empt	tive, noi	n-pre-	emp	tive-M	ultipro	ocesso	or sch	eduling	g.			_
Text Book	k Text Book 2: Ch 2,5												
MODULE-4	LE-4 Concurrency 22AIM541.4, 22AIM541.5 8 Hours												
۲hreads- Multithreading models- Threading Issues. Deadlocks- Resource allocation and management- Deadlock													
handling mechanisms: prevention, avoidance, detection, recovery from deadlock. Inter-process communication,													
Synchronization- Implementation of synchronization primitives: Peterson's solution, Bakery algorithm-													
Semaphores-Cl	<u>assi</u> cal	<u>l syn</u> chi	roniza	<u>itio</u> n	<u>pro</u> ble	ems.							
Text Book	Text	book 2:	Ch 4,	6,8									
Case Study	Prod	ucer -C	onsun	ner p	robler	n	<u> </u>		4 = 00				
MODULE-5	Memo	ory and	Stor	age n	nanag	emen	t 22A	AIM54	1.5.22	AIM541	1.6	8 Ho	ours
							2)6					

Main Memory: Contiguous Memory allocation- paging- structure of the page table-Swapping. Virtual Memory: Demand Paging – Copy-on-Write- Page Replacement- Allocation of Frames- Thrashing. Disk structure and attachment- Disk Scheduling algorithms: Seek Time- Rotational latency based. RAID Levels.

Text Book Text Book 2: Ch 9,10

<u>CIE Assessment Pattern</u> (50 Marks – Theory)

	RBT Levels	Test (s)	Qualitative Assessment (s)/NPTEL
		25	25
L1	Remember	5	-
L2	Understand	5	5
L3	Apply	10	10
L4	Analyze	5	10
L5	Evaluate	-	-
L6	Create	-	-

*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. Computer Architecture: A Quantitative Approach By John L. Hennessy, David A. Patterson , 2017. ISBN: 9780128119068, 0128119063
- 2. Operating System Concepts Abraham Silberschatz, Peter B. Galvin, Greg Gagne, , Wiley ,2018. ISBN: 9781119124894, 1119124891

Reference Books:

- 1. "Designing Data-Intensive Applications" by Martin Kleppmann, 2011. ISBN: 9781491903117
- 2. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig,2011. ISBN: 9781292401171

Web links and Video Lectures (e-Resources):

- https://www.cse.iitb.ac.in/~mythili/os/
- https://www.youtube.com/watch?v=mXw9ruZaxzQ
- https://medium.com/@harishramkumar/comparing-gpu-vs-tpu-vs-lpu-the-battle-of-ai-processors-2cf4548c4a62

	INTERNET OF THINGS													
Course Code	22A	IM54	2					0	CIE Ma	rks		50		
L:T:P:S	3:0:	:0:0						S	EE Ma	rks		50		
Hrs. / Week	3							I	otal M	larks		100		
Credits	3							E	Exam H	lours		03		
Course outcon	nes: /	At the	end of	the c	ourse	e, the s	tuden	t will l	be able	e to:				
22AIM542.1	Und	lerstar	ding	of the	fund	ament	al con	cepts	of IoT.					
22AIM542.2	Exp	lore te	chniq	ues fo	r ma	naging	real-t	ime d	ata in 1	IoT app	lication	s.		
22AIM542.3	Ana	lvze tł	e prir	iciples	s of c	onnect	ting de	vices	in IoT.					
22AIM542.4	Eva	luate r	rotoc	ols wi	th be	st pra	ctices	to ens	ure eff	ficient c	ommun	ication i	n IoT	
	ecos	system	IS.			P								
22AIM542.5	Des	esign the mechanisms and key technologies in the IoT.												
22AIM542.6	Imp	lemen	t the l	atest	techr	ologie	s that	are st	andar	ds of the	e IoT.			
Mapping of Co	ourse	e Outo	omes	s to P	rogr	am Oı	itcom	es an	d Pro	gram S	pecific	Outco	mes:	
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
22AIM542.1	2	-	-	-	-		-	-	-	-	-	-	-	-
22AIM542.2	3	-	-	-	-	-	-	-	-	-	-	2	3	_
22AIM542.3	-	3	-	-	-	-	-	-	-	-	-	-	3	-
22AIM542.4	-	3	-	-	-	-	-	-	-	-	-	3	3	-
22AIM542.5	-	-	3	-	-	-	-	-	-	-	-	3	3	-
22AIM542.6	-	-	-3	-	3	-	-	-	-	-	-	3	3	-
MODULE-1	INT	INTRODUCTION 22AIM542.1 8 Hours												
	22AIM542.2													
An Overview: IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT,														
Examples of lo	Examples of IoT. Emergence of IoT: Evolution of IoT, Enabling IoT and Complex Interdependence													
Application	OI NG	etwork		nnlia	nents	Lavor	essing	strat	egles I	n 101.				
Toxt Book			Toyt	Rook	1.1 1	Layer	121/	115	1617	7 Toxt	Roolz 2.	1112	121	1 1 5
MODIII F.2	DE	SIGN F	PRINC	IDUOK	5 FO	R CON	I.J, I.9	r, 1.3, 'FD	224	IM542.2	22ΔIM	<u>4.1, 4.2</u>	, 1 .5, 1 Q	Hours
WODULL-2	DE	VICES	MINU		510		INLU I	LD	22A	IM542.2		JT2.J	0	liouis
IoT Sensing and	d Acti	uation	Sense	ors. Se	nsor	Chara	cteris	tics. Se	ensing	Types.	, Actuato	rs. Actu	ator tyr	ies.
Actuator Char	acter	istics.	IoT/	M2M	Svst	em L	avers	and	Desig	n Stan	dardisa	tion, Co	ommuni	ication
Technologies,	Data	Enric	hment	t, Dat	a co	nsolid	ation	and I	Device	manag	ement	at Gate	way, E	ase of
designing and a	afford	lability	<i>.</i>										-	
Text Book	Tex	t Book	1:2.1	, 2.2, 2	2.3, 2	.4, 2.5	Text	: Book	2: 5.2,	, 5.3, 5.5	5, 5.6, 5.	7, 5.8, 5.	9	
MODULE-3	DA	ГА АС	QUIR	ING, (ORG	ANISI	NG,		22A	IM542.2	22AIM	542.5	8	Hours
	PRO	OCESS	ING A	ND A	NAL	YTICS	5		22A	IM542.6)			
Introduction, D	ata a	cquirir	ig and	stora	ge, 0	rganis	ing the	e data,	Trans	actions,	busines	ss proce	ss, Integ	gration
and Enterprise	Syste	ems, A	nalytic	cs, Kn	owle	dge ac	quirin	g, Mar	naging	and Sto	ring Pro	ocess.		
Text Book	Tex	t Book	1:5.1	<u>, 5.2, 1</u>	5.3, 5	.4, 5.5	5.6		22.4		4 22 4 11	4540 F	0	
MODULE-4	101	COM	MUNI	CATI	UN 1	ECHN	OLOC	TES		IM542.4	4,22AIN 6	1542.5	8	Hours
,22AIM542.6														
Introduction, Infrastructure Protocols, Discovery Protocols, Data Protocols, Identification Protocols, Device Management Semantic Protocols														
Device Management, Semantic Protocols.														
Iext Book Iext Book 2: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7 MODILE -5 Iot Security AND CASE STUDIES 22AIM5425 22AIM5426 9 Hourse														
Introduction V	ulner	ahiliti		urity	Requi	ireme	nts and	d Thre	at Ana	lvsie H		and Mie		ses InT
Security Tomo	granł	iv and	Lave	ered A	ttack	ker Mo	del. I	dentit	y Man	agemen	it and I	Establish	iment	Access
Control and Sec	cure l	Messag	ge Con	nmuni	icatio	on, Sec	uritv N	/lodels	s, Profi	les and	Protoco	ols for Io	от.	
IoT Case Studie	s: Io	Г/ ПоТ	Appli	icatio	ns in	the pr	emises	s, supp	oly cha	in and c	custome	er monit	oring,	
Connected Car	and i	ts appl	icatio	ns and	d serv	vices, S	Smart	city st	reetlig	hts con	trol and	l monito	ring.	

Text Book Text Book 1: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 12.3, 12.4, 12.6

CIE As	CIE Assessment Pattern (50 Marks – Theory)									
		Marks	Marks Distribution							
DDT	Lovolo	Test	Qualitative							
KDI	RB1 Levels		Assessment(s) */ NPTEL							
		25	25							
L1	Remember	5	5							
L2	Understand	10	10							
L3	Apply	10	10							
L4	Analyze	-	-							
L5	Evaluate	-	-							
L6	Create	-	-							

*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	15
L2	Understand	15
L3	Apply	20
L4	Analyze	
L5	Evaluate	
1.6	Create	

Suggested Learning Resources:

Text Books:

1) Dr. Raj Kamal, "Internet of Things: Architecture and Design Principles," McGraw Hill, 2022 ISBN: 978-9390727384

2) Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press, 2021. ISBN: 9781108842952, 110884295X

Reference Books:

1) Callaway EH, "Wireless Sensor Networks: Architecture and Protocols," Auerbach Publications, 2003. ISBN: 9780849318238

2)Michael Miller, "The Internet of Things", First Edition, Pearson, 2015. ISBN: 9780789754004
3) ArshdeepBahga, Vijay Madisetti," Internet of Things: A Hands-on Approach" Universities Press., 2015. ISBN: 9780996025515

Web links and Video Lectures (e-Resources):

- https://www.educba.com/introduction-to-iot/
- https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/
- https://onlinecourses.nptel.ac.in/noc22_cs53/preview
- https://www.simplilearn.com/iot-devices-article

- Visit to any open source IOT lab
- Demonstration of Thermal sensors, Strain gauge sensors
- Video demonstration of the latest IOT applications
- Contents-related activities (Activity-based discussions)
 - > Organizing Group discussions on real-time issues
 - Seminars

	ADVANCED JAVA PROGRAMMING													
Course Cod	e 2	241	1543						CIE	Marks		50		
L: T:P:S	3	:0:0:	:0						SEE	Marks		50		
Hrs / Week	3	10101	U						Tota	al Mark	S	10	0	
Credits	0	03 Fxam Hours 03												
Course outo	comes	: At	the e	nd of t	the co	urse. t	he stu	dent v	vill be	able to:	0	00		
22AIM543.1	Un	ders	tand	basics	of sei	ver-si	de and	d TCP/	/IP soc	ket pro	gramin	g.		
22AIM543.2	Ana dev	alyze zelor	e the ping n	need f nodul	or adv es in r	vanced project	l Java (s.	concep	ots like	e enume	erations	and an	notatior	ıs in
22AIM543.3	Eva	Evaluate the functioning of graphical programming using AWT.												
22AIM543.4	De	sign	serve	er-side	e scrip	ts (ser	vlets)	and JS	SPs tha	it fit int	o a Java	-based	web	
22AIM543.5	Exa	amin	e hov	v the J	DBC A	API car	n be us	sed to	access	databa	ses and	manag	e conne	ctions.
22AIM543.6	Jus	tify t forn	the us	se of c	ollecti	on fra	mewo	rks an	d grap	hics pr	ogramn	ning to i	ncrease	
Mapping of	f Cour	rse (Jutco	omes	to Pr	ogran	n Out	comes	s and i	Progra	m Spe	cific Ou	itcome	s:
	P01	PO	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
		2												
22AIM543.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM543.2	-	3	-	-	-	-	-	-	-	-	-	2	3	2
22AIM543.3	-	3	-	-	-	-	-	-	-	-	-	2	2	2
22AIM543.4	-	-	3	-	3	-	-	-	-	-	-	3	2	2
22AIM543.5	-	3	-	-	-	-	-	-	-	-	-	3	3	3
22AIM543.6	-	3	-	-	3	-	-	-	-	-	-	Z	3	-
MODULE-1	Iav	o No	two	ling						2	21115/	1.2 1	QH	ours
Network Bas	jav	a No	ckot	overv	ίσων Τ		client	socka	te IIRI		D sorve	r socka	te Data	grame
iava net nacl	rage S	lacke	er Ser	verSo	icw, i icket	InetAd	ldress	IIRI.	URLCo	nnectio	n serve	I SOUKE	is, Data	51 a1115,
Case Study	uge o	oone	UR	L. UR	LConr	nectio	n	, 01(1)			/11			
Text Book			Tex	t Bool	< 1: ch	apter	22							
MODULE-2	En	ume	ratio	ns, Au	utobo	xinga	nd An	notat	ions	22AI	M543.2		8 H	lours
Enumeration are class typ Methods, A character va	ns, En es, en utobo alues,	ume ume xing Auto	ration ration /Unb oboxi	n fund ns Inh oxing ng/Ur	amen erits I occu ıboxir	tals, th Enum, Irs in Ig helj	ne valu examj Expr ps pre	ies() a ple, typ ession event o	nd val pe wra 1s, Au errors	ueOf() I ppers, A toboxin ,A wor	Method Autobox Ig/Unbo d of Wa	s, Java e king, Au oxing, l arning.	numera toboxin Boolean Annota	tions g and and tions,
Annotation	basics	s, sp	ecifyi	ing re	tentic	on pol	icy, O	btaini	ng An	notatio	ns at i	run tim	e by u	se of
reflection, A	nnota	ted e	eleme	ent Int	erface) -								
Case Study	A	utob	oxing	g in ex	pressi	ons								
Text Book	Text Book Text Book 1: chapter 12													
MODULE-3	MODULE-3CollectionFrameworkandGraphics22AIM543.3,22AIM548 HoursProgramming3.6								lours					
The collection	ons an	d Fra	amew	ork: C	ollect	ions O	vervie	w, Re	cent C	hanges	to Colle	ections,	The Coll	ection
Interfaces, T in Collection AWT.	he Co s, The	llect Ran	ion Cl dom .	lasses, Access	, acces s Inter	ssing a face, T	collec The Co	tion v llectio	ia an I n Algo	terator, rithms,	Storing Graphic	g User D cs progr	efined (amming	lasses gusing
Text Book	Тех	ctboo	ok 1 -	chapt	er 18									
MODULE-4	Sei	rvle	t Con	cepts	5					2	2AIM5	43.4	81	lours
Background The Servlet	; The API	Life ; Tł	Cycle ne ja	e of a S vax.se	ervlet	t; Usin packa	ng Tor nge; Re	ncat fe eading	or Ser Servl	vlet de et Para	velopm meter; '	ient; A s The Jav	simple S ax.servl	ervlet; et.http

packa	package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. Java Server							
Pages	(JSP): JS	SP, JSP Tags,	Tomcat, R	lequest Strin	ng, User Ses	sions, Cookies, Session Object	S	
Case S	Study	Session tra	cking using	g servlets				
Text E	look	Textbook 1	- Ch 38	Textboo	k 3- Ch 37,3	8		
MODU	LE-5	The Conce	pt of JDBC			22AIM543.5 22AIM543.6	8 Hours	
The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC proces								
Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement O								
ResultSet; Transaction Processing; Metadata, Data types; Exceptions.								
Text Book Textbook 2- Chapter 2								
CIE As	ssessme	ent Pattern	(50 Marks	s – Theory)				
			Tost	Qualit	ative			
	RBT L	evels	(s)	Assess	ment			
			(s)/NPTEL					
			25	2:	5			
L1	Reme	ember	5 -					
L2	Unde	rstand	5	5				
L3	Apply	y	5	10				
L4	Analy	vze	10	10				
L5	Evalu	late	-	-				
	Creat	ie		-				
SEE A	ssessm	ent Pattern	(50 Mark	s – Theoryj	1			
	RBT Le	evels	Exam Distribu	Marks				
L1	Reme	mber	1	10				
L2	Under	stand	1	10				
L3	Apply		1	15				
L4	Analy	ze	15					
L5	Evalua	ate		-				
L6 Create								
Sugge	ested Le	earning Res	sources:					
Text	Books	:						
1. Herbert Schildt: JAVA the Complete Reference, 9th Edition, Tata McGraw Hill, 2014. ISBN:								
: 	:9780071808552, 0071808558.							
Z. J	2. Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.ISBN: 9780072224726,							

007222472X

Reference Books:

- 1. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004. ISBN: 9780321245755.
- 2. Y. Daniel Liang: "Introduction to JAVA Programming", 10th Edition, Pearson Education, 2007.ISBN: 9780136012672, 0136012671.

Web links and Video Lectures (e-Resources):

1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

2. https://www.codecademy.com/learn/learn-advanced-java

- > Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning
- Visit to software industry
- > Organizing hands-on sessions on JSP and servlets.

	INFORMATION STORAGE AND RETRIEVAL													
Course Code	22AI	M544	ŀ					CI	E Mar	ks		50		
L:T:P:S	3:0:0):0						SE	E Mar	'ks		50		
Hrs. / Week	3							Тс	otal M	arks		100		
Credits	03							Ex	am H	ours		03		
Course outcon	nes: At	t the e	nd of	f the c	ourse,	the stu	ıdent	will be	e able	to:				
22AIM544.1	Unde	erstan	d the	funda	menta	al conc	ept of	Inform	nation	n retriev	al.			
22AIM544.2	Apply	v adva	inced	Infor	matio	n retri	-val te	chnia	ues an	d strate	gies in 1	oractica	lscena	arios
	and s	vstem	15.		matio		evai ee	, ennind	ueo un	ia bei acc	-9-00 m j	practice	been	1100
22AIM544.3	Analy	vze th	e per	forma	nce ar	d effe	ctiven	ess of	Inform	nation r	etrieval	system	s using	<u> </u>
	metr	netrics and evaluation methods.												
22AIM544.4	Desig	gn info	ormat	tion re	etrieva	l syste	ms us	ing di	stribut	ted, mul	timedia	concep	ts.	
22AIM544 5	Inves	, stigate	eme	roino	trende	chall	enges	and a	dvanc	ements	in Infor	mation	retrie	val
2211101311.5	throu	igh re	searc	rh and	exner	iment:	ation	, and a	avanc	ements	III IIII0I	mation	i eti ie	vai
22AIM544.6	Disco	ver ir	sight	ts and	comp	lexitie	s of w	eb Info	ormati	on retri	eval.			
Manning of C	21500								Duca	C)+		
Mapping of Co			D	S to P	rogra					gram Sp			ies:	DCOO
	201	POZ	PU3	P04	P05	P06	P07	P08	P09	P010	POII	P012	P201	P502
22AIM544.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM544.2	3	-	-	-	-	-	-	-	-	-	-	3	2	
22AIM544.3	-	3		-	-	-	-	-	-	-	-	3	3	-
22AIM544.4	-	-	3	-	-	-	-	-	-		-	3	3	2
22AIM544.5	-	3	-	-	-	-	-	-	-		-	3	3	2
22AIM544.6	-	-	-	3	3	-		-	-				2	2
MODULE-1 Introduction To Information Retrieval 22AIM544.1 8 Hours														
Basic Concepts of IR, Data Retrieval & Information Retrieval, Text mining and IR relation, IR system block														
diagram. Automatic Text Analysis: Luhn's ideas, Conflation Algorithm, Indexing and Index Term														
weigning, Prop	abilist	le mue	exing	ginver	team	e, Sum	x tree	s & su	inx arr	ays, sig	nature	mes, sca	attersi	lorage
Application	sing, c	luster		tural I	Jorita	to Info	rmati	on Dot	rioual					
Toxt Book				t Rool	le 1. Ch	<u>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </u>	mati	on Ret	lievai					
	Adva	ncod	Dotr	ioval	Strate					22411	15112		01	Jourc
Potrioval strate		loctor	Spar	ievai	dol Dr	obabil	ictic r	otriou	al etra	togios I	1344.2	o modo	le Infe	ronco
networks Bool	an re	triova	opau I I a	tont s	omant	ic inde	istic i ving	Noura	ai su a 1 notu	vorks F	Languag	t rotrio	is, iiit val Rat	rioval
utilities Releva	ance fe	edhad	u, La vk Cl	uster	Hypot	hesis	Cluste	ring l	Algorit	hms Si	uzzy se nole Pa		val Net rithm	Single
Link Algorithm		cubut	, UI	uster	nypot	110515,	Glubic		1150110		ingle i a	55 711501	101111,	omgie
Text Book	Text	Book	2· Ch	2										
MODULE-3	Asse	ssing	Perf	orma	nce Ai	nd Vis	ualizi	ng		22AIN	/1544.3		8 H	lours
	Infor	matio	on Sv	stem	S			0						
Performance e	valuati	on: Pi	recisi	on an	d reca	ll, MR	R, F-S	core, N	NDCG,	user or	iented r	neasure	es, cros	ss fold
evaluation. Vis	ualisat	tion ir	n Inf	ormat	ion Sy	vstem:	Start	ing po	oints, o	docume	nt cont	ext, Use	er rele	vance
judgment, Inter	face s	uppor	t for	search	ı proc	ess		01						
Text Book Text Book 1: Ch:3														
MODULE-4	Distributed Information Retrieval 22AIM544.4, 8 Hours													
	22AIM544.5													
Distributed IR: Introduction, Collection Partitioning, Source Selection, Query Processing, web														
issues. MULTIMEDIA IR: Introduction, Data Modeling, Query languages, Generic multimedia														
indexing approach, One dimensional time series, two-dimensional color images, Automatic feature														
extraction	extraction													
Case Study	Study Automatic feature extraction in Multimedia IR													
Text Book	Text	Book	1: Ch	:4									1	
MODULE-5	Web	Infor	mat	ion R	etriev	val	22A	IM544	6				8 H	Iours
Searching the V	Veb: C	hallen	iges,	Chara	cterizi	ng the	Web,	Searc	h Engi	ines, Br	owsing,	Web cr	awlers	, Web

data mining, Searching using Hyperlinks, Web Graph, Page ranking algorithms

Text Book Text Book 1: Ch 5

	ssessment rattern		- Theory
	RBT Levels	Test (s)	Qualitative Assessment (s)/NPTEL
		25	25
L1	Remember	5	-
L2	Understand	5	-
L3	Apply	10	15
L4	Analyze	5	5
L5	Evaluate	-	=
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Theory)

	RBT Levels	Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	15
L3	Apply	15
L4	Analyze	10
L5	Evaluate	-
L6	Create	-

Suggested Learning Resources:

Text Books:

1) David A. Grossman, Ophir Frieder, Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition (Distributed by Universal Press), 2004. ISBN: 9781402030055, 1402030053

Reference Books:

1.Soumen Chakrabarti, Mining the Web: Discovering Knowledge from Hypertext Data, Morgan – Kaufmann Publishers, 2002. ISBN: 9781558607545

2.Gerald J Kowalski, Mark T Maybury Information Storage and Retrieval Systems: Theory and Implementation, Springer, 2004. ISBN: 9780792379249

Web links and Video Lectures (e-Resources):

- https://www.geeksforgeeks.org/what-is-information-retrieval/
- https://cse.iitkgp.ac.in/~pabitra/course/ir06/ir06.html

- Organizing Group wise discussions on issues
- ➤ Seminars
- Contents related activities (Activity-based discussions)
 - For active participation of students, instruct the students to read research papers on deep learning and have a discussion.
 - Presentations

				CC	OMPU	TATI	ONAL I	NTELI	IGEN	СЕ		1		
Course Code	22A	IM54	45				CIE M	larks				50		
L:T:P:S	3:0:	0:0					SEE N	larks				50		
Hrs / Week	3						Tota	Mark	S			100		
Credits	03						Exam	Hour	S			03		
Course outco	mes:	At th	e end o	of the	cours	e, the s	student	will b	e able	to:				
22AIM545.1	Unde	rstan	d the f	undar	nenta	ls of co	omputa	tional	intelli	gence	and its a	applica	ations.	
22AIM545.2	Apply searc	v the l h pro	knowl blems	edge o	of evol	lutiona	ary algo	orithms	s and t	heir ap	plicatio	ons in	optimiz	zation and
22AIM545.3	Analy	ze th	e prin	ciples	of fuz	zy log	ic and i	ts appl	icatio	ns in d	ecision-	makir	ig and c	control
22AIM545.4	Evalu	ite pe	erforma	ance o	f inte	lligenc	e algor	ithms	using	metric	5.			
22AIM545.5	Desig	n a n	nodel f	or pat	tern r	ecogni	ition ar	nd class	sificati	ion usi	ng Neur	al Net	work.	
22AIM545.6	Create a solution for real-world problems (complex problem) using intelligence algorithms.													
Mapping of (Cours	e Ou	tcome	es to F	rogr	am O	utcom	es and	l Prog	gram S	pecific	Outc	omes:	
	P01	PO2	PO3	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIM545.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM545.2	3	-	-	-	-	-	-	-	-	-	-	2	3	2
22AIM545.3	-	-3-	-	-	-	-	-	-	-	-	-	2	3	2
22AIM545.4	-	3	-	-	-	-	-	-	-	-	-	2	3	3
22AIM545.5	-	-	3	-	-	-	-	-	-	-	-	2	2	2
22AIM545.6	-	-	3	3	-	-	-	-	-	-	-	2	2	2
MODULE-1	Intro Intell	duct ligen	ion to ce	Comp	outati	onal		22	AIM5	45.1				8 Hours
Definition and	scone	of co	mnuta	tional	intel	ligence	histo	rv and	evolut	tion A	lantatio	n Sel	f-organ	ization
Computational	Intell	igenc	re Vs A	rtificiz	al Inte	lligen	ce and	hard co	omnut	ing Ov	ver-view	of Ev	olution	iarv
computations.	meen	-90110					ee ana	inar a o	mpu	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		01 11	oración	iai y
Text Book	Text	Boo	k 2: Ch	2,3										
MODULE-2	Evolı	ition	ary Al	goritl	ıms			22A	IM54	5.1, 22	AIM545	.2		8 Hours
Genetic algorit	hms, (Genet	ic prog	gramn	ing, I	Evoluti	on pro	gramn	ning, E	volutio	onary st	rategi	es.	
Case study	Route	e opti	mizati	on pro	oblem	using	GA.							
Text Book	Text	Boo	k 2: Ch	3.										
MODULE-3	Fuzzy	y Sys	tems				2	2AIM5	45.3,2	22AIM	545.4			8 Hours
Fuzzy set. fuzzy	v logic	. The	orv of	Fuzzv	Sets.	Appro	ximate	Reaso	ning.	fuzzv c	ontrol s	vstem	s. fuzzy	7
clustering.	, -0 -	, -	-) -	- ,	,	FF -			0,	- j -		j	_, _ ,	
Text Book	Text	: bool	k 2: Ch	7.										
MODULE-4	Neur	al Ne	etwork	s			2	22AIM	545.5					8 Hours
Neural Networ	Neural Networks-components and terminology-Topologies- Neural Network Adaptation-Perceptron,													
Multilayer pero	Multilayer perceptron (MLP), Back propagation, Self-Organizing Maps (SOMs).													
Text Book	ook Text Book 2: Ch 5													
MODULE-5	Swar	m In	tellige	ence A	lgori	thms		22A	IM545	,22, 5.5	AIM545	.6		8 Hours
Particle swarm	optin	nizati	ion (PS	50), Ar ithm	nt Cole	ony Op	otimiza	tion (A	.CO), E	Bee Col	ony Opt	imiza	tion (B	20),
Toyt Pool			ן aigur ר 1 - רא	1 7 <i>/</i>	20									
TEXT DOOK	Text	. 000		1,2,4,	20									

<u>CIE Assessment Pattern (50 Marks</u> – Theory)

	RBT Levels	Test (s)	Qualitative Assessment (s)/ NPTEL							
		25	25							
L1	Remember	5	-							
L2	Understand	5	5							
L3	Apply	10	10							
L4	Analyze	5	10							
L5	Evaluate	-	-							
L6	Create	-	-							

*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.** Swarm intelligence Algorithms: A Tutorial, Adam Slowik, CRC Press, 2020. ISBN: 9780429749506, 0429749503
- **2.** Russell C Eberhart and Yuhui Shi" Computational Intelligence: Concepts to Implementations", Maorgan Kaufmann publishers, 2007.ISBN: 978-1-55860-759-0

Reference Books:

- 1. "Softcomputing:Fundamentals, Techniques, Applications", Saroj Kaushik, Sunita Tiwari by McGraw Hill Publishing, 2018. ISBN: 9789353160678
- 2. S N Sivanandam, SN Deepa, "Principles of Soft computing", 3rd Edition, Wiley Inida, 2008. ISBN: 9788126510757, 8126510757

Web links and Video Lectures (e-Resources):

- https://www.bing.com/videos/riverview/relatedvideo?q=computional+intelligence+video+NPTE L&mid=136E9B8085C8BBAE9CD0136E9B8085C8BBAE9CD0&FORM=VIRE(Simulated Annealing).
- https://scte-iitkgp.vlabs.ac.in/List%20of%20experiments.html(Fuzzy systems)
- https://www.youtube.com/playlist?list=PLxpgde902dpk5vAUIw52j11L9AWiVJZ2K

- Group discussion on real-world problems.
- Contents-related activities (Activity-based discussions)
- Organizing Group discussions on real-world problems
- Seminars
| | | RE | SEAR | CH M | ETHO | DOLO | GY AN | ID IPR | | | | | | | | | | |
|---|---|--|---|---|--|--|---|---|---|--|---|--|--|--|--|--|--|--|
| Course Code | 22RMK | 55 | | | | | CIE M | larks | | | | 50 | | | | | | |
| L: T: P: S | 1:1:0:0 | | | | | | SEE M | larks | | | | 50 | | | | | | |
| Hours / Week | 03 | | | | | | Total | Marks | | | | 100 | | | | | | |
| Credits | 02 | | | | | | Exam | Hours | | | | 03 | | | | | | |
| Course outcomes
At the end of the | :
course, th | ie studei | nt will | be able | to: | | | | | | | | | | | | | |
| 22RMK55.1 | Define a | a resear | ch pro | blem | and to | formul | ate res | search q | uestion | s. | | | | | | | | |
| 22RMK55.2 | Demons | strate tl | ie vari | ious pi | ocess | ing tech | niques | s of rese | earch. | | | | | | | | | |
| 22RMK55.3 | Choose | approp | riate r | netho | ds to f | ormulat | e rese | arch ob | jectives | • | | | | | | | | |
| 22RMK55.4 | Develop | o advan | ced cr | itical t | hinkin | ıg skills | and er | hance | writing | skills. | | | | | | | | |
| 22RMK55.5 | Underst | tand the | e statu | tory p | rovisi | ons of d | ifferen | it forms | of IPRs | in simp | le form | s. | | | | | | |
| 22RMK55.6 | Identify | [,] the sig | nificaı | nce of] | praction | ce and p | roced | ure of p | atents. | | | | | | | | | |
| Mapping of Co | pping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | | | | |
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| 22RMK55.5 | 3 | 3 | 2 | 1 | - | - | - | 1 | 1 | 2 | - | - | | | | | | |
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Copyright – Trademark – Patents – Industrial Designs – Trade Secrets – Geographical Indications – Application of Different Forms of IPR– Future Aspects of IPR– Some Examples of IPR.

Text Book	Text Book 2: Ch. 1 and 2		
MODULE-5	BASICS OF PATENTS	22RMK55.5, 22RMK55.6	6 Hours

Patents and its Basics – Patentable and Non-Patentable Inventions–Patent Application Process (National and International level) – Searching a Patent-Drafting and Filing a Patent –Types of Patent Applications–Patent Documents– Specification and Claims–Assignment, Licensing, Infringement–Different Layers of International Patent System–Some Examples of Patent – forms requirement for patent application with charges

Case Study	Analyze different domains of filed patents
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Text Book	Text Book 2: Ch. 1 and 2
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CIE Assessment Pattern (50 Marks – Theory)

			Marks Distributio	on
	DDT Lovale	Test	Qualitative	MCO's
	RD1 Levels	(s)	Assessment (s)	MCQS
		25	15	10
L1	Remember	5	-	-
L2	Understand	5	-	-
L3	Apply	5	5	5
L4	Analyze	5	5	5
L5	Evaluate	5	5	-
L6	Create	-	-	-
SEE A	ssessment Pattern	(50 Mark	s – Theory <u>)</u>	
	DDT Lovals	Exam	Marks	
	NDT Levels	Distribu	ition (50)	
L1	Remember		10	
L2	Understand		10	
L3	Apply		10	

10

10

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L6 Create

Analyze

Evaluate

L4

L5

Suggested Learning Resources:

Text Books:

- 1) Kothari C R, "Research Methodology: Methods and Techniques", New Age International, 2018, ISBN-13: 978-8122436235
- 2) Ramakrishna Chintakunta, "A Text book of Intellectual Property rights", Blue Hill Publication, ASIN: B09T6YDB5N, 2022

Reference Books:

- 1) Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K, An Introduction to Research Methodology, RBSA Publishers. 2015, ISBN-13:978-8176111652
- 2) Ranjith Kumar, Research methodology, Saga publications,4th edition, 2014, ISBN-13- 978-9351501336
- 3) Sinha, S.C. and Dhiman, A.K., Research Methodology, EssEss Publications. 2 volumes, 2012. ISBN : 81-7000-324-5, 81-7000-334-2
- 4) Asha Vijay Durafe, Dhanashree K. Toradmalle, Intellectual Property Rights, Dreamtech Press, 2020, ISBN:9390395917

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=GSeeyJVD0JU
- https://www.youtube.com/watch?v=nv7MOoHMM2k
- https://www.youtube.com/watch?v=BGSgZ1J8-yQ

- Video Sessions
- Organizing Group Wise Discussions
- Seminars

CRITICAL AND CREATIVE THINKING SKILLS														
Course Code		22SDK	(56						CIE Ma	arks	50			
L:T:P:S		0:0:1:0)						SEE Ma	arks	-			
Hrs / Week 2									Total Marks 50					
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Upon success	ful comp	oletion o	f this co	urse, the	e studen	t will be	able to	:						
22SDK56 1	Demor	Demonstrate proficiency in solving quantitative aptitude problems using fundamental												
223DK30.1	concepts.													
22SDK56.2	Apply a	Apply advanced quantitative techniques to address and solve complex real-world problems.												
22SDK56 3	Develo	Develop and enhance logical reasoning skills essential for problem-solving in various												
223DR30.3	competitive examinations.													
22SDK564	Cultiva	te critic	al and c	reative	thinking	g skills n	ecessar	y for an	alytical	reasonin	g and pr	oblem-		
223DR30.4	solving	<u>g</u> .												
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012		
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22SDK56.2	3	3	-	-	2	-	-	-	-	-	-	2		
22SDK56.3	3	3	-	-	2	-	-	-	-	-	-	2		
22SDK56.4	3	3	-	-	2	-	-	-	-	-	-	2		

	CRITICAL THINKING THROUGH	22SDK56.1	(Hours
MODULE-1	QUANTITATIVE ANALYSIS	22SDK56.2	o nours

Number systems: LCM and HCF of numbers, Squaring and Cubing Techniques, Multiplication Tricks, Divisibility rules, Digit sum method, Speed Math, Simplifications, Approximations.

Percentages: Conversion of Fraction to Percentage Table, Percentage Change, Net percentage change/Effective percentage change, Successive Percentage, Concept of more/less percentage, Percentage of percentage, Product constancy, Increased/decreased by P%, Percentage Changes in Numerator and Denominator, Successive Percentage.

Averages: Basic concept, Consecutive Numbers, Non-Consecutive Numbers, Equation Concept, True/False concept, Including/Excluding concept, Replacement concept, Average Speed concept.

MODULE 2	NUMERICAL TECHNIQUES FOR	22SDK56.1	6 Hours
MODULE-2	PROBLEM SOLVING	22SDK56.2	o nours

Profit and Loss: Basic concept, Profit Percentage, Loss Percentage, Profit/Loss Percentage, Overall Profit/Loss, Dishonest shopkeeper, More/less loss concept.

Discounts: Successive discounts, Buy X and Get Y Free, Profit after allowing discount, True Discount, Difference between percentage profit and percentage discount.

Ratio and Proportion: Concept Explanation, Duplicate Ratio, Triplicate Ratio, Direct Proportion, Indirect Proportion, Double rule of three or compound proportion, Ratio in investment, Ratio in partnership, Ratio in averages, Ratio in profit and loss, Ratio in interest rates.

Time and Work: Unit work, Combined work, Individual efficiency, Group efficiencies, Time taken by an individual or a group, Work done by an individual or a group, Total work done, Chain Rule Concept, Pipes and Cisterns, 4 Rules of Pipes and Cistern.

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MOD	ULE-3	ADVANCE TECHNIQI	ID QUANT UES	ITATIVE		22SDK56.1 22SDK56.2	6 HOURS			
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Geon Pytha	netry: Concepts gorean Theorem,	of Angles, Differen Perimeter and Are	nt polygo ea of Triar	ns like triangle 1gle, Rectangle,	es, rectar and circl	ngle, square, right es.	t-angle triangle,			
Statis	stics: Mean, Media	an, Mode, Standard	d Deviatio	n, Variance.						
MOD	MODULE-4 ANALYTICAL REASONING AND 22SDK56.3 CREATIVE PROBLEM SOLVING 22SDK56.4									
Numl progr Expor	ber Series - Missi ession, Geometri nential series, Inc	ng numbers, Incor c progression, H reasing multiplicat	nplete ser armonic tion, Hybr	ies - Odd-even s progression, So id series.	series, pr quares a	imes, Fibonacci se nd cubes, Opera	eries, Arithmetic tions on digits,			
Alphabetical Series - Missing alphabets, incomplete letter series - series of words, series of letters, arrangement of words/letters, letters marked with corresponding numbers sequence, positions of letters, ranking of the word in dictionary; Mixed Series - Missing numbers and words/letters, complete the series.										
Analo	ogies: Alphabet C	lassification, Word	l Classifica	tion, Number C	lassificat	ion.				
Codir digit 1	ng and Decoding mapping, Re-orde	Coding based on or control of the co	order, Let ord seque	er to Letter Ma ncing, Match th	pping, Le le word te	etter to number ma o code, Symbol Co	apping, Letter to ding.			
MOD	ULE-5	PROBLEM LOGICAL	I SOLVINO ANALYSIS	THROUGH		22SDK56.3 22SDK56.4	6 Hours			
Direc	tions: Eight Directions of shadows,	ections, Distance, Axis based proble	Displacen ms, Actua	nent, Starting a and conditiona	and endi al directio	ng points, Refere ons.	ntial directions,			
Seati arran Seatir	ng Arrangemen gement, Vertical ang Arrangement, (t s: Linear arrang arrangement, Seat Complex arrangem	gement, S ing arrang ient, Misce	quare Arranger gement in a pho Illaneous arrang	ment, Re otograph, gements.	ectangular Arrang Tabular arranger	ement, Circular nent, Hexagonal			
Blood Mixed	l Relations: Rel l/Chain Blood Rel	ations defined, G ations, Symbol bas	eneration sed Blood	Verticals, Fam Relation.	ily Tree,	, Single Person E	Blood Relations,			
CIE A	ssessment Patte	rn (50 Marks – T	heory)							
	RBT Levels	Marks Distribut	tion							
		Tests								
	T	50								
	Remember	10								
	Understand	10								
	Apply	20								
	Fyaluato	10	———							
L5 L6	Create	-								
	Greate	-								

				ENV	IRON	IMEN	TAL ST	TUDIE	S					
CourseCode	22ESK5	7		2111			CIE	Marks	0	50				
L:T:P:S	1:0:0:0	-					SEE	Marks		50				
Hrs / Week	1						Tot	al Mark	s	10	100			
Credits	01						Exa	m Hour	'S	02				
Course outco	mes:													
At the end of	the cours	e, the s	studer	nt will	be able	e to:								
22ESK57.1	Understar	nd the o	conce	pts of E	Enviro	nment,	ecosyst	em and	biodiv	ersity.				
22ESK57.2	Explain th	e strat	egies	for ma	nagen	nent of r	natural	resource	es to a	chieve su	stainab	ility.		
22ESK57.3	Analyze tł	ne cont	rol me	easure	s of Er	ivironm	ental p	ollution	and gl	obal Env	ironmei	ntal issues.		
22ESK57.4	7.4 Apply the knowledge of Environment Impact Assessment, Technology, Environmental acts and laws in protecting Environment and human health.													
Mapping of C	of Course Outcomes to Program Outcomes and Program Specific Outcomes:													
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P0100	P011	P012		
22ESK57.1	-	-	-	-	-	3	3	-	-	-		-		
22ESK57.2	-	-	-	-	-	3	3	-	-	-	-	3		
22ESK57.3	-	-	-	-	-	3	3	3	-	3	-	3		
22ESK57.4	-	-	-	-	1	3	3	3	-	3	-	3		
MODULEA		LIOTIO										21		
MODULE 1		TRODUCTION TO ENVIRONMENT, ECOSYSTEM 22ESK57.1 3hrs												
Fnvironment.	Definition	n Com	noner	nts of I	Inviro	nment	Fcosvs	tem· Tv	nes &	Structur	e of Eco	system Fnergy		
flow in the eco	osystem; E	Biodive	rsity:	Types,	Hot-s	pots, Tł	reats a	nd Cons	ervati	on of bio	diversit	y.		
Self-study / Ca	ase	Depar	tmen	t Speci	ific Sel	lf-study	/ Case	Study /	Applic	cations c	an be ac	dded.		
Study / Appli	cations	•		Ĩ		Ų	,	5,						
Text Book		Text B	ook 1	: Ch. 1	,3&4	1			-					
MODULE 2	NATUR	AL RES	SOUR	CES					22	ESK57.2		3hrs		
Advanced Ene	ergy resou . Mineral r	rces (H esourc	lydrog ces. Fo	gen, So prest re	lar, 01 sourc	FEC, Tid es. Strat	al and V tegies o	Vind), n f manag	nerits a cement	and deme concept	erits, Wa of susta	iter resources – ainability.		
Self-study /	Depart	ment	Specif	ic Self	-study	/ Case	Study /	Applica	ations	can be a	dded.	<u>y</u>		
Case Study /	1		1		5	,	57	11						
Applications														
Text Book	Text Bo	ook 1: (Ch. 2											
MODULE 3	ENVIRO	NMEN	TAL	POLLI	JTION	1			22	2ESK57.3	3	3hrs		
Definition, Ca	uses, effe	cts and	cont	rol me	asure	s of Air	Polluti	on, Wat	er Pol	lution, so	oil Pollu	tion and Noise		
Solf study /	a wastes a	ind its	mana	gemen	t. Role	Case St	ety, NGC) and Go	ovt. age	encies in	prevent dod	ion of pollution		
Case Study /	Departii	ient sp	Jecini	sen-s	tuuy /	Case Si	uuy / A	ppiicat		all be au	ueu.			
Application														
S														
Text Book	Text Boo	k 1: Ch	n. 5,6,	Text B	ook 2:	Ch. 5								
MODULE 4	GLOBAL	ENVI	RONM	IENTA	L ISSU	JES, EN	VIRON	IENT	22	2ESK57.3	3	3hrs		
	ACTS AN	ID AM	ENDM	IENTS										
Fluoride prob	lem in dri	nking	water	, Acid	Rain, ()zone la	iyer dep	oletion,	Global	warming	g and cli	mate change.		
National fores	st policy, E	nviron	menta	al laws	and a	cts. Inte	ernation	al agree	ements	s and pro	tocols.			
Self-study /	Departr	nent S	pecifi	c Self-s	study ,	/ Case S	tudy / A	Applicat	tions c	an be ad	ded.			
Case Study /														
Applications	Torrt D		<u>ь с т</u>			'h (
Text BOOK	I ext Bo	эк 1: C	u. 6, T	ext Bo	ок 2: (.n. b								
	I													

MODI	JLE 5	HUMAN P	OPULATIO	N AND ENVIRONME	INT IMPACT	22ESK57.4	3hrs						
		ASSESSME	ENT										
Popula	ation gro	wth & expl	osion, Pop	ulation pyramids. Ne	gative impact	of agriculture and u	rbanization, Role						
of Tec	of Technology in protecting environment and human health. Environment Impact Assessment.												
Self-st	udy /	/ Department Specific Self-study / Case Study / Applications can be added.											
Case S	Study /	dy /											
Applic	cations												
Text B	ever Book Text Book 1. Ch. 7												
CIE As	sessme	nt Pattern	(50 Marks	- Theory) -									
				Marks Distributio	n]							
		wala	Test	Qualitative	MCO's								
	RB1 Levels		(s)	Assessment (s)	MCQS								
			25	15	10	-							
L1	Reme	mber	5	-	-								
L2	Unde	rstand	10	5	5	-							
	Apply	7	10	5	5	-							
	- Analy Evolu	ate		5	-	-							
	Creat	ат <u>е</u> Р				-							
SEE As	ssessme	ent Pattern	(50 Marks	s – Theory)									
		1-	Exam	Marks									
	KBI Le	vels	Distribu	ition (50)									
L1	Remer	nber	1	15									
L2	Under	stand	1	15									
L3	Apply		2	20									
	Analyz	ze .											
L5	Evalua	ite											
LO		a main a D		-									

Text Books:

- 1. "Environmental studies" by Benny Joseph, Tata McGraw Hill Education Private Limited, 2009, ISBN: 9870070648135.
- 2. "Environmental Studies: Basic Concepts" by Ahluwalia, V. K. The Energy and Resources Institute (TERI) Publication, 2nd edition, 2016. ISBN: 817993571X, 9788179935712.

Reference Books:

- Handbook of Environmental Engineering by Rao Surampalli, Tian C. Zhang, Satinder Kaur Brar, Krishnamoorthy Hegde, Rama Pulicharla, Mausam Verma; McGraw Hill Professional, 2018. ISBN: 125986023X, 9781259860232
- 2. Environmental Science and Engineering by P. Venugopala, Prentice Hall of India Pvt. Ltd, New Delhi, 2012 Edition. ISBN: 978-81-203-2893-8.
- 3. Elements of Environmental Science and Engineering by P. Meenakshi, Prentice Hall of India Pvt. Ltd, 2005 Edition. ISBN: 8120327748, 9788120327740

Web links and Video Lectures (e-Resources):

- https://archive.nptel.ac.in/courses/120/108/120108004/
- https://archive.nptel.ac.in/courses/103/107/103107215/

- Visit to any company to study the initiative taken for environmental impact.
- Case studybased learning on engineering approaches for pollution prevention.
- Video/ model / chartsbased learning
- Activities/awareness program for preventing environmental pollution

					Μ	INI PF	ROJEC	T -II							
Course Code	22 A	AIM58					·	CIE	Mark	S	5	50			
L:T:P:S	0:0	:1:0						SEE Marks				50			
Hrs / Week	-							Tota	al Mar	'ks	1	100			
Credits	1							Exam Hours 03							
Course outcomes: At the end of the course, the student will be able to:															
22AIM58.1	1 Understand the technological needs and/or societal needs and sustainability of the environment.														
22AIM58.2	App	Apply practical knowledge and the latest tools usage along with project development.													
22AIM58.3	Ana	Analyze the outcome of the project.													
22AIM58.4	Des	ign app	olication	ıs usin	g Big	Data c	oncept	ts/ tec	hniqu	es.					
22AIM58.5	Imp add	lement	t the pro	oject a concer	nd pro ms an	ovide s d uphc	olutio olding	ns wit ethical	hin the l issue	e contex s.	t of the	e Legel fi	ramew	ork,	
22AIM58.6	Pre	sent th	e Repor	t for tł	ne imp	olemen	nted pr	oblem	and i	ts soluti	ons as	a team.			
Mapping of	Cour	se Out	comes	to Pro	ogran	n Outo	comes	and l	Progr	am Spe	cific O	utcom	es:		
		P02	PO3	P04	P05	P06	P07	P08	P09	P010	P01	P012	PSO1	PSO	
	P01										1			2	
22AIM58.1	2	-	-	-	-	-			-	-	-	-	-	-	
22AIM58.2	3	-	-	-	3	-	-	-	-	-	-	-	-	-	
22AIM58.3	-	3	-	-	3	-	-	-	-	-	-	-	-	-	
22AIM58.4	-	-	3	-	-	-	-	-	-	-	-	3	3	2	
22AIM58.5	-	-	-	3	3	2	2	3	3	3	-	3	3	2	
22AIM58.6	-	-	-	3	3	-	-	3	3	3	-	3	-	-	

Each team capable of identifying a problem and carry out a mini project on the problem defined. A panel of experts will review the code developed towards the project during the course of the semester. Plagiarized projects will automatically get an **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of a project, the team will submit a project report, which will be evaluated by duly appointed examiner(s).

CIE Assessment Pattern (50 Marks)

	DDT Lovele	Review (50 marks)
	RBI Levels	50
L1	Remember	-
L2	Understand	-
L3	Apply	20
L4	Analyze	20
L5	Evaluate	10
L6	Create	-

SEE Assessment Pattern (50 Marks)

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

				NATION	JAL SFE	RVICE	SCHEM	F (NS	5)				
Course	22NS	S 50				WICL	CIE M	larks	5)	50			
Code							(each	Seme	ester)				
L:T:P:S	0:0:0:0 SEE Marks												
Hrs / Week	2 Total Marks								S	50	x 4 = 2	00	
Credits	00 Exam Hours												
Course outco	mes:	urco th	o studon	t will be	abla to								
	Under	Lie course, the student will be able to:											
22N5550.1	Under	stand			$\frac{1}{1}$ $\frac{1}{1}$ $\frac{1}{1}$	ier res		$\frac{11000}{1000000000000000000000000000000$	oward		<u>.</u>		
22NSS50.2	for the	se the e e same	environn	iental ai	nd socie	etal pro	oblems/	issues	s and v	vill be ab	le to des	sign solutions	
22NSS50.3	Evalua develo	ate the opmen	existing t. Implen	system ient gov	and to p rernmer	propos nt or se	e practi elf-drive	ical sol en proj	lutions jects ei	s for the s ffectively	same for in the f	r sustainable ïeld.	
22NSS50.4	Devel	op capa	acity to m	ieet eme	ergencie	es and	natural	disast	ers & p	practice r	national	integration and	
Manning of	social	harmo	ony in ger	ieral.			_						
Mapping of C			Dimes to			DO6	: PO7	DUð	DUO	D O10	D011	PO12	
22NSS50 1	-	-	-	-	-	3	3	-	2	-	-	1	
22NSS50.2	-	-	-	-	-	3	3	-	2	-	-	1	
22NSS50.3	-	-	-	-	-	3	3	-	2	-	-	1	
22NSS50.4	-	-	-	-	-	3	3	-	2	-	-	1	
6													
Semester/ Course Code				CON	TENT					COs		HOURS	
	1. (Organi	c farmin	g. India	an Agri	cultur	e (Past	. Pres	ent				
	ä	and Fu	cure) Connectivity for marketing					22NSS30.1					
3 RD 22NSS30	2.	Waste organi:	manag zation, 5	ement– R's.	Public,	Priv	ate a	nd G	ovt	, 30 HRS 22NSS30.2 , 22NSS30.3		30 HRS	
	3.	Setting leading	g of the in g to com	lformat htributi	ion imp on in	arting social	club fo and e	r won econoi	nen mic				
	i	issues.	_							, 22NSS30	.4		
АТН	4. W	'ater c stakeh	conservat olders– Ii	ion tec mpleme	hnique: ntation	s – R	ole of	differ	ent	22NSS40	.1	20 UDS	
22NSS40	5. FI (enhanc	ing the	village	incom	ie and	d appr	oach	for 2	, 22NSS40	.2	50 1165	
	6. H	elping enhanc	local sc ce their	hools t enroln	o achie nent ii	eve go n Hig	ood res her/ t	ults <i>a</i> echnic	nd Z	, 22NSS40	.3		
		<u>voca</u> tio	nal educ	ation.			, -			22NSS40	.4		
F TH	7. D)evelop rural a	oing Susta reas and	ainable ` implem	Water n entation	nanage nappro	ement s baches.	ystem	for	22NSS50	.1	20 1100	
22NSS50		Govern Swachl	iment of Bharat.	India. F	Foreg. D irbhar I	igital Bharat	India, S h. Make	kill In in In	dia, 2 dia.	, 22NSS50	.2	50 HK5	
	9. S	Mudra preadi	scheme, ng publ	Skill dev ic awar	velopmo	entpro under	grams e rural	etc. outre	ach	22NSS50 ,	.3		
		progra	ms. (min	imum 5	progra	ms).				22NSS50	.4		
< TH	10. (Organiz	ze Natio	nal inte	egration	and	social	harm	ony 2	22NSS60	.1		
6 ^{1H} 22NSS60		events progra	/ work ms).	shops	/ semi	nars.	(Minim	um T	WU	, 22NSS60	.2	30 HRS	
	I					44			I	,			

11. Govt. school Rejuvenation a	nd helping the	em to achieve 22NSS60.3
good infrastructure.		, , ,
CIE Assessment Dathana (EO Marilas Astisitas	h 1)	22NSS60.4
CIE Assessment Pattern (50 Marks – Activity	based) –	
CIE component for every semester	Marks	
Presentation - 1	10	-
Selection of topic, PHASE - 1	20	
Commencement of activity and its progress	10	
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	50	
semester		
 Implementation strategies of the project 	(NSS work)	
The last report should be signed by NSS	Officer the H	D and principal
 At last report should be evaluated by the 	NSS officer o	f the institute
 Finally the consolidated marks sheet sh 	ould be sent t	o the university and also to be made available at
LIC visit.	ould be selle t	o the university and diso to be made available at
Suggested Learning Resources:		
Reference Books:		
1. NSS Course Manual, Published by NSS	Cell, VTU Bela	agavi.
2. Government of Karnataka, NSS cell, act	tivities report	ts and its manual.
3. Government of India, NSS cell, Activitie	es reports and	d its manual.
Pre-requisites to take this Course:		
1. Students should have a service-oriented n	nindset and s	ocial concern.
2. Students should have dedication to work a	works	place, allyullie with available resources and
3. Students should be ready to sacrifice some	of the time a	nd wishes to achieve service-oriented targets
on time.		
Pedagogy:		
• In every semester from 3rd semester to 6th	n semester, ead	ch student should do activities according to the
scheme and syllabus.		
• At the end of every semester student perfor	mance has to	be evaluated by the NSS officer for the assigned
activity progress and its completion.		
• At last, in 6th semester consolidated repor	rt of all activit	ies from 3rd to 6th semester, compiled report
should be submitted as per the instructions	S.	
 State the need for NSS activities and its pre Support and guide the students for self-size 	sent relevance	e in the society and provide real-life examples.
 Support and guide the students for self-pla. NSS coordinator will also be responsible for 	r accigning has	o. mowork grading assignments and guigges and
documenting students' progress in real act	i assigning 1101 jvitjes in the fi	ield
 Encourage the students for group work to i 	mprove their	creative and analytical skills
_needinge me students for group work to r		er enter e una anary treat smith
Plan of Action:		
• Student/s in individual or in a group Should	d select any or	he activity in the beginning of each semester till
end of that respective semester for success	ful completion	n as per the instructions of NSS officer with the
consent of HOD of the department.		
• At the end of every semester, activity report	rt should be su	bmitted for evaluation.
	15	

- 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	Торіс	Groupsize	Location	Activity	Reporting	Evaluation
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/Continu ous 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 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.	May be individual or team	Villages/ City Areas/Grama 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

						1
5.	Preparing an actionable business proposal for enhancing the village income and approach for implementation. Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational	May be individual or team May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus Local government / private/ aided schools/Government Schemes officers	Group selection/pro per consultation/ Continuous monitoring/ Information board School selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer Evaluation as per the rubrics of scheme and syllabus by NSS officer
7.	education. Developing Sustainable Water management system for rural areas and implementation approaches.	May be individual or team	Villages/ City Areas /Grama 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
8.	Contribution to any national level initiative of Government of India.For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme,Skill development programs etc.	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
9.	Spreading public awareness under rural outreach 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

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

		РН	YSICAL	EDUCA	TION (PE) (S	PORTS	AND	ATHLE	TICS)		
Course	22PEI) 50				-)(-	CIE M	arks		50		
Code	(each semest											
L:T:P:S	0:0:0:	0										
Hrs / Week	2						Total	Mark	S	50	x 4= 20	0
Credits	00						Exam	Hour	S	02		
Course outco	comes:											
At the end o	e end of the course, the student will be able to:											
22PED50.1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and											
	Fitness.	Fitness.										
22PED50.2	Create c	Create consciousness among the students on Health. Fitness and Wellness in developing and										
	maintai	ning a h	ealthy l	ifestvle.				,				
22PED50.3	Perform	in the	selected	sports	or athle	tics of	^r studen	t's cho	ice and	narticir	oate in t	he
	competi	ition at	regiona	l/state	/ nation	al / in	ternatio	nal lev	vels.	purcier	<i>face in c</i>	
22PED504	Underst	and the	roles a	nd resp	onsihili	ties of	organiz	ation	and adn	ninistrat	tion of s	norts and
	games	und the	l oles u	nuresp	011515111	105 01	organiz	ation	and dun	minsera		porto una
Manning of	Course	Outcor	nes to	Progra	m Outo	omes	•					
Mapping of	P01	PO2	PO3		P05	PO6	P07	P08	P09	P010	P011	P012
22PED50.1	-	-	-	-	-	2	-	3	3	-	-	2
22PED50.2	-	-	-	-	-	2	-	3	3	-	-	2
22PED50.3	-	-	-	-	-	2	-	3	3	-	-	2
22PED50.4	-	-	-	-	-	2	-	3	3	-	-	2
						-		0				
Semester				CONT	ENT				C	Os		HOURS
	Module	e 1: Ori	entatio	n								
	А.	Lifesty	vle,						2201	1 0.01	5 HRS	
	В.	Fitnes	S						2286	1030.1		
	С.	Food &	& Nutrit	ion					22PF	, 2 02 07		5 1113
	D. Health & Wellness								1000.2			
-	<u> </u>	Pre-Fi	tness te	st.								
	Module	e 2: Gei	ieral Fi	itness &	& Comp	onen	ts of Fi	tness				
200	А.	warm	ing up (Free Ha	na exer	cises)			2201	C 0503		
3 ND 2205020	В.	Streng	m - Pus	sn-up / 1 rr Dach	Pull-ups	ò			2296	LD30.2		15 HDS
22F ED30	с. D	Agility	– 30 Mi – Shutt	le Run					22PF	, 5 05 03		15 11K5
	E.	Flexib	ilitv – Si	t and Re	each				2211	1000.0		
	 F.	Cardio	vascula	r Endur	ance – I	Harvar	d step 7	Гest				
	Module	e 3: Red	creatio	nal Act	ivities		ł					
	Α.	Postur	al defor	mities.					22PE	ED30.3		
	В.	Stress	manage	ement.						,		10 HRS
	С.	Aerob	ics.						22PE	ED30.4		
	D.	Tradit	ional Ga	ames.								
	Module	e 1: Eth	ics and	l Moral	Values	5			22PE	ED40.1		
	Α.	Ethics	in Spor	ts Second					2205	, 5D40-2		5 HKS
	B.	Moral	values	in Sport	s and Ga	ames			2295	LD40.2		
4 TH	Module	e 2: Spe	ecific Ga	ames (A	Anyone	e to be	e select	ed by				
22PED40	the stu	aent)	1 1		Comi	. II	on II	d De -	.			
	A. VOII	eyball -	- Attack	к, віоск,	Service	e, upp	er Han	u Pass	22PE	ED40.3		20 HRS
	B Thr	owball	LIANU Pa - Sorvia	133. De Recei	ve Snir	attac	k Not T)ron &	,			
	D. IIII	n throw	- Set vic	e, Recei	ve, spii	i attac	r, net L	nop ø				
	juiii	Punow										

I		Γ	
	C. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle		
	hold and Bonus.		
	D. Kno-Kno – Giving Kno, Single Chain, Pole dive, Pole		
	E Table Tennis – Service (Fore Hand & Back Hand)		
	Receive (Fore Hand & Back Hand) Smash		
	F. Athletics (Track / Field Events) – Any event as per		
	availability of Ground.		
	Module 3: Role of Organization and administration	22PED40.4	5 HRS
<u>5</u> тн 22РЕD50	 Fitness Components: Meaning and Importance, Fit India Movement, Definition of fitness, Components of fitness, Benefits of fitness, Types of fitness and Fitness tips. Practical Components: Speed, Strength, Endurance, Flexibility, and Agility Athletics: Track -Sprints: Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block. Acceleration with proper running techniques. Finishing technique: Run Through, Forward Lunging and Shoulder Shrug. Jumps- Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick)and Landing Throws- Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique) Handball OR Ball Badminton Handball OR Ball Badminton 4. Attack and counter attack, simple counter attack, counter attack from two wings and center. Blocking, Goal Keeping and Defensive skills. Game practice with application of Rules and Regulations. Rules and their interpretations and duties of officials	22PED50.1 22PED50.2 22PED50.3 22PED50.4	Total 30 Hrs/ Semester 2 Hrs/week
	 Service: Short service, Long service, Long-high service. 		
	3. Shots: Overhead shot, Defensive clearshot,		
	Attacking clearshot, Dropshot, Netshot, Smash. 4. Game practice with application of Rules and Regulations.		
	B. Rules and their interpretation and duties of officials.		
6 ^{тн}	Athletics:	22PED60.1	Total 30 Hrs/
22PED60	1. Track -110 Mtrs and 400Mtrs:		Semester
	Hurdling Technique: Lead leg Technique, Trail leg	, 22PED60.2	2 II.ma /l-
	Technique, Side Hurdling, Over the Hurdles	,	Z Hrs/week
	 Crouch start (its variations Juse of Starting Block. 		

Approach to First Hurdles, In Between H Last Hurdles to Finishing	urdles, 22PED60.3
2. Jumps- High jump: Approach Run. Take-c	, ff, Bar 22PED60.4
Clearance (Straddle) and Landing.	
3. Throws- Discus Throw: Holding the Discus,	Initial
(Rotation in the circle).	covery
Football OR Hockey	
Football:	
1. Kicking: Kicking the ball with inside of the foot, Ki	cking
the ball with Full Instep of the foot, Kicking the ball	with
Instep of the foot and Lofted Kick.	Juter
2. Trapping: Trapping- the Rolling ball, and	the
Bouncing ball with sole of the foot.	
3. Dribbling: Dribbling the ball with Instep of the	foot,
Dribbling the ball with Inner and Outer Instep of	of the
foot.	
4. Heading: In standing, running and jumping cond	ition.
5. Throw-in: Standing throw-in and Running throw	v-in.
6. Feinting: with the lower limb and upper part of	of the
7 Tackling: Simple Tackling, Slide Tackling	
8. Goal Keeping: Collection of Ball, Ball clear	ance-
kicking, throwing and deflecting.	
9. Game practice with application of Rules	and
Regulations.	
A. Rules and their interpretation and duties of offi	cials.
Hockey:	
A. Fundamental Skills 1. Passing: Short pass. Longpass. pushpass. hit	
2. Trapping.	
3. Dribbling and Dozing	
4. Penalty stroke practice.	
6 Tackling Simple Tackling Slide Tackling	
7. Goal Keeping. Ball clearance- kicking, and deflect	ting.
8. Game practice with application of Rules and	
Regulations.	
B. Rules and their interpretation and duties of offi	cials
CIF Assassment Pattern (50 Marks - Prostical)	
CIE to be evaluated every semester end based on practical	demonstration of Sports and Athletics
activities learnt in the semester.	
CIE	Marks
Participation of student in all the modules	10
Quizzes – 2, each of 7.5 marks	15

Final presentation / exhibition /								
Participation	Participation 25							
in competitions/ practical on specific								
tasks assigned to the students								
Tota	1 50							
Suggested Learning Resources:								
Reference Books:								
1. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kal	lyani.							
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers	, Kolkata.							
3. Petipus, et.al., Athlete's Guide to Career Planning, Human K	Kinetics.							
4. Dharma, P.N. Fundamentals of Track and Field, Khel Sahity	za Kendra, New Delhi.							
5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New D	Delhi.							
6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New D	Jelhi.							
7. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kal	lyani.							
8. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers	s, Kolkata							
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendr	ra, New Delhi.							
	Delhi.							
10. Dubey H.C., Basketball, Discovery Publishing House, New								
10. Dubey H.C., Basketball, Discovery Publishing House, New 11. Rachana Jain, Teach Yourself Basketball, Sports Publicatio	on.	7 1						
10. Dubey H.C., Basketball, Discovery Publishing House, New 11. Rachana Jain, Teach Yourself Basketball, Sports Publicatio 12. Jack Nagle, Power Pattern Offences for Winning basketbal	on. II, Parker Publishing Co., New Y	′ork.						
 Dubey H.C., Basketball, Discovery Publishing House, New Rachana Jain, Teach Yourself Basketball, Sports Publication Jack Nagle, Power Pattern Offences for Winning basketball Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra 	on. ll, Parker Publishing Co., New Y a, New Delhi.	′ork.						

						YOG	4					
Course	22Y00	G50					CIE M	arks		50		
L:T:P:S	0:0:0:0 SEE Marks											
Hrs / Week	2						Total	Mark	5	50	x 4 = 2	200
Credits	00						Exam	Hour	S	02		
Course outc	Course outcomes:											
At the end of	At the end of the course, the student will be able to:											
22YOG50.1	Unders	Understanding the origin, history, aim and objectives of Yoga.										
22YOG50.2	Becom	Become familiar with an authentic foundation of Yogic practices.										
22Y0G50.3	Practic	e differ	ent Yog	gic meth	ods suc	h as Sı	ıryanan	naskar	a, Pran	ayama a	ind son	ne of the Shat.
22Y0G50.4	Use the	e teachi	ngs of F	Patanjali	in daily	/ life.						
Mapping of	Course	Outcor	nes to	Progra	m Outo	comes	:					-
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	l P012
22Y0G50.1	-	-	-	-	-	3	-	-	-	-	-	1
22Y0G50.2	-	-	-	-	-	3	-	-	-	-	-	1
2210650.3	-	-	-	-	-	3	-	-	-	-	-	1
2210650.4	-	-	-	-	-	3	-	-	-	-	-	1
Semester /												
Course				CONT	ENT					COs		HOURS
Code												
3 rd 22YOG30	 Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, importance of prayer Brief introduction of yogic practices for common man: Yogic practices for common man to promote positive health Rules and regulations: Rules to be followed during yogic practices by practitioner Misconceptions of yoga: Yoga its misconceptions, Difference between yogic and non-yogic practices. Suryanamaskara: Suryanamaskar prayer and its meaning, Need, importance benefits of Suryanamaskar. Suryanamaskar 12 count, 2rounds Different types of Asanas: Sitting: Padmasana, Vajrasana, Sukhasana Propo line: Phujangasana, Shalabhasana 								Total 32 Hrs/ Semester 2 Hrs/week			
4 ^{тн} 22YOG40	Suryanan Brief int Kapalab Differen 1. Sitti Vak 2. Star Has 3. Prop 4. Sup Patanjali	maska roduct hati: Re types ng: Pas rasana, nding: F tapadas ne line: ine line ine line ine line	ra: Sury ion and evision of Asan cchimott Aakarr Parshva sana Dhanun e: Karna tanga Y andra B	vanamas l impor of Kapa nas: tanasan a Dhan Chakras rasana Peedas 'oga : As	skar 12 tance o labhati a, Ardha urasana sana, Ur ana, Sar ana, Pra	count, f: -40stro a Ushtro dhva J rvanga unayan	4round okes/m rasana, Hastoth sana, Cl na	s in3rou anasar nakraa	nds ia, 2 sana	22YOG4(22YOG4(22YOG4(22YOG4(22YOG4().1,).2,).3,).4	Total 32 Hrs/ Semester 2 Hrs/week

5 ^{тн} 22YOG50	Kapalabhati: Re Brief introduct Different types 1. Sitting: Yog Paschimott 2. Standing: F Parshvakou 3. Prone line: Bhujangasa 4. Supine line: Sarvangasa Patanjali's Asht	evision of Kapalabhati - 60strokes ion and importance of: of Asanas: gamudra in Padmasana, Vibhakta canasana, Yogamudra in Vajrasana Parivritta Trikonasana, Utkatasana nasana Padangushtha Dhanurasana, Poo ana / Rajakapotasana : Navasana/Noukasana, Pavanam ina canga Yoga: Pratyahara, Dharana	/min3rounds a, rna uktasana,	22Y(22Y(22Y(22Y(OG50.1, OG50.2, OG50.3, OG50.4	Total 32 Hrs/ Semester 2 Hrs/week			
	Franayama: ()) Kapalabhati: Re Brief introduct	ayı, Sheetali, Sheektari evision of Kapalabhati – 80 stroke ion and importance of:	s/min3round						
б ^{тн} 22YOG60	 Different types 1. Sitting: Bak Rajakapota 2. Standing: F Parshvakon 3. Supine line 4. Balancing: Patanjali's Asht Pranayama: Bh 	of Asanas : casana, Hanumanasana, Ekapada sana Parivritta Trikonasana, Utkatasana hasana : Setubandhasana, Shavasanaa (R Sheershasana c angaYoga : Dhyana (Meditation), astrika, Bhramari, Ujjai	a, elaxation pos [.] Samadhi	22Y 22Y 22Y 22Y	OG60.1, OG60.2, OG60.3, OG60.4	Total 32 Hrs/ Semester 2 Hrs/week			
	Shat Kriyas: Jala	aneti and sutraneti, Sheetkarma K	apalabhati						
CIE Assess CIE to b	ment Pattern (50 e evaluated every) Marks – Practical) y semester based on practical de	monstration	of Yog	gasana lea	arnt in the			
semeste	semester and internal tests (objective type)								
		Avg of Test 1 and Test 2	25		-				
		Demonstration of Yogasana	25		-				
		Total	50		1				

Suggested Learning Resources:

Reference Books:

- 4. Swami Kuvulyananda: Asma (Kavalyadhama, Lonavala)
- 5. Tiwari, O P: Asana Why and How
- 6. Ajitkumar: Yoga Pravesha (Kannada)
- 7. Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha (Bihar School of yoga, Munger)
- 8. Swami Satyananda Saraswati: Surya Namaskar (Bihar School of yoga, Munger)
- 9. Nagendra H R: The art and science of Pranayama
- 10. Tiruka: Shatkriyegalu (Kannada)
- 11. Iyengar B K S: Yoga Pradipika (Kannada)
- 12. Iyengar B K S: Light on Yoga (English)

Web links and Video Lectures (e-Resources):

- https://youtu.be/KB-TYlgd1wE
- https://youtu.be/aa-TG0Wg1Ls

SEMESTER VI

	DEEP LEARNING													
Course Code	22A	IM6	1				CIE	Mark	S			50		
L:T:P:S	3:0:	0:0					SEE	Marl	κs			50		
Hrs / Week	3						Tot	al Ma	rks			100		
Credits	03						Exa	m Ho	urs			03		
Course outcom	ies: A	t the	end o	of the o	cours	e, the st	udent	: will ł	be able	to:				
22AIM61.1	Unde	rstar	nd the	funda	ment	tal prine	ciples	of dee	ep learr	ning, inc	luding ı	neural n	etwork	
	archi	tectu	ires ar	nd trai	ining	method	ls.							
22AIM61.2	Apply classi	y con ificat	ivoluti ion, ol	onal r bject o	neura letect	l netwo tion, and	rk (Cl d segr	NN) ai nenta	chitect tion.	ures to	image-r	elated t	asks for	
22AIM61.3	Analy Mem	yze tł ory (ne arc LSTM	hitect) netv	ure, p vorks	rinciple, and Ga	e of re ited R	curre ecurr	nt neur ent Uni	al netw ts (GRU	orks (R s).	NNs), Lo	ong Short	-Term
22AIM61.4	Evalu	valuate the principles and applications of generative adversarial networks (GANs) and ariational autoencoders (VAEs).												
224IM615	Comr	/ariational autoencoders (VAEs).												
22AIM01.5	Compare the architectures, applications of transformer networks such as BERT and GPT.												di 1.	
22AIM61.6	Creat comp	te de blex p	ep lea: proble	rning ms by	mode levei	els using raging p	g tran pre-tra	ster le ained	arning, models	self-su	pervise	d learnir	ng technio	ques for
Mapping of Co	ourse	Out	come	s to P	rogr	am Ou	tcom	es an	d Prog	ram Sp	oecific (Outcom	es:	
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
22AIM61.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM61.2	3	-	-	-	-	-	-	-	-	-	-	2	3	3
22AIM61.3	-	3		-	-	-	-	-	-	-	-	2	3	2
22AIM61.4		3	-	-		-	-	-	-	-	-	2	3	2
22AIM61.5	-	3	3	-	-	-	-	-	-	-	-	2	3	-
22AIM61.6	-	-	3	-	3	-	-	-	-	-	-	2	-	-
MODULE-1	Fund	lame	entals	of De	ep Le	earning		22	2AIM61	.1	•		8 Hou	ırs
Introduction to I	Deep I	Learr	ning, A	pplica	ations	s of Dee	p Lea	rning.	Feedfo	orward	Neural	Netwo	rks (FNN): Basics
of Neural Netwo	rks-A	ctiva	tion F	unctio	ons-T	raining	Neura	al Net	works:	Backpro	opagatio	on and G	radient I) Descent.
Deep Learning	Fram	ewo	rks: T	ensor	Flow,	PyTorc	ch.			-				
Text Book	Tex	t Boo	ok 1: C	h 8,9 .	Text	book 2:	Ch:16	5						
MODULE-2	Con	volu	tiona	l Neu	ral No	etwork	s	22	AIM61.	2			8 Hou	ırs
	(CN	Ns) a	and A	pplica	ation	S								
Convolutional N	leura	l Net	twork	s (CN	Ns): 1	Underst	andir	ng Con	volutio	nal Lay	ers-Poo	ling Lay	ers and F	ully
Connected Layer Image Classificat	s-CNI ion-O	N Arc bject	chitect t Dete	tures (ction-	[LeNe Image	et, AlexN e Segme	let, Vo entatio	GG, Re on.	sNet).	Гуреs o	f CNNs.	Applica	tions of	CNNs:
Applications	Onlin	ie sel	f-serv	ice so	lutior	ns								
Text Book	Text	t Boo	$\frac{1}{1} \frac{301}{1}$	h:9	Text	Book 2:	Ch:1	0						
MODULE-3	Sea	uenc	e Mo	deling	with	<u>1</u>	22	2 AIM6	51.3				8 Hou	rs
	Rec	urre	nt Ne	tworl	s									-
Recurrent Neur	al Ne	two	rks (R	NNs)	Intro	oductio	n to R	NNs-V	/anishii	ng and I	Explodin	ng Gradi	ents Prol	olem-
Applications of R	RNNs.	Long	g Shoi	t-Ter	m Me	emory	(LSTN	A) Net	tworks	and Ga	ited Re	current	Units (G	RUs):
Architecture of L	STM	Netw	orks-	GRU v	s. LS	ГM: Con	npara	tive A	nalysis					-
Text Book	Tex	t Boo	ok 1: C	h10	Text	t Book:2	2: Ch 1	14	Ľ					
Cases Studies	Time	e Seri	ies Pre	edictio	on wit	ch any d	lata se	et						
MODULE-4	Adva	nce	d Gen	erativ	ve Mo	dels	2	2AIM	61.4				8 Hou	rs
Autoencoders: Autoencoders	Autoe	ncod	lers fo	r feat	ure ez	tractio	n, clas	sifica	tion-De	enoising	Autoen	coders-	Sparse	rator and
Discriminator-Tr	rainin	σΩΛ	Nsan	d Ann	licati	ans (Im	പപ്പപ്പ പാപപ	onoro	tion Str	ulo Tran	ster)	CHIECUL		ator allu
Case Study	Δno	<u>s un</u> malu		<u>a npp</u> ction	iicatii	sus (IIII	uge U	ciicia	, stj	yic Ital				
Text Book	Tev	t Boo	k 1 · C	h 14	г	'ext Roc	<u>1k 2. (</u>	ħ						
I CAL DOOK	ICA	100	, n 1, U	.1 1 7	1									

	DULE	E-5 Cutting-Edge	Techniques in D	eep 22AIM61.5, 22AIM61.	6	8 Hours
		Leai iiiig	T CDT). Un denete	 		
ra	nsiorn	ner Networks (BER	I, GPIJ: Understa	anding the Transformer Archited	ture-Self-Atte	ention
ec	hanisn	n-Applications: BER	for NLP, GPT for	Text Generation. Transfer Lear	ning: Introdu	iction to Transfe
ear	ning-P	re-trained Models a	nd Fine-Tuning-U	se Cases: Medical Imaging, Natur	ral Language	Processing.
rez	xt Book	Text Book 1:	Ch 12 Text Bo	00K 2: Ch 11		
	Asses	ssment Pattern (50	Marks – Theory			-
				Marks Distribution		_
		RBT Levels	Test (s)	Qualitative Assessment	MCO's	
				(\$)		_
			25	15	10	
L	1	Remember	5	-	5	
Ľ	2	Understand	5	-	5	
Ľ	3	Apply	10	5		
L	4	Analyze	5	10	-	
Ľ	5	Evaluate	-	-	-	
L	6	Create	-	-	-	
E	E Asse	ssment Pattern (50	Marks – Theory) jotnikution		
		RBT Levels	Exam Marks Di (50)			
	L1	Remember	10			
	L2	Understand	10			
	L3	Apply	20			
	L4	Analyze	10			
	L5	Evaluate				
Γ	L6	Create	-			
		d Learning Resour	ces:	· · · · · · · · · · · · · · · · · · ·		
Su	ggeste					
Sug T	ggeste ext Bo	oks:				
Sug T 1.	ext Bo Ian (o ks: Good Fellow, Yeshu	aBengio, Aaron C	ourville, "Deep Learning", MIT	Press,2017.	ISBN:
5u T 1.	ext Bo Ian (9780	o ks: Good Fellow, Yeshu 0262035613, 026203	aBengio, Aaron C 5618	ourville, "Deep Learning", MIT	Press,2017.	ISBN:
5ug T 1. 2.	ext Bo Ian (9780 And	o ks: Good Fellow, Yeshu 0262035613, 026203 rewW.Trask," Grok	aBengio, Aaron C 5618 king Deep Learni:	ourville, "Deep Learning", MIT ng", Manning Publications ,201	Press,2017.	ISBN: 1617293702
5u T 1. 2. Re	ext Bo Ian (9780 And ferenc	ooks: Good Fellow, Yeshu 262035613, 026203 rewW.Trask," Grok ce Books:	aBengio, Aaron C 5618 king Deep Learni	ourville, "Deep Learning", MIT ng", Manning Publications ,201	Press,2017.	ISBN: 1617293702
Su T 1. 2. Re	ext Bo Ian (9780 And ference	ooks: Good Fellow, Yeshu 262035613, 026203 rewW.Trask," Grok ce Books: to Deep Learning, A	aBengio, Aaron C 5618 king Deep Learni Aston Zhang, Zach	ourville, "Deep Learning", MIT ng", Manning Publications ,201 nary C. Lipton, Mu Li, and Alexa	Press,2017. 1 .9, ISBN:9781 under J. Smola	ISBN: L617293702 a, Amazon Senic
Su 1 1. 2. Re L.	ext Bo Ian (9780 And ferenc Dive in entists	ooks: Good Fellow, Yeshu 262035613, 026203 rewW.Trask," Grok ce Books: Ito Deep Learning, A s – Open source and	aBengio, Aaron C 5618 king Deep Learni Aston Zhang, Zach Free Book, Marc	ourville, "Deep Learning", MIT ng", Manning Publications ,201 nary C. Lipton, Mu Li, and Alexa ch 2022. ISBN:	Press,2017. 9, ISBN:9781 Inder J. Smola	ISBN: 1617293702 a, Amazon Senic
Su T 1. 2. Re L.	ext Bo Ian (9780 And ference Dive in entists Yegnar	ooks: Good Fellow, Yeshu 262035613, 026203 rewW.Trask," Grok ce Books: nto Deep Learning, A s – Open source and narayana, B., Artificia	aBengio, Aaron C 5618 king Deep Learni Aston Zhang, Zach Free Book, Marc al Neural Network	ourville, "Deep Learning", MIT ng", Manning Publications ,201 nary C. Lipton, Mu Li, and Alexa ch 2022. ISBN: ss PHI Learning Pvt.Ltd, 2009. ISI	Press,2017. .9, ISBN:9781 ander J. Smola BN: 97881203	ISBN: 1617293702 a, Amazon Senic 312531
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Course C	code	22	AIL6	1						CIEN	<u>Aarks</u>	50					
L:T:P:S		0:0):1:0							SEE I	Marks	50					
Hrs/We	eek	2								Tota	I Marks	<u>s 100</u>					
Credits		01	1	1	<u></u>		.1 .	1 4	.11.1	Exan	n Hours	s 03					
Course o		es: A	t the	end of	t the c	<u>ourse,</u>	the st	udent	$\frac{\text{Will be}}{1}$	e able	to:						
ZZAIL61.	.1	Ap	ply th	e vari	ous a	eep lea	rning	algori	thms i	n Pyth	on.						
22AIL61.	.2	Ana	alyse	deep l	earni	ng moo	dels lil	ke type	es of C	NNS.	1	the regulte					
22AIL61.	.3	Bu	ild de	ep lea	rning	model	s in Te	ensor	low ai	id inte	erpret ti	the results.					
ZZAILOI.	.4 TofCol	EVa				eep lea	arning m Our	tcom	works	Drog	ram Sr		Dw, Py I				
Mapping		n se P01	PO2	PO3	P04	P05	P06		P08	PO9	PO10	PO11	P012	PSO1	PS02		
22AIL61	1	3	-	-	-	-	-	-		-	-	-	-	-	3		
22AIL61	2	-	3	_	-	-	_	_	-	-	_	_	3	3	2		
22AIL61	.3	-	-	3	-	3	-	-	-	-	-	-	3	3	3		
22AIL61	.4	-	3	-	-	3	-	-	-	-	-	-	2	-	3		
Ex. No			Ū		Ez	xperin	ients					Нои	urs –	C	0s		
				Р	rereo	quisite	Expe	rimen	ts / P	rogra	ms / De	emo					
	Basic	s of	Macl	hine le	earni	ng Cor	rcepts	and F	ythor	1 Prog	rammi	ng	2	NA			
						Ŭ		Part	Ă			0					
1	Write a	pyt	hon p	rogra	m to i	mplem	nent X	OR fun	ction	using		2	2	22AIL61.	1		
	multi-la	ayer	Neur	al Net	work								2	22AIL61.	3		
2	Write a	a pro	ogran	n to ir	nplen	nent 11	d CNN	I for g	iven t	imese	ries	2	2	22AIL61.2	2		
	data.								2	22AIL61.	3						
3	3 Develop a program for recognizing handwritten digits us					using	2	2	22AIL61.	1							
	Convol	utior	nal Ne	ural N	etwor	k (CNI	N).						4	22AIL61.	2		
			LOT	M 1			<u> </u>					2	4	22AIL61.	3		
4	Develo	pa h	LSI	M-bas	ea m		for ar	1 opei	n-sour	ce da	taset.	Z	4	22AIL61.			
	of IST	еш м	le al c		bodd	LSIM ing di	monsi	ons		handle	the			22AIL01 22AIL61.	Э 4.		
	sequen	re le	noth	s, em variał	nility i	ing ui in innu	t texts	0115.	nisu 1	lianuit	the the		2	LZAILUI.	т		
5	Write	a nr	rograi	$\frac{varia}{m}$ to	imple	ement	the st	tens to	o prer	proces	s the	2	2	22AIL61.	1		
_	images	and	laugr	nent t	he da	ta for t	rainin	g a UN	let mo	del, al	so do	_		22AIL61.2	2		
	necessa	ary	adjus	tment	t in t	the ar	chitec	ture o	lesign	to h	andle		2	22AIL61.	3		
	differei	nt da	ataset	ts. Col	lect i	mage (datase	t for j	perfor	ming	U-Net		2	22AIL61.4	4		
	segmer	itati	on														
6	Consid	er th	ie tas	k of a	nnota	ting in	nages	for au	tonom	ous ve	ehicle	2	2	22AIL61.	1		
	detecti	on s	ysten	ıs. Wr	ite a	progra	m to i	impler	nent a	n app	roach		2	22AIL61.2	2		
	labeling	g co	omple	x obj	ects .	such a	as peo	destria	ins, cy	vclists	, and		2	22AIL61.	3		
	various	typ	es of	vehicle	es usi	ng an il	mage I	abelin	g tool,	also e	xport		4	22AIL61.4	4		
	the ann	otat	tions	in JSU	N Or C	SV for	mats.										
						Part I	В										
7	Experir	nent	t diffe	rent h	vperp	arame	ter an	d activ	ation f	unctio	ns to	2	2	22AIL61.2	2		
	find an	opti	mal s	olutio	n in th	ne impl	ement	ation	of class	sifier n	nodel						
	for give	<u>n d</u> a	<u>atase</u> t	using	<u>3- la</u>	yer nei	ural ne	<u>etwor</u> ł	Κ								
8	Develo	pap	ytho	n code	to in	pleme	nt Cor	nvoluti	on Ne	ural		2 22AIL61.3					
	Netwoi	·k, v	isuali	ze the	featu	re map	os gene	erated	and g	eneral	ize						
	the mo	del ı	using	regula	irizati	ion.											
9	Train to	<i>N</i> O io	dentio	cal neu	iral ne	etwork	s on si	uitable	e datas	et, one	with	2	2	22AIL61.4	4		
	9 Train two identical neural networks on suitable dataset, one with 2 22AIL61.4 batch normalization and one without. Compare their								Com								

	performance r show the effeo network classi	netrics (acc ct of batch fier.	on the test set and drop out in neural			
10	Develop a pro	ogram for la	anguage modeling us	ing RNN.	2	22AIL61.3 22AIL61.4
11	Write a prog	STM.	2	22AIL61.1 22AIL61.3 22AIL61.4		
12	Develop a py the generate learning rate,	oder and visualize hyperparameters s.	2	22AIL61.1 22AIL61.2 22AIL61.3 22AIL61.4		
			Part C- Virtua	al Lab		
1	Demonstrate the	e working of	f Back propagation. h	ittps://vlab.spit.ac.i	n/ai/#/exp	eriments/1
2	YOLO CNN for O	bject Detect	tion. https://vlab.si	pit.ac.in/ai/#/exper	iments/6	/
3 F	Handwritten Digi	t Recognitio	on Using CNN. https:/	//vlab.spit.ac.in/ai/	#/experime	ents/2
		(50 M)				
CIE ASS	sessment Patter	n (50 Mari	KS – Labj	-		
R	RBT Levels	Test (s) (20)	Assessment (30)			
R L1	RBT Levels Remember	Test (s) (20) -	Assessment (30)	-		
R L1 L2	RBT Levels Remember Understand	Test (s) (20) - 5	Assessment (30) - 10			
R L1 L2 L3	RBT Levels Remember Understand Apply	Test (s) (20) - 5 5	Weekly Assessment (30) - 10 10			
L1 L2 L3 L4	RBT Levels Remember Understand Apply Analyze	Test (s) (20) - 5 5 10	Weekly Assessment (30) - 10 10 10 10			
R L1 L2 L3 L4 L5	RBT Levels Remember Understand Apply Analyze Evaluate	Test (s) (20) - 5 5 10 -	Weekly Assessment (30) - 10 10 10 -			
R L1 L2 L3 L4 L5 L6	Remember Understand Apply Analyze Evaluate Create	Test (s) (20) - 5 10 -	weekiy Assessment (30) - 10 10 10 - -			
R L1 L2 L3 L4 L5 L6 SEE Ass	RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Patter	Test (s) (20) - 5 10 - - - Tn (50 Mar)	Weekly Assessment (30) - 10 10 -			
R L1 L2 L3 L4 L5 L6 SEE Ass	RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Patter RBT Levels	Test (s) (20) - 5 10 - - rn (50 Mar) F	Weekly Assessment (30) - 10 10 10 - <td>ution</td> <td></td> <td></td>	ution		
R L1 L2 L3 L4 L5 L6 SEE Ass L1	RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Patter RBT Levels Remember	Test (s) (20) - 5 10 - rn (50 Mar) H	weekiy Assessment (30) - 10 10 10 - - ks - Lab Exam Marks Distrib (50) -	pution		
R L1 L2 L3 L4 L5 L6 SEE Ass L1 L2	RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Patter RBT Levels Remember Understand	Test (s) (20) - 5 10 - - - - - - - - - - - - - - - - - -	Weekly Assessment (30) - 10 10 10 - - - - - - - - - - - - - - - - - (50) - 10	pution		
R L1 L2 L3 L4 L5 L6 SEE Ass L1 L2 L3 L1 L2 L3	RBT Levels Remember Understand Apply Analyze Evaluate Create Sessment Patter RBT Levels RBT Levels Remember Understand Apply	Test (s) (20) - 5 5 10 - - - - - Fn (50 Mar)	Weekly Assessment (30) - 10 10 10 - 10 - 10 10	pution		
R L1 L2 L3 L4 L5 L6 SEE Ass L1 L2 L3 L4 L4	RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Patter RBT Levels Remember Understand Apply Analyze	Test (s) (20) - 5 10 - - rn (50 Mar) F	Weekly Assessment (30) - 10 10 10 10 10 10 10 10 10 10 - ks - Lab) Exam Marks Distrib (50) - 10 20	pution		
R L1 L2 L3 L4 L5 L6 SEE Ass L1 L2 L3 L4 L2 L3 L4 L5 L5 L1 L2 L3 L4 L5 L5 L6 SEE Ass L4 L5 L5 L5 L5 L5 L5 L5 L5 L5 L5	RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Patter RBT Levels Remember Understand Apply Analyze Evaluate	Test (s) (20) - 5 10 - rn (50 Mar) F	Weekly Assessment (30) - 10 10 10 - - ks - Lab) Exam Marks Distrib (50) - 10 20 10	pution		

Reference Books:

1)Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt.Ltd, 2009. ISBN: 9788120312531 2)Golub, G., H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013. ISBN: 9781421407944

	BIG DATA & CLOUD TECHNOLOGIES													
Course Code	22A	IM62	2				CIE M	arks				50		
L:T:P:S	3:0:0	0:0					SEE N	larks				50		
Hrs / Week	3						Total	Mark	S			100		
Credits	03						Exam	Hour	S			03		
Course outcon	nes: A	t the	end of	the co	ourse,	the st	udent v	vill be	able to	0:		•		
22AIM62.1	Undeı Techr	rstan	d basi ies.	ic con	cepts,	prino	ciples a	nd pa	radigi	m of C	loud Co	omput	ing and	l Big Data
22AIM62.2	Apply Mana	the or th	cloud j	olatfor	m arc	chitect	ures of	virtua	lized o	data ce	nters ar	nd Inte	r-cloud	Resource
22AIM62.3	Evalu	Evaluate the performance of Iterative processing algorithms using Spark.												
22AIM62.4	Desig	Design a model for real time problem using MAP REDUCE.												
22AIM62.5	Mana	Manage the data using Dataframe and RDD concepts.												
22AIM62.6	Creat	e a m	ethod	or mo	del to	hand	le data	in clou	d env	ironme	ent usin	g big d	ata tecl	nnologies.
Mapping of Co	ourse	Outo	comes	to Pr	ogra	m Out	tcomes	and l	Progr	am Sp	ecific (Jutco	mes:	
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
22AIM62.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM62.2	3	-	-	-	-	-	-	-	-	-	-	3	3	2
22AIM62.3	-	3	-	-	-	-	-	-	-	-	-	3	3	2
22AIM62.4	-	-	3	-	-	-	-	-	-	-	-	3	3	2
22AIM62.5	_	-	3	-	3	-	-	-	-	-	-	3	3	2
22AIM62.6	-	-	2		3	-	_	-	-	-	_	3	3	2
	Intro	ducti	jon to	Cloud	Com	nutin	<u>а</u>	22		21		5		8 Hours
MODOLE-1	muo	uucu		ciouu	COM	puun	g	22	AIMO	2.1				0 110 11 5
Defining Cloud, (Service Models, FORCE.COM, and Text Book	Cloud (Compu l ANEI	Comp uting KA. Bool	outing Platfo	Reference $rm an$	ence M d serv	Model, vices: A	Charac AWS, G(teristi DOGLE	cs and APP I	l Benef ENGIN	its, Dist E, MICR	ribute OSOF1	d Syste FAZURI	ms, Cloud E,
	Cloud			1,2	hitoc	turo o	nd	2	2 A I M G	2 1 22		2		9 Hours
MOD. LE-Z	Data	Inter	ise Co	mput	ing	lui e a	inu	<i>L</i> 2	LAIMC)2.1, 22	AIMOZ.	2		0 11001 5
Types of Cloud,	Cloud	Inter	ropera	bility	and s	tanda	rds, Sca	labilit	y and	Fault '	Toleran	ce. Ch	aracter	izing Data-
Intensive Comp	outatio	ns, '	Techn	ologie	s for	Data	-intens	ive co	mput	ing, st	torage	systen	ns, pro	ogramming
platforms. Virtua	alizatio	on.												
Text Book	Text	Bool	k 1: Ch	3.	Text	Book	2: Ch 3	,4,8						
MODULE-3	Intro	ducti	ion to	Big D	ata ai	nd Ha	doop	2	2AIM	62.1, 2	2AIM62	2.4		8 Hours
Introduction to I	Big Da	ta, Da	ata Sto	rage a	nd Ar	alysis	, Comp	arison	with o	other s	ystems,	A brie	f Histor	ry of
Hadoop, Hadoop	Relea	ise, A	pache	Hado	op and	d Eco S	Systems	s, Anal	yzing	Data w	rith Unix	x syste	ms, Ana	alyzing
Data with Hadoo	p, Hac	<u>loop</u>	Stream	ning, F	ladoo	p Pipe	es.							
Text Book	Text	bool	x 3. Ch	1,2										
MODULE-4	HDFS	and	MAP	REDU	<u>E</u>			22AIN	162.3,	22AIM	162.4			8 Hours
HDFS Concepts,	Hadoo	op file	e syste	ms, in	terfac	es, Da	ta flow,	Hado	op Arc	chives.	Map Re	duce:	Anatom	y of a Map
Reduce Job Run,	Failur	es, Jo	b Sch	edulin	g, Shu	iffle ar	nd sort,	Task E	Execut	ion, Ma	ap Redu	се Тур	es and	Input and
Output Formats,	Map I	Redu	ce feat	ures.										
Text Book	Text	Bool	k 3: Ch	3,6,7				- Ia a 1		<u> </u>				
MODULE-5	Apacl	he Sp	bark					22A	IM62.	3, 22A	IM62.5,	22AIN	162.6	8 Hours
Introduction to A Distributed Data	Apache sets (I	e Spa RDDs	rk, Str 5)-Adv	ucture anced	ed API RDDs	ls: Dat . Strea	a Frame aming P	es, SQI rocess	and l funda	Data Se amenta	ets. Low Ils.	-Level	APIs: R	esilient
Case Study	Find	ing tl	he mos	st pop	ular n	ιovie ι	using R	DD.						
Text Book	Text	Bool	k 4: Ch	1,2,3,	4-13									

CIE As	E Assessment Pattern (50 Marks – Theory)										
	-		Marks Distribution								
	RBT Levels	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 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. Douglas Comer, "The Cloud computing Book: The future of Computing Explained", 1st Edition by CRC Press, 2021.ISBN: 9781000384284, 1000384284
- Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi, "Mastering Cloud Computing: Foundations and Application Programming", Morgan Kaufmann (Elesiver),2013. ISBN: 9780124114548, 0124114547
- 3. Tom white, "Hadoop: The Definitive Guide" Third Edition, O'reily Media, 2012.ISBN: 9781449338770, 1449338771
- 4. Bill Chambers and Matei Zaharia, "Spark: The Definitive Guide" First Edition, O'reily Media, 2018 ISBN 9781491912294, 1491912294

Reference Books:

1 Frank Kane," Taming Big Data with Apache Spark and Python", Packt Publishing, 2017. ISBN: 9781787288300

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=2LaAJq1lB1Q
- https://www.educative.io/blog/what-is-big-data
- https://medium.com/@tomhcorbin/understanding-apache-spark-part-1-spark-architecture-21c347bf622b
- https://sparkbyexamples.com/

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

	BIG DATA & CLOUD TECHNOLOGIES LAB														
Course	Code	22AI	L62						CI	E Mar	ks		50		
L:T:P:S		0:0:1	L:0						SE	E Mar	'ks		50		
Hrs. / V	Veek	2							То	tal Ma	arks		100		
Credits	;	1							Ex	am H	ours		03		
Course	outcon	nes: A	t the e	nd of	f the c	ourse,	the st	udent	will b	e able	to:				
22AIL6	2.1	Apply	y the l	know	ledge	of clo	ud con	nputin	g to Co	onfigu	re virtu	alizatio	n tools V	/irtual E	Box,
		VMw	are w	orkst	ation.	1		-							
22AIL6	2.2	2.2 Design an application on cloud.													
22AIL6	2.3 Develop data applications using Map Reduce Concept.														
22AIL6	2.4 Create applications for Big Data Analytics using Spark.														
Марріі	ng of Co	ourse	Outc	ome	s to P	rogra	m Ou	tcom	es and	l Prog	gram Sj	pecific	Outcon	nes:	
		P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIL6	2.1	3	-	-	-	-	-	-	-	-	-	-	2	3	-
22AIL6	2.2		-	3	-	-	-	-	-	-	-	-	2	3	-
22AIL6	2.3	-	-	3	-	-	-	-	-	-	-	-	2	3	-
22AIL6	2.4	-	-	3	-	3	-	-	-	-	-	-	2	3	-
													1	n	
Ex. No						Expe	erimer	ıts					Hou	C	Os
													rs		
				Pr	erequ	lisite	Exper	iment	s / Pr	ogran	ıs / Dei	no			
 c. Des 1. 2. 3. 4. 5. 	Deploy Imple Glue o Googl using Use G By Ins into co execut Imple	y any ment a or Goo le Clou server AE (G talling ontaine te in D ment t	applic applic a data ogle D ud Sto less so oogle g Dock er and ocker the fol	atior proc patafl orage ervic App l er de l ther	using using essing ow): 1), set 1 es, an Engine sktop	g cloud g pipel Define up ET d mor e) laun and c e a HT	s from l infra line us e data L (Ex nitor jo cher to reate a ML pro	Part <i>A</i> struct sing cl source tract, ' bb exe launc a conta ogram	ure ser oud se es (e.g Transf cution h any v ainer t in Vis	rvices. rvices. ervices ., files form, l and c web ap hen pu ual Stu	s (e.g., A s in S3 o Load) jo lata floy plication all an im adio Coo	AWS or obs w. ns. nage de and	2 2 2 2 2 2	22AIL 22AIL 22AIL 22AIL 22AIL 22AIL 22AIL 22AIL 22AIL	62.1 62.2 62.1 62.2 62.1 62.2 62.1 62.2 62.1 62.2
6.	Implement the following file management tasks using Hadoop:222AIL62.3i.Adding files and directories,22AIL62.4ii.Retrieving files22AIL62.4iii.Deleting files22AIL62.3Implement the classic word count program using Hadoop MapReduce:2Write Mapper and Reducer classes in Java, compile into a JAR file, upload22AIL62.3input text files to HDFS, and run the MapReduce job to count occurrences22AIL62.4														
	orcac						Par	rt R					1	I	
7	Analyze with any standard dataset to perform the data materialization										2	22AIL	62.3		
/.	using	Man R	educe	Had	00n	itaset,	to per	101111	inc uat	amat	ci iulizai	.1011	<u> </u>	22AIL	62.4
8.	Write a program for read CSV file into Data Frame and write Data Frame 2										2	22AIL	62.3		
	to CSV	file u	sing Si	park.		1	Du		uii				-	22AIL	62.4
9.	Write	a prog	gram f	or co	nvert	Spark	RDD t	o Data	a Fram	e and	Dataset		2	22AIL 22AIL	62.3 62.4

10.	Write a program t	o read data a	and write data from/into Mong	oDB using	2	22AIL62.3					
	Spark.					22AIL62.4					
11.	Write a program	for importing	g and exporting data from vario	ous	2	22AIL62.3					
	databases using S	park.				22AIL62.4					
12.	Write a program t	o manage da	ta using Spark (Real-time heal	th dataset).	2	22AIL62.3					
						22AIL62.4					
 Spar https://doi.org/10.1001 Hive https://doi.org/10.1001 https://doi.org/10.1001 	k and RDD Program s://www.bing.com, 50FA3C2B4739587 -Program: s://www.bing.com,	Beyond a: https://spa https /videos/sear 9D64250FA /videos/sear	PART-C d Syllabus/ Virtual Lab Conter arkbyexamples.com/spark/spa s://sparkbyexamples.com/pysj rch?q=spark+rdd+experiments 3C2B47&FORM=VIRE rch?q=video+for+spark+RDD+p	n t rk-rdd-transf park-rdd/ +video&view programs+usi	formatic =detail& ng+pyt	ons-2/ ∣=395879D hon&&view=de					
tallo	21111										
CIE As	sessment Pattern	(50 Marks -	· Lab)								
CIE As	sessment Pattern	(50 Marks - Test (s)	- Lab) Weekly Assessment								
CIE As	sessment Pattern RBT Levels	(50 Marks - Test (s) (20)	· Lab) Weekly Assessment (30)								
CIE As	sessment Pattern RBT Levels Remember	(50 Marks - Test (s) (20) -	· Lab) Weekly Assessment (30) 5								
CIE As L1 L2	sessment Pattern RBT Levels Remember Understand	(50 Marks - Test (s) (20) - 5	• Lab) Weekly Assessment (30) 5 5								
CIE Ass L1 L2 L3	sessment Pattern RBT Levels Remember Understand Apply	(50 Marks - Test (s) (20) - 5 5	• Lab) Weekly Assessment (30) 5 5 10								
CIE As L1 L2 L3 L4	sessment Pattern RBT Levels Remember Understand Apply Analyze	(50 Marks - Test (s) (20) - 5 5 5 10	• Lab) Weekly Assessment (30) 5 5 10 10								
CIE As L1 L2 L3 L4 L5	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate	(50 Marks - Test (s) (20) - 5 5 10 -	• Lab) Weekly Assessment (30) 5 5 10 10 10 -								
CIE As L1 L2 L3 L4 L5 L6	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create	(50 Marks - Test (s) (20) - 5 5 5 10 -	• Lab) Weekly Assessment (30) 5 5 10 10 - -								
CIE As L1 L2 L3 L4 L5 L6 SEE As	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create ssessment Pattern	(50 Marks - Test (s) (20) - 5 5 5 10 - 10 - (50 Marks	• Lab) Weekly Assessment (30) 5 5 10 10 10 - - - Lab)								
CIE As L1 L2 L3 L4 L5 L6 SEE As	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Pattern RBT Levels	(50 Marks - Test (s) (20) - 5 5 10 - (50 Marks -	• Lab) Weekly Assessment (30) 5 5 10 10 - - - - - Lab) Exam Marks Distribution (50)								
CIE As L1 L2 L3 L4 L5 L6 SEE As L1	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Pattern RBT Levels Remember	(50 Marks - Test (s) (20) - 5 5 10 - (50 Marks -	• Lab) Weekly Assessment (30) 5 5 10 10 10 - - - - Lab) Exam Marks Distribution (50) 10								
L1 L2 L3 L4 L5 L6 SEE As L1 L2	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create ssessment Pattern RBT Levels Remember Understand	(50 Marks - Test (s) (20) - 5 5 10 - (50 Marks -	• Lab) Weekly Assessment (30) 5 5 10 10 - - - Lab) Exam Marks Distribution (50) 10 10 10								
L1 L2 L3 L4 L5 L6 SEE As L1 L2	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create ssessment Pattern RBT Levels Remember Understand Apply	(50 Marks - Test (s) (20) - 5 5 10 - (50 Marks -	• Lab) Weekly Assessment (30) 5 5 10 10 - - - Lab) Exam Marks Distribution (50) 10 10 10 10 10 10								
L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Pattern RBT Levels RBT Levels Remember Understand Apply Analyze	(50 Marks - Test (s) (20) - 5 5 10 - (50 Marks -	· Lab) Weekly Assessment (30) 5 5 10 10 - - - - - - - - - - - - - - - - -								
L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate	(50 Marks - Test (s) (20) - 5 5 10 - (50 Marks -	 Lab) Weekly Assessment (30) 5 5 10 10 - - Lab) Exam Marks Distribution (50) 10 10 10 20 - 								
CIE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L1 L2 L3 L4 L1 L2 L3 L4 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L3 L4 L5 L6 SEE As L1 L2 L1 L1 L2 L5 L6 SEE As L1 L2 L1 L1 L2 L5 L6 SEE As L1 L2 L3 L1 L1 L2 L5 L6 L1 L2 L1 L2 L1 L2 L1 L1 L2 L1 L2 L1 L2 L1 L2 L1 L2 L1 L2 L1 L2 L3 L1 L2 L3 L1 L2 L3 L1 L2 L3 L4 L1 L2 L3 L4 L1 L2 L3 L4 L3 L4 L3 L1 L2 L3 L4	sessment Pattern RBT Levels Remember Understand Apply Analyze Evaluate Create sessment Pattern RBT Levels Remember Understand Apply Analyze	(50 Marks - Test (s) (20) - 5 5 10 - (50 Marks -	 Lab) Weekly Assessment (30) 5 5 10 10 - - Lab) Exam Marks Distribution (50)								

Suggested Learning Resources:

Reference Books:

- 1) Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015. ISBN: 978-8126579518
- 2) Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press ,2013. ISBN: 9781466565784
- 3) Paul Zikopoulos, Dirk DeRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corigan, "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012. ISBN: 9780071808187

ETHICAL CYBER SECURITY														
Course Code	22A	IM63	3				CIE M	arks				50		
L:T:P:S	2:1:	0:0					SEE M	larks				50		
Hrs / Week	4						Total	Mark	S			100		
Credits	03						Exam	Hour	S			03		
Course outco	mes:	At th	e end o	of the	cours	e, the s	student	will b	e able	to:				
22AIM63.1.	Unde presc	rstan ribec	d the k l legal	oasics and Go	of cyb ovt ch	oercrin annels	ne, Cybe s.	er Law	v and l	now to	report	these o	rimes t	through
22AIM63.2	Apply	v diffe	erent p	reven	tion n	netho	ls to pro	otect t	he sys	stem fro	om Hac	kers/p	rotect	data from
22AIM63.3	Analy	Analyse the type of attacks and tools to launch the attacks.												
22AIM63.4	Evalu	Evaluate the intrusion technique for its performance to detect intrusion.												
22AIM63.5	Devel	Develop solution for prevent cyber security attacks.												
22AIM63.6	Imple	emen	t the B	asic E	thics l	oy Cyb	er Secu	rity Pı	ofessi	ionals.				
Mapping of (Cours	e Ou	tcome	es to F	rogr	am O	utcome	es and	l Prog	gram S	pecific	Outc	omes:	
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIM63.1	2	-	-	-	-	-	-	-	-	-	-	-	-	
22AIM63.2	3	-	-	-	-		-	-	-	-	-	3	2	-
22AIM63.3	-	3	-	-	-	-	-	-	-	-	-	3	2	-
22AIM63.4	-	3	-	-	-	-	-	-	-	-	-	3	2	-
22AIM63.5	-	-	3	-	3	- 2	-	- 2	-	-	-	3	2	-
	- T	-	3	- Cl- a	-	3	-	3 22		-		3	2	- O Houma
MODULE-1			tion to	Суре	r sec	urity a	ina	22	AIMO	3.1 <i>ZZF</i>	411/103.2			8 Hours
Cyber Crime- C Laws – The Ind Text Book Case study	yberc lian IT Text	rimir <u>Act</u>	nals – (– Cybe k1: Ch f High-	Classifi rcrime 2 1 Profile	ication e and ext B	n of Cy Punisł ook 2: er Seci	bin for c bercrin <u>nment-</u> Ch 1, 2	nes – A Cyber ,6 ridente	A Glob Law-(al Pers	pective	on Cy	ber Cri	mes; Cyber
MODULE-2	Tool	s and	meth	ods u	sed ir	1 Cvhe	r	224	3. AIM63	2 2 2 A	IM63 3			8 Hours
	crim	e	mem	ous u	Jeu II	I Gybe	· -							onourb
Introduction- F	roxv	Serve	ers-Phi	shing-	pass	word	cracking	g- kevl	ogger	s and s	pvware	s-DoS	and DE	DoS
attacks-SQL inj	ection	n and	Buffer	overf	lows-	Attac	ks on w	ireless	s Netw	vorks-T	'rojan H	lorses	and Ba	ckdoors-
Social Engineer	ring										-			
Case study	Analy	vsis o	f Netw	ork Se	ecurity	y Incid	ents							
Text Book	Text	Boo	k 2: Ch	3, 4		Те	xt Book	: Ch 2,	, 5,9					
MODULE-3	Intr	usio	n Dete	ction			22	2AIM6	3.4,22	AIM63	.5			8 Hours
Host -Based In Detection – Int	trusio rusior	n Det 1 Dete	ection ection	– Net Excha	work nge F	-Baseo ormat	d Intrus – Hone	ion De ypots	etectio – Exar	on – Dis nple Sy	tribute stem S	d or Hy nort	ybrid Ir	ntrusion
Text Book	Text	Boo	k 4: Ch	8									1	
MODULE-4	Intru	sion	Preve	ntion			2	2AIM6	53.4, 2	2AIM6	3.5			8 Hours
Firewalls and I	ntrusi	on P	revent	ion Sy	stems	: Need	l for Fir	ewalls	s – Fire	ewall C	haracte	ristics	and Ac	cess
Policy – Types Svstems – Exar	of Fire nple U	ewall Inifie	s – Fir d Thre	ewall I at Ma	Basin§ nagen	g – Fir nent P	ewall Lo roducts	ocatio	n and	Configu	urations	s – Intr	usion I	Prevention
Case Study	5G Te	chnc	ologies	and it	s secu	irity m	easure	s.						
Text Book	Text	Boo	k 4: Ch	9				-						
MODULE-5	Ethic	s in (Cyber	Secur	ity			22A	IM63.	6				8 Hours
Important Ethi	cal iss	ues i	n Cybe	r Secu	rity-0	Comm	on ethic	al cha	llenge	s for cy	vbersec	urity p	rofessi	onals-Best
practices in Cy	ber Se	curit	y- Ethi	cal fra	imew	ork gu	ide for (Cyber	Secur	ity Pro	fessiona	als.		

Text BookText book 5: Ch 1,2Reference Book 1: Ch 1,2,3

CIE Assessment Pattern (50 Marks - Theory)

			Marks Distribution	
	DBT Lovals	Test	Qualitative	MCO's
	KDI LEVEIS	(s)	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 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:

- Anand Shinde, "Introduction to Cyber Security Guide to the World of Cyber Security", Notion Press, 2021. ISBN: 9781637816431
- 2. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publishers, 2011. ISBN: 978-8126521791
- **3.** Kimberly Graves, "CEH Official Certified Ethical Hacker Review Guide", Wiley Publishers, 2007. ISBN: 9780470142356, 0470142359
- 4. William Stallings, Lawrie Brown, "Computer Security Principles and Practice", Third Edition, Pearson Education, 2015.ISBN: 9781292066202
- 5. Daniel G Graham, "Ethical Hacking: A Hands-on Introduction to Breaking in, 2021. ISBN: 9781718501881, 1718501889.

Reference Books:

1) An Introduction to Cybersecurity Ethics MODULE AUTHOR: Shannon Vallor, Ph.D. William J.

Rewak, S.J. Professor of Philosophy, Santa Clara University. Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=U_P23SqJaDc
- https://www.upguard.com/blog/cybersecurity-ethics
- https://builtin.com/articles/cybersecurity-tools

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

						СОМ	PUTE	R NET	WOR	KS				
Course Code	22	2AI	M641	_			_		CIE	Marks		50		
L:T:P:S	3:	3:0:0:0							SEE Marks 50)		
Hrs / Week	3						Total Marks 100			0)			
Credits	03	3							Exa	m Hour	`S	03		
Course outco	omes:	: At	the e	nd of t	he cou	urse, tl	he stu	dent w	ill be a	able to:				
22AIM641.1	Und	lers	tand	the ba	sic str	ucture	of an	abstra	ct lay	ered Ne	twork p	rotocol	model f	or any
	Net	wor	rking	envirc	nmen	ıt.								
22AIM641.2	Арр	oly t	he fu	nction	ality o	of OSI a	and TO	CP/IP r	eferei	nce mod	lels.			
22AIM641.3	Ana	lyse	e netv	vork la	ayer p	rotoco	ols.							
22AIM641.4	Eva	luat	te Arc	chitect	ure fo	r Appl	icatio	n layer	r proto	ocols.				
22AIM641.5	Des	ign	appr	opriate	e prot	ocol fo	or desi	red co	mmur	nication	service			
22AIM641.6	Imp	olem	ient a	ı wide	range	of pro	otocols	s to set	up cry	ptogra	phy and	firewal	ls.	
Mapping of	Cours	se (Jutco	omes	to Pro	ogram	n Outo	comes	and	Progra	m Spec	ific Ou	tcomes	•
I	PO1P	02]	PO3	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIM641.1	2	-	-	-	-	-	-	-	-	-	-	-	3	-
22AIM641.2	3		-	-	-	-	-	-	-	-	-	-	3	-
22AIM641.3	-	3	-	-	-	-	-	-	-	-	-	-	3	-
22AIM641.4	-	3	-	-	-	-	-	-	-	-	-	-	3	-
22AIM641.5	-	-	3	-	-	-	-	-	-	-	-	-	3	-
22AIM641.6	-	-	3	3	3	-	-	-	-	-	-	-	3	-
MODULE-1										RHours				
OSI TCP/IP a	nd of	her	netw	orks r	nodel	s Netv	vork T	onolo	oies M	INTO I I.A	N and I	MAN Tr	ansmise	sion media
copper, twist	ed pai	ir w	vireles	ss. swi	tching	and M	Jultipl	exing	and D	e-multi	olexing.	Networ	king De	vices.
Toyt Pool	Tor	+ Do	olr 1.	222	4 Toyd	- Doolr	2.1/	1 5			,		8	
MODILI F.2		ΓΔΙ	<u>I INK</u>	ΙΔVΕ	P IEX	L DOOK	2. 1.4	,1.3	22	ΔIM641	1 224	M641 2		8 Hours
Framing Frr	or de	tect	tion a	and co	rrecti	on Fl	ow Co	ntrol	Multi	nle Acc	ess Pro	tocols -	- Data I	ink Laver
Addressing	ARP. I	RAR	RP. D	HCP. F	Etherr	net sta	ndard	s. Med	lia Ac	ress Co	ontrol P	rotocols	s MAC	addresses
Wireless LAN	S. Hig	zh L	evel I	Data Li	nk Co	ntrol.	Asvnc	hrono	us Tra	nsfer M	lode.	100000		
Text Book	Tex	t Bc	ook 1:	3.10-3	8.18	Γext Bo	ook 2:	3.1,3.2	2,4.1-4	ł.6				
MODULE-3	NET	ГW	ORK	LAYEF	2			,	,	22A	IM641.	3		8 Hours
Internet Prot	ocol ((IP),	, IPv4	and l	Pv6, 9	Sub-ne	etting	and Su	iper-n	etting,	ICMP, U	Jnicast I	Routing	Protocols:
Link State Ro	outing	g, Di	istand	ce Vec	tor R	outing	, Hiera	archica	al Rou	iting, R	IP, OSP	F, BGP I	Multicas	st Routing,
Multicast Rou	iting F	Prot	tocols	: DVM	RP, M	OSPF,	CBT, F	PIM, M	BONE,	Mobile	IP, IPse	c.		
Text Book	Tex	t Bo	ook 1:	20.1-2	20.4, 2	1.2, 22	2.3,22.	4						
MODULE-4	TRA	ANS	SPOR'	T LAY	ER				224	22AIM641.2, 22AIM641.3,				8 Hours
Transport La	aver	Ser	vices	Conn	ection	iless	Protoc	nls. I	ΙΠΡΙ	<u>۷۷۸ (</u> مع IDP	uM041. gment	4 Reliah	e Data	Transfer
Connection-0	riente	ed .	Proto	cols [,]	TCP S	Leome	nt Str	ucture	RTT	'estim	ation F	Flow Co	ntrol (Connection
Management Congestion Control Integrated and Differentiated Services Integry_ Different														
Self Study	Self Study Session Laver Protocols: RPC, PPTP, SCP. SDP: Function and Design Issues													
Text Book	Tex	Text Book 1: 23,24: Text Book 2: 6.1-6.4												
MODULE-5	APF	APPLICATION LAYER22AIM641.2, 22AIM641.3,8 Hours												
							_		22	AIM641	.5, 22AI	M641.6		
Principles of I	Netwo	ork /	Appli	cation	s, The	Web a	nd HT	TP, FT	P, Ele	ctronic	Mail, SM	ITP, Mai	l Messag	ge Formats
and MIME, D	NS, So	ocke	et Pro	ogrami	ming y	with T	CP an	d UDP	. Mult	imedia	Networ	king: In	ternet '	Felephony,
KTP, KTCP, R	ISP. N	vetw	vork S	securit	y: Pri	nciples	s of Cr	yptogr	aphy,	Firewa	iis, Attao	cks and	Lounter	measures.
Lase Study	Mer	ntor	· intro		ons an		ow-Up)						
Text Book	Tex	Text Book 1:25-29, Text Book 2: 7. 1-7.7												

CIE Assessment Pattern (50 Marks - Theory)

	RBT Levels	Test (s)	Qualitative Assessment (s)/NPTEL
		25	25
L1	Remember	5	-
L2	Understand	5	5
L3	Apply	10	10
L4	Analyze	5	10
L5	Evaluate	-	-
L6	Create	-	-

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) Data Communications and Networking–Behrouz A. Forouzan, 2013, ISBN: 9780073376226.

2) Computer Networks—Andrew S Tanenbaum, 4thEdition. Pearson, 2005, ISBN:8177581651

Reference Books:

1) James F. Kurose and Keith W. Ross, —Computer Networking: A Top-Down Approach Featuring The Internet, Pearson Education, Third edition, 2006. ISBN: 9780131365483

2) An Engineering Approach to Computer Networks-S. Keshav,2nd Edition,1997, Pearson Education. ISBN: 9788131711453

Web links and Video Lectures (e-Resources):

- https://youtu.be/O--rkQNKqls (nptel)
- https://youtu.be/lnU-Zw3NEEQ (nptel)
- https://youtu.be/aP346youQ0k (nptel)
- Introduction to TCP/IP Course (YSU) (Coursera)
- https://youtu.be/qiQR5rTSshw (freecodecamp)

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

• Demonstration of various networking devices.

- Contents related activities (Activity-based discussions)
 - For active participation of students, instruct the students to prepare the model for various layers of OSI model.
 - Flipped classroom methodologyVideo demonstration of latest trends in mobility/robotics
 - Contents related activities (Activity-based discussions)
 - > Organizing Group wise discussions on Netwok issues
 - Seminars

	COMPUTER VISION												
Course Code 22AIM642							CIE	CIE Marks 50					
L:T:P:S	3:0	0:0						SEE	Marks		50	50	
Hrs / Week3Total Marks10						0							
Credits	03							Exa	m Hour	S	03		
Course outco	mes: At	the er	nd of t	he cou	irse, th	ie stud	lent w	ill be a	ble to:				
22AIM642.1	Unders	stand l	basic l	knowle	edge, t	heorie	es and	metho	ods in in	age pro	cessing	and	
	compu	ter vis	sion.										
22AIM642.2	Apply	2D fea	ature-	based	image	alignr	nent, s	segme	ntation	and mot	tion esti	mations	5.
22AIM642.3	Evalua	te the	image	erecog	nition	i syste	m usir	ig tech	iniques.				
22AIM642.4	Constr	uct im	ages i	using 3	D ima	ge rec	onstru	iction	techniq	ues.			
22AIM642.5	Develo	p an i	nnova	tive sy	vstem	using i	image	rende	ring.				
22AIM642.6	Implen	nent b	asic a	nd adv	vanced	imag	e proc	essing	techniq	ues to s	olve rea	l world	
Manalasa	proble	m.		D		0				C	<u> </u>		
Mapping of C	Lourse		mes 1		gram		omes	and F	rogran	n Speci	DO12	Comes:	DCO2
	2 2	2 PU3	P04	P05	PU0	PU/	P08	P09	P010	PUII	P012	P301	P302
22AIM042.1	2 -	-	-	-	-	-	-	-	-	-	-	-	-
22AIM042.2	3 -	-	-	-	-	-	-	-	-	-	-	3	-
22AIM042.5	- 3	- 2	-	-	-	-	-	-	-	-	-	-	-
22AIM042.4		2	-	-	-	-	-	-	-	-	2	3	3
22AIM042.5		2		3							2	3	3
22AIW042.0		J	_	5	_	_	_	_	_	_	4	5	5
MODULE-1	INTRO PROCI	DUCT	G G	ΓΟ IMA	AGE F	ORMA	TION	AND	2	2AIM64	2.1	8 H	lours
Computer Visi	ion - Ge	ometr	ic pri	mitive	s and	transi	tormat	ions -	Photon	netric ir	nage to	rmation	1 - The
algital camera	- Point d worsel	opera	tors -	Linear	naforr	ng - M	ore ne	eignbo	rnood o	perator	s - Four	ier trans	sforms
- Pyrainius and	u waven		t Rool	$\frac{110}{21}$ Ch	2 2	IIauoi	15 - 610	ivai op	Juiiiizau	1011.			
MODULE-2	FFATI		FTFC	τιο <u>Ν</u>	 ΜΔΤΓ	HING			224IM	6421		81	Jours
MODULL 2	SEGMI	ENTA	ΓΙΟN:	11011,1			mu		22AIM	642.3			10413
Points and pat	ches - E	dges -	Lines	- Segr	nentat	tion - A	Active	contoi	urs - Spl	it and m	nerge - N	Aean sh	ift and
mode finding -	- Norma	lized o	cuts - (Graph	cuts a	nd ene	ergy-ba	ased m	nethods.		0		
Application	. Insu	rance	e Tech	nolog	у								
Text Book	Text	Book	1: Ch	7									
MODULE-3	FEATU	RE-B	ASED	ALIC	INME	NT &	. MO	ΓΙΟΝ	2	2AIM64	ł2.2 <i>,</i>	8 H	lours
	ESTIMATION 22AIM642.4												
2D and 3D fe	ature-b	ased a	alignn	ient - I	Pose e	estima	tion -	Geom	etric in	trinsic o	calibrat	ion -	
Triangulation	i - Two-:	frame	struc	ture fi	rom m	otion	- Fact	orizat	tion - Βι	indle ac	ljustme	ent -	,
Constrained structure and motion - Translational alignment - Parametric motion - Spline-based													
motion - Optical flow - Layered motion. Ch 8,9 TB 1													
Case Study	Retail and visual search												
Text Book	Text Book 1: Ch 8,9												
MUDULE-4	3D RE	LUNS		nding	Curr	face		mtatio	2	ZAIM6	42.4	18	iona
Volumetric rei	x - Acu presenta	ve ra	nge n - Mod	nuing el-bas	- Sur ed rec	onstri	eprese	- Reco	vering t	exture r	eu repi nans.	resentat	.10115
Text Book	Text B	ook 1	: Ch 1	3									
MODULE-5	IMAG	E-BAS	ED R	ENDE	RING	AND			2	2AIM64	12.5,	8 H	lours
	RECO	GNITI	ON						2	22AIM64	42.6		

View interpolation Layered depth images - Light fields and Lumigraphs - Environment mattes -Video-based rendering-Object detection - Face recognition - Instance recognition - Category recognition - Context and scene understanding- Recognition databases and test sets.

Case Study Medical use cases for computer vision

Text Book Text Book 1: Ch 14

CIE Assessment Pattern (50 Marks - Theory) -

	RBT Levels	Test (s)	Qualitative Assessment (s)/NPTEL
		25	25
L1	Remember	5	-
L2	Understand	5	5
L3	Apply	10	10
L4	Analyze	5	10
L5	Evaluate	-	-
L6	Create	-	-

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) Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer- Texts in Computer Science, Second Edition, 2022. ISBN: 9783030343729, 3030343723

2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, Second Edition, 2015. ISBN: 013300192X, 9780133001921

Reference Books:

- 1. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004. ISBN: 9780511184512
- 2. E. R. Davies, Computer and Machine Vision, Fourth Edition, Academic Press, 2012. ISBN: 9780123869081

Web links and Video Lectures (e-Resources):

- https://www.bing.com/videos/riverview/relatedvideo?q=computer%20vision%20vide os%20lectures&mid=917C507226BC359F04DE917C507226BC359F04DE&ajaxhist=0
- https://www.bing.com/videos/riverview/relatedvideo?q=computer%20vision%20vide os%20lectures&mid=28D3E71B7B5D5408E98D28D3E71B7B5D5408E98D&ajaxhist=0

- Demonstration of various networking devices.
- Contents related activities (Activity-based discussions)
 - Flipped classroom methodologyVideo demonstration of latest trends in mobility/robotics
 - Contents related activities (Activity-based discussions)
 - Organizing Group wise discussions on issues

	EMBEDDED SYSTEMS													
Course Code	22AIM643							CI	CIE Marks 50					
L:T:P:S	3:0:0:0						SE	SEE Marks 50				50		
Hrs. / Week	3							To	Total Marks 100					
Credits	03							Ex	am H	ours		03		
Course outcon	nes: A	t the e	nd o	f the c	ourse,	the st	udent	will be	e able	to:				
22AIM643.1	Unde	erstand	d the	Funda	ament	als of o	embed	lded c	omput	er syste	ems.			
22AIM643.2	Appl	y knov	vled	ge abo	ut dev	ices ai	nd bus	es use	ed in e	mbedde	d netwo	orking.		
22AIM643.3	Anal	yze the	e wo	rking _l	princip	ole of o	levice	drive	r.					
22AIM643.4	Inves	stigate	emb	bedded	l softw	vare de	evelop	ment	proces	ss and it	s testin	g.		
22AIM643.5	Desi	gn moo	dels	using l	Real ti	me op	erating	g syste	ems.					
22AIM643.6	Deve	lop an	i inno	ovative	e embe	edded	applic	ation	for rea	al time c	omplex	problei	n.	
Mapping of Co	ourse	Outco	ome	s to P	rogra	m Out	tcome	es and	l Prog	ram Sp	pecific (Outcon	ies:	
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIM643.1	2	-	-	-	-	-	-	-	-	-	-	-	3	-
22AIM643.2	3	-	-	-	-	-	-	-	-	-	-	-		2
22AIM643.3		3	-	-	-	-	-	-	-	-	-	-		3
22AIM643.4		3		-	-	-	-	-	-	-	-	-	2	3
22AIM643.5			3	3	-	-	-	-	-	-	-	3	2	3
22AIM643.6			3	3	3	-	-	-	-	-	-	3	3	3
MODULE-1	INTE		CTI(ON TO) ЛС		22A	IM643	8.1				8 H	lours
Introduction to	ombo	ddad		ma E	n5 mbodd	lad aw	tome	Droco	acor o	mbodd	d into a	o custor	Emb	oddod
hardware units	and d	ovico i	by ste	vetom	Embe	ieu sys	softwr	roin		m Evar	nnlos of	Sombody	dod sve	euueu
Design process	in em	hedde	n a s d sve	stem ('laccifi	cation	ofem	hedde	a sysic ad sysic	ems	lipies of	embeu	ieu sys	stems,
Design process	mem	bcuuc	u sys	stem, t	1033111	cation		bcuut	Lu Syst	.cms				
Text Book	1		Tex	rt Bool	x 1: Ch	1								
MODULE-2	DEV	ICES A	ND				22AIM643.2					8 H	lours	
		MUNI ICES N	CAT	ION R	USES I	FOR								
IO types and e	vamnl	e Ser	ial co	ommu	nicatio	n dev	vices I	Daralle	al devi	ce nort	s Sonh	isticated	l inter	facing
features in devi	ice nor	ts Wi	reles	s devi	res Ti	mer a	nd cou	nting	device	ec port	hdog tir	ner Rea	al time	clock
Networked em	bedde	d syste	ems.	Serial	bus co	mmui	nicatio	n prot	tocols.	Paralle	l bus de	vice pro	tocols	ciocit,
Text Book	Text	Book 2	2: Ch	2	240 00			<u></u>		1 01 0110		rice pre		
MODULE-3	DEV			/ERS.			22AIM643.3						8 H	lours
	INTE		PTS	AND)								01	louib
	SERV	/ICE M	IECH	IANIS	M									
I/O busy-wait a	approa	ch wit	thout	t inter	rupt se	ervice	mecha	anism,	ISR co	oncept, 1	Interrup	ot sourc	es, Inte	errupt
servicing (Han	dling)	Mecha	anisr	n, Mu	ltiple i	interru	upts, C	Contex	t and	the per	iods fo	r contex	t swit	ching,
interrupt latency and deadline														
-														
Taxt Book 1. Ch.3														
	RFAL-TIME OPERATING 22AII					22 AIM642 4 22 AIM642 E				Q I	Joure			
MODOLL-4	SYST	EMS	LUI	LIVAI	INU		220		5.4, 22	AIM04.).J		01	10015
Real-time oper	Real-time operating systems, Basic design using an RTOS. RTOS task scheduling models. interrupt													
latency and response of the tasks as performance metrics, OS security issues. Introduction to														
embedded software development process and tools, Host and target machines, Linking and location														
software, Debu	software, Debugging Techniques													
Text Book	Text	Book	1: Ch	:6.12										
MODULE-5	EMB	EDDE	D SY	STEM			22AIM643.6					8 H	lours	
	APP	LICAT	ION	AND										
70														

Case Study of Washing Machine- Automotive Application- Smart card System Application-ATM machine -Digital camera

Text BookText Book 1: Ch 13, Text Book 2: Ch 17

CIE Assessment Pattern (50 Marks – Theory)

	RBT Levels	Test	Assessment(s) /NPTEL
		25	25
L1	Remember	5	
L2	Understand	5	5
L3	Apply	10	10
L4	Analyze	5	10
L5	Evaluate	-	-
L6	Create	-	-

*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) Raj Kamal, "Embedded Systems: Architecture, Programming, and Design" 2nd / 3rd edition, Tata McGraw hill-2013.

2) An Embedded Software Primer, David E. Simon, Pearson Education, 1999. ISBN: 9780201615692, 020161569X.

Reference Books:

1.Marilyn Wolf, "Computer as Components, Principles of Embedded Computing System Design" 3rd edition, 2012. ISBN: 9780123884428

Web links and Video Lectures (e-Resources):

- https://www.ibm.com/docs/it/rsar/9.5?topic=dm-designing-real-time-embedded-systems-byusing-model
- https://www.youtube.com/watch?v=y9RAhEfLfJs&list=PL90187D2B8F5AC28F

- Online Class using Jeopardy Lab
- Contents related activities (Activity-based discussions)
 - For active participation of students, instruct the students to read research topics on Machine Learning
 - Class Presentation.
| | | | | AU | GMEN | ITED A | AND V | IRTUA | AL RE | ALITY | | | | |
|-----------------------------|------------|---------|--------------|----------|---------|----------|---------|----------|----------|-----------|------------------|-----------------|------------|----------|
| Course Code | e | 22AIN | 164 4 | Ļ | | | | | CIE | Marks | | 50 | | |
| L:T:P:S | | 3:0:0: | 0 | | | | | | SEE | Marks | | 50 | | |
| Hrs / Week | | 3 | | | | | | | Tota | al Mark | S | 10 | 0 | |
| Credits | | 03 | | | | | | | Exa | m Hour | S | 03 | | |
| Course outc | ome | es: At | the e | nd of t | he cou | urse, tl | he stu | dent w | ill be a | able to: | | | | |
| 22AIM644.1 | Un | dersta | and tl | ne imp | ortan | ce of A | ugme | nted re | eality a | and its a | pplicat | ions. | | |
| 22AIM644.2 | Ap | ply the | e com | nputer | visior | n for A | ugmer | nted re | ality. | | | | | |
| 22AIM644.3 | An | alyze | the ir | nporta | ance of | f Tracl | king sy | stem. | | | | | | |
| 22AIM644.4 | D | esign | virtu | al real | ity sys | tem u | sing co | ompute | er graj | phics co | ncepts. | | | |
| 22AIM644.5 | Cre | eate a | augn | nentd | and vi | rtual r | eality | systen | n base | d on pra | actical l | knowled | ge. | |
| 22AIM644.6 | Im | pleme | ent ba | isic co | ncepts | s of vir | tual re | eality f | or inn | ovative | idea. | | | |
| Mapping of | Έ Οοι | irse C |)utco | omes | to Pro | ogran | 1 Outo | comes | and | Progra | m Spec | cific Ou | tcomes | : |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | PO | P010 | P011 | P012 | PS01 | PSO2 |
| | | | | | | | | | 9 | | | | 0 | 0 |
| 22AIM644.1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| 22AIM644.2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| 22AIM644.3 | | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| 22AIM644.4 | - | - | 3 | - | 3 | - | - | - | - | - | - | - | 3 | 2 |
| 22AIM644.5 | - | - | 3 | - | 3 | - | - | - | - | - | - | - | 3 | 3 |
| ZZAIM044.0 | - | - | 3 | - | 3 | | | | Z | - | | 3 | 3 | 3 |
| MODULE-1 |] | Introd | lucti | onto | Augm | ented | Reali | ty | | 2 | 2AIM6
2AIM6 | 44.1,
44.2 | 8 H | ours |
| Model.
Case Study U
m | nde
ode | rstan | ding | AR Fu | ındam | nental | s and | invest | igate | visual pe | erceptio | on and s | patial d | isplay |
| Text Book | louc. | | Tex | t Bool | x 1: 1- | 28.33- | -78 | | | | | | | |
| MODULE-2 | T | racki | ng | | | , | | | | | 22AIM6
22AIM6 | 644.2,
644.3 | 8 H | lours |
| Tracking, Ca | alibr | ation, | and | Regi | stratio | on, Ch | naracte | eristics | of 7 | Fracking | g Tech | nology, | Statio | nary |
| Tracking Sys | stem | s, Mo | bile | Sensor | rs,0pt | ical Tr | acking | , Sens | or Fus | sion | - | | | _ |
| Case Study Ex | xplo | re trac | cking | metho | od alo | ng wit | h adva | intages | s and l | imitatio | ns, and | the cho | ice of tra | acking |
| te | chn | ology | depe | nds or | 1 facto | ors suc | h as th | ie type | e of AF | R/VR ap | plicatio | on, devic | e capab | ilities, |
| u | ser e | xperie | ence | requir | emen | ts, and | l envir | onmer | ntal co | ndition | S. | | | |
| Text Book | <u> </u> | Text E | Book | 1:85-1 | 120 | | | | | | | | | - |
| MODULE-3 | C | ompu | ter V | ision | for Au | ugmei | nted R | eality | | | 22AIM6
22AIM6 | 644.2,
644.3 | 81 | lours |
| Marker Tracl | cing,
- | Mult | iple- | Came | era In | trared | Trac | king, l | Natura | al Featu | ire Tra | cking b | y Deteo | ction, |
| Incremental T | racl | cing, S | imul | taneou | us Loc | alizati | on an | d Maj | pping, | Outdoo | or Trac | king Cal | ibratior | and |
| Registration-(| Came | era Ca | libra | tion, I | Display | y Calib | ration | , Regis | tratio | n | | | | |
| Case Study | E | xplore | e the | learn | ing In | nage F | Proces | sing a | nd Ar | nalysis. | | | | |
| Text Book | T | ext Bo | ok 1: | 121,1 | 22,123 | 3-190 | | | a = : | | | | | |
| MODULE-4 | In | itrodu | ictio | n to V | irtual | Reali | ity | | 22A | M644.4 | , 22AIN | 1644.5 | 8 H | lours |
| Fundamental | Co | ncept | and | Com | poner | its of | t Virt | ual R | eality. | Prima | ry Fea | tures a | and Pre | esent |
| Development | on | Virtua | al Re | ality. I | Multip | le Mo | dels of | t Input | t and | Output | Interfac | ce in Vii | tual Re | ality: |
| Input - Tracke | r, Se | nsor, | Digit | al Glov | /e, Mo | veme | nt Cap | ture, V | | based In | iput, | | | |
| Lase Study | nve | stigat | e an | a exp | iore N | lastei | ring V | к Dev | elopn | nent Sk | ills, Un | dersta | naing V | irtual |
| Tout Do al- | keal | ILY FU | | | 115. | | | | | | | | | |
| I EXL DOOK | 10 | ext BO | OK Z | 1-40 | | | | | | | | | | |

IODULE-5	Visual Comput	ation in Vi	rtual Reality	22AIM644.5, 22	AIM644.6	8 Hours
undamentals	of Computer Gra	ohics. Softv	vare and Hard	ware Technology or	n Stereoscop	oic Display.
dvanced Tec	nniques in CG: Ma	nagement o	of Large-Scale	Environments & Rea	al Time Renc	lering.
nteractive Te	chniques in Virt	ual Reality:	Body Track,	Hand Gesture, 3D	Manus, Ob	ject Grasp
)evelopment'	Γools.	-	-			-
Case Study	Survey on Visu	al Computa	ation and und	erstanding object g	rasp develo	pment
	tools.					
'ext Book	Text Book 2:123	3-195				
CIE Assessm	ent Pattern (50 N	/larks – Th	eory)			
						
RB	T Levels	Test (s) Quali	tative Assessment	: (s)	
	•	(25)		/NPTEL		
	emember			-		
	nderstand	5		5		
L3 A	pply	10		10		
L4 A	nalyze	10		10		
L5 EV	valuate	-		-		
	reate	-		-		
SEE Assessm	ent Pattern (50	Marks – Th	neory)		1	
	RBT Levels		Exam Marks	Distribution (50)	-	
L1 Re	emember			10	-	
L2 U1	nderstand			10	-	
L3 Aj	oply			20	-	
L4 Ai	nalyze			10	-	
L5 Ev	aluate			-	-	
L6 Cr	eate					
Suggested L	earning Resour	ces:				
Text Books	S:					
1. Augmen	ted Reality: Princi	ples and Pr	actice by Diete	r Schmalstieg, Tobi	as Hollerer,2	2016.
15BN: 97	OUISSISSZUU, U. Daality Taabaala	USSISSZU/		fot Wilow IEEE Dw	oce 2nd Ed	ition
2. virtual $2002/2$	$\frac{1}{106} \frac{1}{100} \frac{1}$	gy Duruea,	, a. c. r. col n/71360000	IEL WIIEY-IEEE PI	CSS 2110 EU	
2003/2	JUU. ISDIN: 7/804/	1300030,	04/1300099			

- Education India; First edition (12 October 2016), ISBN-10: 9332578494
- 2. Developing Virtual Reality Applications, Foundations of Effective Design, Alan Craig WilliamSherman Jeffrey Will Morgan Kaufmann, 2009. ISBN: 9780080959085.

Web links and Video Lectures (e-Resources):

- https://elearn.nptel.ac.in/shop/iit-workshops/completed/foundation-course-onvirtual-reality-and-augmented-reality/?v=c86ee0d9d7ed
- https://www.youtube.com/watch?v=04AMaTsXFJU
- https://www.youtube.com/watch?v=UgE6eG95ddw
 - https://www.youtube.com/watch?v=UQpTJ_OTZe4

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

- Contents related activities (Activity-based discussions)
- **AR Scavenger Hunts**: Create scavenger hunts where students use AR-enabled devices to find and interact with virtual objects or landmarks overlaid onto the real-world environment.
- **Simulated Experiments:** Enable students to conduct science experiments or simulations in VR environments where they can manipulate variables, observe outcomes, and learn through hands-on exploration.

- **Collaborative Problem-Solving:** Facilitate collaborative problem-solving activities in VR environments where students work together to solve puzzles, overcome challenges, or complete tasks that require teamwork and communication.
- > For active participation of students, instruct the students to prepare Flowcharts and Handouts
- > Organizing Group wise discussions on issues
- Seminars

					RAN	DOMIZ	ZED AI	GORIT	THMS					
Course Code	22A	IM6 4	ł5				CIE M	Iarks				50		
L:T:P:S	3:0:	0:0					SEE N	larks				50		
Hrs / Week	3						Total	Mark	S			100		
Credits	03						Exam	Hour	S			03		
Course outco	mes:	At th	e end o	of the	cours	e, the s	tudent	will be	e able	to:				
22AIM645.1	Unde	rstan	d the f	undar	nenta	l princ	iples o	f rando	mizeo	d algori	thms, ii	ncludi	ng type	s of
22AIM64E 2	Anal		ss and	unen	appin	diamon		of you d		d data	at a star	waa ta	avalua	to their
22AIM045.2	effect	ivene	e perio ess in l	nandli	ng dvi	a prop namic	data ar	of rand id optij	mizing	ed data	orv usag	ires to ze.	evalua	te their
22AIM645.3	Evalu	ate tl	he accu	iracv	and ef	ficiend	cv of M	onte Ca	arlo m	ethods	for nur	nerica	l integi	ation and
	rando	omize	ed mat	rix mu	ltiplio	cation,	measu	ring th	eir ap	plicabi	lity to s	olve co	omplex	numerical
	probl	ems.						U	•	•	5		•	
22AIM645.4	Asses	s the	conve	rgenc	e proj	perties	and sa	mpling	g effici	iency o	f Marko	ov Chai	in Mon	te Carlo
	(MCM	1C) m	ethod	s to cr	itique	their	perfori	nance	in gen	erating	g repres	entati	ve sam	ples and
	explo	ring	comple	ex stat	e spa	ces.								
22AIM645.5	Desig	n heu	ıristic	optim	izatio	n solut	tions u	sing m	etaheı	aristic a	algorith	ms to	create	effective
	strate	egies	to add	ress o	ptimi	zation	proble	ms in c	livers	e doma	ins.			
22AIM645.6	Synth	nesize	e know	ledge	from	modul	es to a	nswer	real-w	vorld p	roblems	s using	g rando	mized
	algor	ithms	5.											
Mapping of	Cours	e Ou	tcome	es to F	rogr	am Oı	utcom	es and	Prog	gram S	pecific	Outco	omes:	
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
22AIM645.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22AIM645.2	-	3	-	-	-	-	-	-	-	-	-	2	3	2
22AIM645.3	-	3		-	-	-	-	-	-	-	-	3	3	2
22AIM645.4	-	3	-	-	-	-	-	-	-	-	-	3	3	2
22AIM645.5	-	-	3	-		-	-	-	-		-	3	3	2
22AIM645.6	-	-	3	3	3	-	-	-	-	-	-	3	3	2
MODULE-1	Intro	duct	ion to	Rand	omiz	ed		22	AIM6	45.1		-		8 Hours
NODULL I	Algoi	rithm	1011 10	nunu	UIIIZ	cu			1111-10	10.1				onours
Introduction	to Rar	ndom	ized A	lonri	thms	Defin	ition a	nd imn	ortan	re of ra	ndomiz	ed alg	orithm	s-Types of
randomness: L	as Veg	vas vs	Mont	e Carl	o algo	rithm	s -Annl	ication	s of r	andomi	zed alg	orithm	ns. Data	a
Structures wi	th Rai	idom	nizatio	n: Ski	p List	s: stru	cture. d	operati	ons. a	nd perf	forman	ce -Tre	aps: st	- ructure.
operations, and	d bala	ncing	prope	erties.	F		,	- F	,	P				,
Text Book	Text	t Bool	k 2: Ch	1,8										
Case study	Class	ificati	ion and	d its A	pplica	tions								
MODULE-2	Rand	lomiz	zed Da	ta Str	uctui	es and	d	22 <i>A</i>	AIM64	5.1 22/	AIM645	.2		8 Hours
	Grap	h Alg	orith	ns										
Hashing and H	Bloom	Filte	ers: Bl	oom F	ilters	struct	ure, op	peratio	ns, an	d false	positive	e prob	ability-	Cuckoo
Hashing: algor	ithm, a	analy	sis, an	d prac	tical a	pplica	tions.	Rando	mized	l Grapl	h Algor	ithms	: Rando	omized
Minimum Spar	ning '	Гree ((MST):	algor	ithms	and a	pplicat	ions -R	andor	nized (Graph T	ravers	al: tech	iniques
and performan	ice ana	alysis		0		-					-			-
Text Book	Text	: Bool	k 2: Ch	10	Text	Book 1	l: Ch 5,	10						
MODULE-3	Mont	te Cai	rlo Me	thod			2	2AIM6	45.3 2	2AIM6	45.4			8 Hours
Monte Carlo M	letho	d- Ra	ndomi	zed M	atrix	Multip	licatio	n. App i	roxim	ate Co	unting	Rand	omized	1
Approximatior	n Schei	mes-	The D	NF Co	unting	g Probl	lem: Tł	ne Naïv	e App	roach-	A fully	Polync	omial	
Randomized So	<u>chem</u> e	for <u>C</u>	ONF Co	unting	g -App	oroxim	ating t	he peri	manei	<u>nt -Vol</u> ı	ime Est	imatio	n.	
Text Book	Text	: Bool	k 1: Ch	10,1	1									
MODULE-4	Mark	co Ch	ain Me	onte C	arlo	Metho	ds 2	22 AIM	645.4					8 Hours

Markov Chain Monte Carlo (MCMC)- Introduction to MCMC: basic concepts -The Metropolis Algorithm – A 2-SAT Example- Marko Chains-Random Walks on Graphs: algorithms and applications in network analysis.

Text Book Text Book 2: Ch 6

MODULE-5 Advance Algorithms

22AIM645.5 22AIM645.6 8 Hours

Parallel and Distributed Algorithms: PRAM Model- Maximal Independent Sets- Perfect Matching-The Choice Coordination Problem- byzantine Agreement. Online Algorithms: The online paging Problem-Adversary Models- Paging against an Oblivious Adversary- The k-server Problem.

Case Study	Packing items into a container in a way that minimize transportation cost.
Text Book	Text Book 2: 12.13.

CIE Assessment Pattern (50 Marks - Theory)

	RBT Levels	Test (s)	Qualitative Assessment (s)/NPTEL
		25	25
L1	Remember	-	-
L2	Understand	5	5
L3	Apply	10	10
L4	Analyze	10	10
L5	Evaluate	-	-
L6	Create	-	-

*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. Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and Data Analysis by Eli Upfal and Michael Mitzenmacher, Cambridge University,2005 (ISBN: 0521 83540 2)
- 2. "Randomized Algorithms" by Rajeev Motwani and Prabhakar Raghavan, Cambridge University Press, 2000. ISBN: 0521 47465 5.

Reference Books:

1. Algorithm Design By Jon Kleinberg, Éva Tardos , Pearson Education, 2006. ISBN: 9788131703106

Web links and Video Lectures (e-Resources):

- https://www.kindsonthegenius.com/how-bloom-filters-work/
- https://archive.nptel.ac.in/courses/106/103/106103187/
- https://www.youtube.com/watch?v=0r2D32esF3Y
- https://brilliant.org/wiki/randomized-algorithms-overview/

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

					PI	ROJEC	Т РНА	SE I						
Course Code	22/	AIM65				,		CIE	Mark	s	5	50		
L:T:P:S	0:0	:2:0						SEE	Mark	s	5	50		
Hrs / Week	-							Tot	al Ma	rks	1	100		
Credits	2							Exa	m Ho	urs	0)3		
Course outo	comes	: At the	end of	the co	urse. t	he stu	dent w	ill be	able to	0:				
22AIM65.1	Identi	fv a rea	l life/er	iginee	ring p	roblen	n. utiliz	ze prio	or kno	wledg	e and cor	nduct ex	tensiv	e
2241465 2	invest	igation	, across	divers	se sou	rces, ii	<u>i addr</u>	essing	the so	olution	l.	n innor	rativo	
22AIM05.2	desig	gn/ app	roach, a	ind cor	nputii	ng the	requir	emen	ts.	g, 10111			auve	
22AIM65.3	Perfoi provid	rm prof ding the	essiona leader	lly—a: ship no	s a tea ecessa	m mei ry to e	nber, a ensure	accept proje	ting re	sponsi cess.	bility, ta	king init	tiative,	and
22AIM65.4	Use fo	ormal ar	nd infor	mal co	mmui	nicatio	ns wit	h tean	n men	nbers a	and guide	e, make		
	prese	ntations	s and pr	epare	techn	ical do	cumer	its.						
22AIM65.5	Provid	de a sol	ution w	ithin t	he lega	al fran	neworl	c addr	essing	g socie ⁻	tal and e	nvironn	nental	
22AIM65.6	conce Prese	rns and nt the R	uphold	ling et or the	hical is implei	ssues. mente	d prob	lem ai	nd its	solutio	ons as a t	eam.		
Manning of	fCour	se Out	comes	to Pro	noran		nmes	and	Prog	am Sr	pecific O	utcom	65.	
Mapping 0	P01	P02	PO3	P04	P05	P06	P07	PO8	P09	P010	P011	P012	PS01	PSO2
22AIM65.1	3	3	100		100	100	107	100	107	1010	1011	3	3	3
22AIM65.2	5	3	3		3							3	3	3
22AIM05.2		5	5		5	2	2	2	3	2		2	3	3
22AIM05.3					3	2	2	2	3	2	3	2	3	3
22AIM05.4					5	2	2	3	3	2	2	2	3	3
22AIM05.5					3	-	-	2	2	2	-	3	-	-
This course	will be	condu	tad lar		grou	$n of 2_{-}$	Actuda	nt me	mbor	s undo	r the dir	act supe	rvisior	of a
member of a	will be	nic staff		gely as	grou	p 01 2-	fstuut		mber	s unue	i the un	ectsupe	1 115101	101a
Students wil	l he re	anired	to											
1 Students	should	l form t	eams to	carry	out th	e nroi	ect Th	e size	of the	team	s can con	nnrise o	famin	imum
of two stude	ents ar	nd maxi	mum of	fours	tuden	te proj		0 5120	or the			iprise o	1 a 11111	mum
2 Each tean	n are fi	ree to cl	hoose tl	heir In	ternal	Guide	or wi	l he a	ssigne	d an Ir	iternal G	uide hv	the	
Department	Coord	linator.			cer mai	Guiuc	. 01	ii be u	Jugite	a an n		ulue by	the	
3. Teams ca	n carry	y out th	eir proi	ect in-	house	or in a	a renu	ed or	ganiza	ntion (x	which ha	s to be a	annrov	ed bv
the Internal	Guide). Stude	ents tak	ingun	indus	try pro	piects (can do	so wi	ith the	conditio	n that th	iev are	
allowed to d	lemon	strate t	heir pro	iect w	ork or	the c	ollege	camp	us.					
4. Identifica	tion of	a prob	lem wh	ich is f	easibl	e and	innova	tive b	ased o	on the	current s	state of a	art tech	nology
and having	releva	nce and	social i	mpact	. cons	iderin	g the b	ounda	aries o	of socie	tal. envii	ronmen	tal and	ethical
issues.				1							,			
5. Survey of	literat	ure rela	ated to	the ide	entifie	d prob	lem to	make	e a feas	sibility	study ar	nd ident	ify the	project
requiremen	ts. Pre	pare an	d subm	it a sy	nopsis	s of yo	ur pro	ect to	your	respec	tive Guid	les.	-	- /
6. Based on	the lit	erature	review	, prepa	ration	ı of re	view p	aper a	and pu	blishir	ng it.			
7. Evolve a ł	nigh-le	vel des	ign/sys	tem le	vel arc	chitect	ure an	d ider	ntify tl	ne vari	ous impl	ementa	ble mo	dules
with their ir	iput/o	utput n	eeds.						-		-			
8. Preparatio	on and	submis	ssion of	Projec	ct Pha	se1 teo	chnical	repoi	rt.					
CIE Assessn	nent P	attern	(50 Ma	rks – '	Theor	y)								
RI	BT Lev	vels			Revie	ew (50) marl	ks)						
L1 Ren	nembo	er				-								
L2 Und	lersta	nd				-								
L3 App	oly					20								
L4 Ana	lyze					20								
L5 Eva	luate					10								
L6 Crea	ate					-								

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

r														
]	PROB	LEM S	SOLV	ING S	KILLS		T		
Course Code	2	2SDF	K66						CIE M	larks		50		
L:T:P:S	0	:0:1:	0						SEE N	larks		-		
Hrs / Week	2								Total	Marks		50		
Credits	1								Exam	Hours		1		
Course outco	omes	:		- 4 - 1 - 1			1							
At the end o	n the	cours	se, the	stude		i be ab								
22SDK66.1	lr	ifer t	he con	nplex	proble	ms us	ing the	e conc	epts o	t data st	ructui	es and	C progr	amming.
22SDK66.2	A st	pply atem	object ients.	-orien	ted pr	ogran	iming	conce	pts in	C++and	Java t	o solve	real tim	ie problem
22SDK66.3	So	olve i	real-w	orld p	robler	n usin	g pyth	on and	1 C#.					
22SDK66.4	D	evelo	op the	skills	of han	dling o	lata ba	ase qu	eries a	nd prod	cedure	s.		
Mapping of	Cour	se O	utcor	nes to	Prog	ram (Outco	mes a	nd Pi	rogram	Spec	ific Ou	tcomes	5:
	P01	PO	P03	P04	P05	P06	P07	P08	P09	P010	P01	P012	PS01	PSO2
22508661	2	2	2	2	2						1	2	2	2
223DK00.1	<u> </u>	2	3 2	2	2	-	-	-	-	-	-	2	2	2
22SDK00.2	3	3	3	2	2		-	-	-	-	-	2	2	2
225DK66.4	3	3	3	2	2	-	-		-	-	-	2	2	2
220DR00.1	5	5	5	-	-							-		
MODULE-1	P S'	ROB	LEM S	SOLVI ES AN	NG O	N DAT	FA			2	2SDK	66.I		6 Hours
Data Structu	ires u	Ising	C: Sta	ck and	d aueu	es. list	t, grap	h. tree	. sorti	ng and s	search	ing. Has	sh funct	ions
Advanced C	prog	rami	ning:	Point	ers, Re	ecursio	on, Fur	nction	s, Stru	cture, U	nion, (C Prepro	ocessor	
MODULE-2	P P	ROB ROG	LEM S RAMI	SOLVI MING	NG O	N OBJ G CPP	ECT C	ORIEN	TED	22	SDK6	6.2		6 Hours
Object Orien	ted 1	Prog	rammi	ng: Ir	herita	ince,	Polym	orphis	sm, Ex	ceptior	n hand	dling, F	'ile Har	ndling, Predefined
function, Void	d fund	ction	, Name	e space	es, Inp	ut and	l outpi	ut stre	ams.	-		0		C C
MODULE-3	P	ROB	LEM S	SOLVI	NG O	N JAV.	A ANI) XML	I	22	SDK6	6.2		6 Hours
Object orie Collections, E XML: DTD, S	e nted Except chem	pro tion l	o gran nandli rver P	nming ng, Str ath, D	g usir eams, OM, XS	ng Ja v Funct SLT, N	va: In ional I ame S	nherita Interfa pace, <i>F</i>	nce, 1 ce. JAX.	Polymo	rphisn	n, Abst	ract cla	ass and Interface,
MODULE-4	P	ROB	LEM	SOL	VING	USIN	IG C	# .	AND	22	SDK6	6.3		6 Hours
	P	үтн	ON											
Python: Fun	ction	ıs, ite	erator	s, Obje	ect ori	ented	Prog	ramm	ing, Ex	xceptio	n Han	dling, P	ackage	s, Frame works-
Django, Colle	ectior	1S.			D 1						•			
C#: Object of	riente	ed Pr	ogran	nming	g, Dele	gate, (tions a	and ge	eneric, l	lame :	space.		<
MODULE-5	S	CENA	ARIO	BASE	D PRC	DRFEN	15 ON	DRW	5	22	SDK6	6.4		6 Hours
ER Model, SC)L- D	DL. I	OML. 1	CL D	CL. Io	ins, si	ihaue	rv. PL	/SOL-	Index. S	Seque	nce. pro	ocedure	es and functions.
normalizatio	n, B1	tree.	B+ tre	e, Foi	ms.	1110, 00	ioque	.,	021		Jeque	nee, pre	Joodan	

	RBT Levels	Test (s)
		50
L1	Remember	5
L2	Understand	10
L3	Apply	20
L4	Analyze	15
L5	Evaluate	
L6	Create	-

- 1. Martin C Brown, "Python-The Complete Reference", Mc Graw Hill, 4th edition, 2020
- 2. Reema Tharega, "Data Structures using C", Oxford University Press, 2020
- 3. Ullakirch-Prinz, "A complete guide to program in C++", Jonas and Bartlett Learning, 2022
- 4. Kathy Sierra, "Headfirst Java", O'reilly Media, 2021
- 5. Andrew Stellman, "Headfirst C#", O'reilly Media, 2021

Web links and Video Lectures (e-Resources):

- 1. <u>https://www.learncpp.com/</u>
- 2. <u>https://www.programiz.com/dsa</u>
- 3. <u>https://code.visualstudio.com/Docs/languages/csharp</u>
- 4. <u>https://www.udemy.com/course/the-complete-java-course-from-basics-to-advanced/?couponCode=ST16MT70224</u>
- 5. <u>https://www.codecademy.com/learn/paths/c</u>

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

- > Analysis of industry relevant use cases
- Problem solving on scenario-based questions
- Placement portal practice sessions

					A	I POV	RED	UI DES	SIGN					
Course Code	e 1	22AIN	1671						CIE	Marks		50		
L:T:P:S	(0:0:1:	0						SEE	Marks		50		
Hrs / Week		2							Tota	al Mark	S	10)	
Credits	(01							Exa	m Hour	S	03		
Course outc	ome	s: At t	he er	nd of tł	ne cou	rse, th	e stud	ent wil	l be al	ole to:				
22AIM671.1	1	Under	stand	d UI/U	X Desi	gn Fui	ndame	ntals.						
22AIM671.2	1	Apply	the u	iser In	terface	es to d	ifferer	it devi	ces an	d requir	ements	1		
22AIM671.3]	Desigr	ı inte	rface f	for var	ious a	pplicat	tions.						
22AIM671.4	(Create	high	ı quali	ty prof	essior	nal doc	ument	ts and	artifacts	s related	l to the c	lesign	
		proces	ss.											
Mapping of	Cou	rse O	utco	mes t	o Pro	gram	Outco	omes a	and P	rogram	Specif	ic Outc	omes:	
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
22AIM671.1	2	-	-	-		-	-	-	-	-	-	-	-	-
22AIM671.2	3	-	-	-	-	-	-	-	-	-	-	2	-	2
22AIM671.3	-	-	3	-	-	-	-	-	-	-	-	2	-	2
22AIM671.4	-	-	3	3	3	-	-	-	-	-	-	2	-	2
Exp. No. / Pgm. No.				List	t of Ex	perim	ents /	' Prog	rams			Hours	5	COs
			J	Prerec	quisite	e Expe	rimer	nts / P	rogra	ms / De	mo			
	٠	Know	vledg	ge abo	ut any	v Desi	gn Too	ols	U			2		NA
							PAR'	Г-А						
1	Wri	ite a p	rogra	am for	variou	ıs UI II	nterac	tion Pa	atterns	;		2	22A	M671.1
2	Bui	ld an i	nter	face wi	ith pro	per U	l Style	Guides	S			2	22A	M671.2
3	Dev	velop a	a Res	ponsiv	ve layo	ut for	a socie	etal ap	plicati	on		2	22A	M671.3
4	Dev	velop V	Nire	flow d	iagran	n for a	pplica	tion us	ing op	en sour	ce	2	22AI	M671.3
	soft	ware										Z		
5	Des	ign a l	Logo	for an	E-Con	nmerc	e app					2	22AI	M671.3
6	Des app	ign Sc dicatio	ocial 1 ons	media	adver	tiseme	nt usi	ng onli	ne too	ls and		2	22AI	M671.3
	upp	mean	/110				PAR'	Г-В						
7	Wri	ite pro	gran	n to so	lve the	e ident	ified n	robler	n usin	g UI/UX		2	22A	M671.4
8	Cre	ate a v	vork	ing UL	/UX pr	ototyr	be usin	g prot	otvpin	ig tools.	-	2	22A	M671.4
9	Cre	ate a s	set of	icons	for a v	veathe	r fore	cast an	p. con	sidering	ŗ		22A	M671.4
-	fact	ors su	ich as	s clarit	y, con	sisten	cy, and	l visual	l hiera	rchy.	,	2		
10	Cre	ate a c	lesig	n Syste	em for	an e-c	comme	erce ap	p usin	g Grid a	nd		22AI	M671.4
	Spa	cing, T	Гуро	graphy	, Colo	ur Sys	tem, a	nd UI e	elemer	its like i	cons,	2		
	ima	iges, b	uttor	is, Inp	uts, Ca	rds, Se	earch l	Bar, Lis	sts, etc					
11	Cre	ating	Socia	l medi	a adve	rtisen	nent us	sing or	nline to	ools and		2	22AI	M671.4
	app	licatio	ons.									Z		
12	Con	duct e	end t	o end i	user re	esearc	h for U	I/UX c	lesign	progran	nming	2	22AI	M671.4
							PART	-C						
1. Onlin 2. free tutor 3. A Con ui-ux	ie UX code ial-fr mple -desi	(To b desig camp com-ze te Roa	e do n toc p on ero-to ndma a-cor	Bey ne du ols and UI ar o-hero p of U nplete	ring L tutori d tutori d UX -with- I and U -roadr	yllabu ab bu als: h desig wirefr JX des nap/	t not t t not t ttps:// m: htt ame-p ign: h	rtual L o be in /www. ps://w prototy ttps://	ab Con nclude figma. www.fr pe-fig www.	ntent ed for Cl com reecodee ma/ geeksfo	IE or SE camp.or rgeeks.o	E) g/news, org/how	/ui-ux-o -to-bec	lesign- oma-

CIE As	ssessment Pattern	(50 Marks -	Lab)	
		Test (s)	We	ekly
	RBT Levels	1030 (3)	Asses	ssment
		20		30
L1	Remember	-		5
L2	Understand	5		10
L3	Apply	10		10
L4	Analyze	5		5
L5	Evaluate	-		-
L6	Create	-		-
SEE A	ssessment Pattern	(50 Marks -	Lab)	
	DDT Longle	Exam M	Iarks	
	KB1 Levels	Distributi	ion (50)	
L1	Remember	10)	
L2	Understand	10)	
L3	Apply	20)	
L4	Analyze	10)	
L5	Evaluate	-		
L6	Create	-		
Sugge	ested Learning Re	sources:		-
Refer	ence Books:			
1.	Visual Design: Cro	eating Great	UI/UX by S	Shaan,20

					A	PI & 1	MICRO	SERV	ICES							
Course Code	e Code 22AIM672 CIE Marks S 0:0:1:0 SEE Marks											50				
L:T:P:S	(0:0:1:	0						SEE	Marks		50				
Hrs / Week	:	2							Tota	al Mark	S	100				
Credits	(01							Exa	m Hour	S	03				
Course outc	ome	s: At t	he er	nd of t	he cou	rse, th	e stud	ent wi	ll be a	ble to:						
22AIM672.1]	Desigr	n RES	Tful A	PIs us	ing No	ode.js i	ncludi	ng sec	ure end	points u	ising JW	Т.			
22AIM672.2]	Manag enviro	ge da nme	tabase nt vari	es with iables	their for co	APIs, p nfigura	perfori ation	ming C	RUD op	eration	ons and using				
22AIM672.3		Deploy discov	y mic ery v	roserv vith Co	vices u onsul	ising D	ocker	and D	ocker	Compos	e, and i	mpleme	nt servi	ce		
22AIM672.4]	Monitor microservices using the ELK stack for centralized le circuit breaker pattern.										ng and l	Hystrix	for the		
Mapping of	Cou	rse O	utco	mes t	o Pro	gram	Outco	omes	and P	rogram	n Speci	fic Outo	omes:			
	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO1											P012	PS01	PSO2		
22AIM672.1									-	-	-	-				
22AIM672.2	-	3	-	-	-		-	-	-		-		-	-		
22AIM672.3	-	-	3	-	-	-		-	-	-	-	-				
22AIM672.4	-	3	-	-	3	-	-	-	-	-	-	-	-	-		
Exp. No. / Pgm. No.				List	t of Ex	perim	ents /	/ Prog	rams			Hour	s	COs		
_			F	Prerec	nuisite	e Expe	erimer	nts / P	rogra	ms / De	emo					
				Basic	Java P	rogra	mming	g/C Pro	ogram	ming		2		NA		
							PAR'	Т-А								
1	Bui	ilding	a R	ESTfu	I API:	- Cre	ate a	simple	e REST	ful API	using					
	Noo imp test	de.js a olemer t the A	nd E nt CR PI us	xpress UD op sing Po	s. (T a eratio ostmar	a sks : S ons for n.)	Set up a reso	the produce (roject, e.g., a	define to-do lis	routes, t), and	2	22AI	M672.1		
2	Sec aut use rou	uring horiza r auth tes us	AP tion ention	Is wi using cation hiddle	th JW JSON syster ware.	/ T : - Web n, gen and te	Imple Token erate st secu	ment s (JW and va ured er	authe T). (Ta alidate adpoin	nticatio asks : Cr JWTs, p ts.).	n and eate a protect	2	22AI	M672.1		
3	Cor or con the	routes using middleware, and test secured endpoints.). Connecting to a Database : - Integrate a database (e.g., MongoDI or PostgreSQL) with your API. (Tasks : Set up the database connection, define models/schemas, perform CRUD operations of the database and use arging up to argin block for a given by										2 22A		M672.2		
4	API API API the	API ocumentation with Swagger: - Generate and document API endpoints using Swagger.(Tasks: Install Swagger, annotat API routes, generate interactive API documentation, and explor the documentation through the Swagger UI.).										t 2 22AIN		M672.2		
5	Bui of t ser mu	i lding resour ver, d tation	a Gr ces efine s, and	aphQl (e.g., a schei d test i	L API : a bool mas a using (- Crea < libra nd re Graphi	te a Gr ary). (' solver: QL or	aphQI Tasks s, imp <u>Apo</u> llo	2 API to : Set to lemento Cliento	o manag up a Gr t querie t.).	ge a set aphQL es and	2	22AI	M672.3		
6	Mic mu for	croser ltiple each s	vice micro ervio	s Are oservi ce, buil	chitec ces us ld and	ture ing Do run co	with ocker. ontaine	Dock (Task ers, set	er : - s: Crea t up Do	Contai ate Dock ocker Co	inerize terfiles mpose	2	22AI	M672.3		

	for multi-container applications, and manage inter-service communication.).		
	PART-B		
7	Consul. (Tasks : Set up Consul, register services, query service instances, and implement load balancing using Consul's DNS interface.).	2	22AIM672.3
8	API Gateway with NGINX : - Configure NGINX as an API Gateway to route requests to different microservices. (Tasks : Install and configure NGINX, define routing rules, implement rate limiting and caching, and test the API gateway functionality.).	2	22AIM672.3
9	Monitoring and Logging with ELK Stack : - Set up centralized logging and monitoring for microservices using the ELK stack (Elasticsearch, Logstash, Kibana). (Tasks : Install and configure ELK components, collect logs from microservices, visualize logs in Kibana, and set up basic monitoring dashboards.).	2	22AIM672.4
10	Circuit Breaker Pattern with Hystrix : - Implement the circuit breaker pattern to handle service failures gracefully using Hystrix. (Tasks : Set up Hystrix in your microservices, configure circuit breakers, simulate service failures, and observe the fallback mechanisms.).	2	22AIM672.4

PART-C

Beyond Syllabus /Virtual Lab Content

• https://kinsta.com/blog/microservices-vs-api/

https://ninetailed.io/blog/microservices-vs-api/

https://cloud.google.com/architecture/microservices-architecture-introduction

CIE Assessment Pattern (50 Marks – Lab)

-			,
	RBT Levels	Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	10
L3	Apply	10	10
L4	Analyze	10	10
L5	Evaluate	-	-
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 Microservices Patterns: With examples in Java" by Chris Richardson, Manning Publications,2018. ISBN 978-1617294549

							W	EB FR	AMEV	WORK							
Cour	se Code	e 22	2AIM	673						CIE Ma	arks	50					
L:T:P	::S	0:	0:1:0							SEE Ma	arks	50					
Hrs /	Week	2								Total I	Marks	100					
Cred	its	01	L							Exam	Hours	03					
Cour	se outc	ome	s: At	the e	nd of	the c	ourse.	the st	udent	will be a	ble to:						
22AII	M673.1	Un	lersta	and h	asics	aspe	cts of y	web fr	amew	ork.							
22AII	M673.2	An	olv th	e has		icent	s nrin	ciples	and n	ractices o	of Web-9	site dev	elonme	nt u	sing	server-	-
	10/012	sid	e tech	nolo	gies (Dian	go and	Node	IS).	i detteeb (eropine	110 0	35	, 501 / 01	
22AII	M673.3	Cre	ate th	ie we	eb apr	olicat	ion usi	ng Dia	ango a	nd Node	IS and r	nange if	ts featu	res.			
22AII	M673.4	Des	sign a	met	hod fo	or bac	kun tł	ne site	or ap	plication.	<u>jo unu n</u>	langen	<u>lo reata</u>				
Map	ping of	Cou	rse (Jutc	omes	to P	rogra	m Ou	tcom	es and P	rogran	n Speci	fic Out	tcon	nes		
		P01	P02	PO 3	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS	01	PSO2	
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22AIN	1673.3	-	-	3	-	3	-	-	-	-	-	-	2		2	-	
22AIN	1673.4	-	-	3	-	3	-	-	-	-	-	-	2		2	-	
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1	Set up	a ne	w Dja bo mu	ngo j	orojec	ci. Cre	eate a	new ap	pp wit	nin the p			OKS.	Z	$\frac{22r}{22l}$	41M073. 41M673	2
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	Create	a sin	npie i		epage	view		-+- D:							224	AIM673.	.4
	Note:	Lreat	e vir	tual	envire	onme	nt, Cre	ate DJ	ango p	project, A	.pp, Djai	igo viev	vs,				
2	Define		-l- f-	D	-l- A-	l	J T							2	22/	MIM672	1
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	Registe	er th	ese m	odel	s in th	ie Dja	ingo a	dmin s	site.						228	$\frac{11073}{11073}$	2
	Add so	mei	nitial	data	via ti	ie ad	min in	terface	e.						ZZP	$\frac{110073}{110073}$	3 ₄
	Note:	Djang	go Ad	$\frac{\min}{1}$	<u>tool, ľ</u>	lode	$\frac{1}{1}$ s, mod	<u>leis re</u>	gistra	tion, crea	ite user				2ZP	$\frac{111073}{111073}$	4
3	Create	view	is to I	ist al	1 boo!	ks an	d disp	lay boo	ok det	ails.				2	221	AIM673. AIM672	.1
	Create	tem	plates	stor	these	view	S. 1.	, ,							22	ΔIM673	.2
	Use Dja	ango	's ten	iplat	e lang	guage	to dis	play d	ata						22	AIM673	.3
		-													22		1
4	Create	a foi	m to	add	new b	ooks								2	221	AIM6/3	.1
	Validat	te an	d pro	cess	torm	data	in viev	VS.							22	AIM073 AIM673	.2
	Create	a ter	nplat	e for	the fo	orm a	nd hai	ndle fo	orm su	bmissior	1S.				22	AIM073 AIM673	.3
	<u>Note:</u>]	Djan	go Foi	rms	-									-	22		.т
5	Add sta	atic f	iles ((USS, J	avaSo	cript)	to the	proje	ct.					2	227	AIM673.	.1
	Use Bo	otsti	ap to	styl	e the	temp	lates.								ZZA	MM6/3.	2
	Enhan	ce th	e use	r inte	erface	with	basic	styling	g.						ZZA	M6/3.	3
	<u>Note:</u> l	Djan	go sta	tic fi	les			-							ZZA	1M6/3.	4
6	Implen	nent	user	regis	tratio	on and	d login	funct	ionalit	ty.				2	22/	AIM673.	.1
	Use Dja	ango	's bui	lt-in	authe	entica	tion sy	/stem.						_	22	AIM673	.2
	Create	tem	plates	s for	regist	ratio	n and	login.							22	AIM073 AIM673	.3
																	• •
							P	акт-В	5								
7	Create	a sh	oppin	ig cai	rt mo	del ar	nd viev	vs.	-					2	22/	AIM673.	.1
	Allow	users	s to ac	dd an	ld ren	nove	books	from t	the car	rt.					22A	IM673.	2
	Display	y the	cart	conte	ents a	nd ca	lculate	e the to	otal pr	rice.					22A	IM673.	3
						-		-	1						22A	IM673.4	4
8	Set up	Dian	go Re	est Fr	amev	vork	(DRF)	in the	proie	ct.				2	22/	AIM673.	.1
_	Create	API	endno	oints	for li	sting	books	and r	etriev	ing book	details			_	22A	IM673.	2
	Serializ	ze th	e Boo	k mo	del fo	or AP	I respo	onses							22A	IM673.	3
	Note:	Dian	20 RF	ST fr	amev	vork									22A	IM673.	4
		يىتەر -													L		

9	Set up a Node.js project and create a simple Express server.	2	22AIM673.1
	Create an endpoint in Node.js to fetch book data from the Django API.	2	22AIM673.2
	Display the fetched data on a separate Node is frontend.		22AIM673.3
	Note: NodeJS basics		22AIM673.4
10	Implement communication between the Django backend and Node.js service.	2	22AIM673.1
	Fetch data from Node.js service within the Django application.		22AIM673.2
	Display data fetched from Node.js in Django templates		22AIM673.3
			22AIM673.4
11	Write unit tests for Django views and models.	2	22AIM673.1
	Write tests for the Node.js service.		22AIM673.2
	Debug and fix any issues in the application.		22AIM673.3
	Note: Django testing framework		22AIM673.4
12	Deploy the Django application to a web server.	2	22AIM673.1
	Deploy the Node. is service to an application server.		22AIM673.2
	Ensure both services are running and communicating in the deployed		22AIM673.3
	environment.		22AIM673.4

PART-C

Beyond Syllabus/ Virtual Lab Content

- https://www.sencha.com/blog/a-comprehensive-guide-to-web-application-frameworks/
- https://developer.mozilla.org/en-US/docs/Learn/Tools_and_testing/Clientside_JavaScript_frameworks/Introduction

CIE Assessment Pattern (50 Marks-Lab)

	RBTLevels	Test(s) - 20 marks	Weekly Assessments	- (30) marks
L1	Remember	-	-	
L2	Understand	05	10	
L3	Apply	05	10	
L4	Analyze	10	10	
L5	Evaluate	-	-	
L6	Create	-		

SEE Assessment Pattern (50 Marks-Lab)

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

Suggested Learning Resources:

Weblinks and Video Lectures(e-Resources):

- https://youtu.be/Rp5vd34d-z4?si=AA5p_c-DKmNjxUMM
- https://www.coursera.org/learn/django-build-web-apps?specialization=django
- https://www.bing.com/videos/riverview/relatedvideo?q=nodeJS+videw&mid=4C29789F60B0A74 FF8664C29789F60B0A74FF866&FORM=VIRE

Reference Books:

- 1. Web Development with Django, by Ben Shaw, Saurabh Badhwar, Andrew Bird, 2021. ISBN: 9781839213779, 1839213779
- 2. Django for Beginners: Build Websites with Python and Django, by William S Vincent, 2020. ISBN: 9781735467207, 1735467200.

				MOB	ILE AI	PP DE	VELO	PMEN'	Т							
Course Cod	e 22AIM	1674					0	CIE Ma	rks	50						
L:T:P:S	0:0:1:	0	50													
Hrs /Week	2						Г	'otal N	larks	100						
Credits	01						E	Exam H	lours	03						
Course outo	omes: A	t the e	nd of th	le coui	rse, the	e stud	ent wi	ll be al	ole to:							
22AIM674.1	Build a	in app	licatior	using	Flutte	er dev	<u>elopm</u>	ent en	vironm	ent.						
22AIM674.2	Experi	ment	with th	e meth	nod of	storin	g, shai	ring ar	<u>id retrie</u>	eving th	ne data :	in Appli	cations.			
22AIM674.3	Exami	ne res	ponsive	user	interfa	ice aci	ross w	ide rai	nge of d	evices.						
ZZAIM674.4	Develo	p a m	obile A	pplicat	tion by	/ using	g vario	us con	nponen	ts like a	activity,	views,	services,			
Manning of	Course	Outco	mest	nu rec	ram	Autco	mes	and P	rogran	ı Snec	ific Out	tcomes				
mapping of			R P04	P05	P06		7P08	P09		P011	P012	PSO1	PSO2			
22AIM674.1	· · ·	3	-		-	-	-	-	-	-	2	3	-			
22AIM674.2	- 3	-	-	-	-	-	-	-	-	-	2	2	-			
22AIM674.3	- 3	-	-	3	-	-	-	-	-	-	2	2	-			
22AIM674.4		3	-	3		-	-	-	-	-	2	2	-			
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Pgm. No.			List o	of Expo	erime	nts / 🛛	Progra	ams		Hour	s (COs				
]	Prereq	uisite	Expe	rimen	its/Pr	ogran	ns/ Den	10						
		Bas	ic of H	ГML, (CSS, ar	ıd Jav	aScrip	ot			2	N	IA			
				PA	RT-A											
1 Create	a new Fl	utter p	oroject	named	l task_	mana	ger.				2					
Run th	e default	Flutte	r app a	nd fan	niliariz	ze you	rself v	vith th	e projec	t		22AIN	4674.1			
structı	ıre.											22AIN	4674.2			
Note:	ntroduct	ion to	Flutter	, Dart,	archit	tectur	e, crea	te proj	ject			22AIN	4674.3 4674.4			
2 Create	2 home s	croon	with a	cimnle	a ann b	or on	d a flo	ating a	ction h	itton	2	22AIN	M674.4			
(FAR)	to add ne	w tasl	75 WILLIA	Simpi	ւսրբւ		u a 110	ating a			2	22AIN	4674.2			
Impler	nent navi	oation	s. to a n	w scr	een fo	r addi	ng tas	ks whe	on the F	AR is		22AIN	4674.3			
nresse	d.	gation				i auui	ing tasi			10 15		22AIN	4674.4			
Note:	UI Compo	onents	. Routii	igs												
3 Define	a Task cl	ass wi	th prop	berties	like ti	tle. de	escript	ion. ar	d dueD	ate.	_	22AIN	4674.1			
Create	a form o	n the a	add tas	x scree	en to ir	iput tl	nese d	etails a	and save	e the	2	22AIN	4674.2			
task in	a local li	st.				1						22AIN	4674.3			
Note:	Forms											22AIN	4674.4			
4 Retriev	ve the list	of tas	ks and	displa	y then	n in a l	ListVie	ew on t	the hom	e	2	4674.1				
screen				•	-							22AIN	4674.2			
Show I	oasic info	rmatio	on like	task ti	tle and	l due o	date in	the lis	st items		22AIM6					
Note:	JI Compo	onents										ZZAIN	4.4			
5 Use a p	oackage li	ke sha	ared_pr	eferen	ices or	hive	to stor	e the l	ist of ta	sks.	2	22AIN	4674.1			
Save ta	isks to pe	rsiste	nt stora	ige wh	en the	ey are	added	, and l	oad the	m		22AIN	4674.2			
when t	he app st	arts.										ZZAIN	4674.3			
Note:	Connect t	o DB, I	Persist	data ii	nto DE	, Conr	nect to	DB an	d Get d	ata		ZZAIN	4.4			
6 Impler	nent navi	gatior	n from t	he tas	k list t	o a tas	sk deta	ils scr	een wh	en a	2	22AIN	4674.1			
task is	tapped.											22AIN	4674.2			
Displa	y full task	detai	ls on th	e task	detail	s scre	en.					22AIN 22AIN	4.3 4674.4			
				P	ART-P	2					+	LLAIN	10/4.4			
												00.17				
7 Add ar	edit but	ton on	the tas	k deta	ils scr	een.	,				2		4.1 4674 2			
Impler	Implement the functionality to edit the task and save the changes to											22AIN	10/4.2 1671 2			
persist	ent stora	ge.										22AIN 22AIN	4671 A			
											+	ZZAIN	vi0/4.4			
8 Add a	delete bu	tton o	n the ta	sk det	ails sc	reen.					2	22AIN	4674.1			
Impler	nent the	tunctio	onality	to dele	ete the	task a	and re	move i	t from			22AIN	VID/4.2			
in a maint	ont store	~ ~					Implement the functionality to delete the task and remove it from									
persist	ent stora	ge.										22AIN 22AIN	M674.3			

9	Add a checkbox to	each task item to marl	k it as complete.	C	22AIM674.1							
	Implement filterir	ng options to show all ta	asks, only incomplete tasks, or	Z	22AIM674.2							
	only completed ta	sks			22AIM674.3							
					22AIM674.4							
10	Use a package like	e firebase_auth to add u	ser authentication to the app.	2	22AIM674.1							
	Implement login a	and registration screens	s and ensure that only		22AIM674.2							
	authenticated use	rs can access the task n	nanager features.		22AIM074.3							
	<u>Note:</u> Use of fireb	ase auth package			ZZAIM674.4							
11	Use a package like	e flutter_local_notification	ons to schedule notifications for	2	22AIM674.1							
	task due dates.				22AIM674.2							
	Allow users to set	reminders for tasks an	d receive notifications at the		22AIM674.3							
	specified times.											
	Note: local notification											
12	Write unit and wi	dget tests for the app's	functionality.	2	22AIM674.1							
	Prepare the app fo	or deployment by creat	ing app icons, splash screens, and		22AIM674.2							
	handling platform	-specific requirements			22AIM674.3							
	Deploy the app to	the Google Play Store a	and/or Apple App Store.		ZZAIM074.4							
	<u>Note:</u> Flutter auto	mated unit testing										
		PART-C										
		Beyond Syllabu	s/ Virtual Lab Content									
•	https://www.tut	orialspoint.com/flutter	/flutter_tutorial.pdf									
•	https://www.tutori	alkart.com/pdf/flutter.pd	lf									
CIE A	ssessment Patter	n (50 Marks-Lab)										
	RBTLevels	Test(s) - 20 marks	Weekly Assessments - (30)									
11	Domomhor		marks									
	Understand	- 0E	- 10									
	Apply	05	10									
	Apply	10	10									
	Fugluato	10	10									
	Evaluate	-	-									
	Create	-										
SEE A		rn (50 Marks-Lab)										
11	RBT Levels	Exam Marks Distri	bution (50)									
	Kemember Understand	-										
	Onderstand	10										
	Арріу	20										
L4	Analyze	20										
L5	Evaluate	-										
L6	Create	•										
Sugg	ested Learning R	esources:										
Refe	rence Books:											
1	. Ultimate Flutte	r Handbook: Learn Cr	oss-Platform App Development	with	Visually Stunning							
	UIS and Real-W	orid Projects, by Lahi	ru Rajeendra Mahagamage, 2023	s. 18B	IN: 978-							
2	9388590860	Un O Dunning Duill	ative area for hoth 200 and A d	L:م								
2	. Flutter & Dart:	up & Kunning: Build r	ative apps for both IUS and And		using a single							
n	couebase, by D	eepti Unopra, Koopal I	Murana, 2023. ISBN: 978-93555	1001	070							
- 3	. riuller for begi	miners, by Alessandro	DIESSER, PACKI PUDIISNING, 2021.	12RI/	. 9/0-							
0	1800565999											

- Weblinks and Video Lectures(e-Resources):
 https://alison.com/course/introduction-to-mobile-app-development-with-flutter
 https://youtu.be/F3JuuYuOUK4?si=nn81DgwP5htUsM-E
 https://alison.com/topic/learn/125818/getting-started-with-flutter-learning-outcomes.

			SOF	TWA	RE T	ESTIN	G ANI	D QUA	LITY	ASSUF	RANCE F	PROGR	AMS				
Cou	irse Code	2	2AIN	4675						CIE	Marks		50				
L:T	:P:S	0	:0:1:	0						SEE	Marks		5	50			
Hrs	/ Week	2								Tota	al Mark	S	1	.00			
Cre	dits	0	1							Exa	m Hour	S	0	3			
Cou	irse outc	omes	s: At 1	the ei	nd of t	he cou	urse, tl	he stu	dent w	rill be a	able to:						
22A	IM675.1	Ana	alyze	e secu	irity te	esting	tools ([e.g., A	cuneti	x) in t	erm of t	he secu	rity p	ostu	re of a	a	
22.4		sof	twar	e app		on.	. 1	(<u> </u>						1	1	
ZZA	IM6/5.2	EVa beł	alure	func	tional softw	testin vare a	ig tool: pplicat	s (e.g., tion	Soapt	JI, Pos	tman J, A	API test	ing pr	inci	ples a	nd	
22A	IM675.3	Des	signa	an eff	fective	e test s	strateg	v usin	g indu	strv-s	tandard	tools (e.g., Iii	ra. T	'estRa	il) for	
		var	ious	funct	tionali	ities.		,,	0			(, -)	
22A	IM675.4	Im	prov	e the	softw	are ap	plicat	ion de	velopr	nent s	kills usi	ng usab	ility t	estii	ng too	ls (e.g.,	
		Ho	tjar).				•					U	U		0		
Ma	pping of	Cour	rse O)utco	mest	to Pro	ogran	n Outo	comes	and l	Program	m Spec	ific O	utc	omes	:	
		P01	P02	PO3	P04	P05	P06	P07	P08	P09	P010	P011	P01	2	PSO1	PSO2	
22AI	M675.1	-	3	-	-	-	-	-	-	-	-	-	-		2	-	
22AI	M675.2	-	3	-	-	-	-	-	-	-	-	-	-		2	-	
22AI	M675.3	-	-	3	-	3	-	-	-	-	-	-	-		2	-	
22AI	M675.4	3	-	-	-	3	-	-	-	-	-	-	-		2	-	
Ex	p. No. /				List	of Exj	perim	ents /	Prog	rams			Hou	Irs		COs	
				I	Preree	quisit	e Exp	erime	nts / I	Progra	ams / D	emo					
	• Intr	oduct	tion	abou	t the	Testii	ng Too	ols						2		NA	
		-						PAR	T-A						004		
1	Use Test	Case	Man	agen	ient T	00lS.			т	1 7.	m (r	1		2	ZZA	IM675.1	
	Function	i: Org	anizo	e, cre	ate, ar	nd mai	nage to	est cas	es. To	ols: Jir	a, Testh	kail,		2			
2		Auto	mati	on T	aala										221	IM675 1	
2	Implem	ntati	on Fi	uncti	0015	itoma	to rond	atitivo	tost cr	neae fa	r officio	ncu		2	LLA	114075.1	
		loniu	im C	vnree	se Ani	nium	ic rept			1303 10		ncy.		2			
3	Use Fun	ctiona	al Te	sting	Tools	Jium									22A	IM675.1	
Ŭ	Impleme	entati	on F	uncti	on: Te	st cor	e func	tionali	ties of	the so	oftware			~			
	applicat	ion ac	cord	ing to	o requ	ireme	ents.							2			
	Tools: So	oapUI	l, Pos	tman	ı, Rest	Assur	red										
4	Use API	Testi	ng To	ools											22A	IM675.1	
	Impleme	entati	on F	uncti	on: Te	st App	plicatio	on Pro	gramr	ning Ir	nterface	s (APIs)	2			
	for funct	ional	ity, s	ecuri	ty, and	d perf	orman	ice.						2			
	Tools: Sa	ame a	is Fui	nctio	nal Te	sting '	Fools (Soapl	JI, Pos	tman,	Rest As:	sured)			<u> </u>		
5	Use Perf	orma	nce [l'estir	ng Toc	ols	.1	c		C . 1	C:	,			22A	IM675.1	
	Impleme	entati	on F	uncti	on: Ev		e the p	ertorn	nance	of the	softwar	e undei		2			
	load, inc	ludin	g spe	ed, s	calabi	lity, ai	nd stal	oility.									
6	I OOIS: L			<u>Γ, JΜ(</u> nα Τ-	eter, K	0											
6	Use Sect	irity i	on E	ng 10	001S on Id	ontifu	milno	rahiliti	ing and		ritu rich	c in the		2	フ フ∧	IM675 2	
	software	Too		cunot	iv No	tenuny tenarl	vuillei zor Ru	i adillu irn Sui	to	i secui	ILY IISK	s in the		2	LLA	114075.2	
	Juitvalt	. 100	13. A	cunet	, IVC	uspari	<u>хсі, Du</u>	PAR'	T-R				I				
7	Use Moh	ile Te	estin	σ Τοο	ls			1 1 11									
	Impleme	entati	on F	uncti	on: Te	st mo	bile ar	plicat	ions fo	or func	tionalit	v.		~	0 .0		
	usability	, and	perf	orma	nce oi	n diffe	rent d	evices	and n	latfor	ns.	,,		2	22A	IM675.3	
	Tools: A	ppiun	n (m	entio	ned in	Test	Autom	nation	Tools	,Robo	tium, Es	spresso					
8	Use Web	Usał	oility	Test	ing To	ols					-	-		2	22A	IM675.4	

Implementation Funct	ion: Evaluate the user evr	periance and identify										
usability issues Tools	· Crazy Fog Hotiar UserT	'esting										
9 Use Test Data Manage	ment Tools	coung		22AIM675 4								
Implementation Funct	Use Test Data Management Tools Implementation Function: Manage and generate test data for testing											
nurposes	purposes.											
Tools: Test Data Mana	Tools: Test Data Manager (TDM), Aequitas, Sqldata											
10 Use Bug Tracking Too	Use Bug Tracking Tools.											
Implementation Funct	Use Bug Tracking Tools. Implementation Function: Track and manage bugs (software defects)											
identified during testi	identified during testing.											
Tools: Iira (mentioned	Tools: Jira (mentioned in Test Case Management Tools),Bugzilla, GitHub											
11 Use Version Control Sy	Use Version Control Systems											
Implementation Funct	ion: Track changes to cod	e and enable collaboration	0									
among developers.	0		2									
Tools: Git, Subversion,	Mercurial											
12 Use Project Manageme	ent Tools.			22AIM675.4								
Implementation funct	on: Manage software dev	elopment projects, including	2									
tasks, deadlines, and c	ommunication.		Z									
Tools: bJira (mentione	d in Test Case Manageme	nt Tools),Asana, Trello										
	PART	-C										
https://www.bing.com/vid +ASSURANCE+PROGRAMS ANCE+PROGRAMS+video+ &FORM=VRDGAR https://www.bing.com/vid +ASSURANCE+PROGRAMS ANCE+PROGRAMS+video+ FORM=VRDGAR	leos/riverview/relatedvie +video+and+notes&qpvt= and+notes∣=64EDFF leos/riverview/relatedvie +video+and+notes&qpvt= and+notes∣=8457EA	deo?&q=SOFTWARE+TESTING =SOFTWARE+TESTING+AND+ D82E656FB1FE0164EDFFD8 deo?&q=SOFTWARE+TESTING =SOFTWARE+TESTING+AND+ 03C6FC178E34428457EA030	G+ANI -QUAL 2E656 G+ANI -QUAL C6FC17	D+QUALITY JTY+ASSUR JFB1FE01& D+QUALITY JTY+ASSUR 78E3442&&								
RBT Lovols	<u>JU Mai KS - Lauj</u> Tast (s) (20)	Wookly Assessment (30	0									
I.1 Remember			<u>''</u>									
L2 Understand	- 5	10										
L3 Annly	10	10										
L4 Analyze	5	10										
L5 Evaluate		10										
L6 Create	-											

SEE A	SEE Assessment Pattern (50 Marks – Lad)									
	RBT Levels	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. Software Testing and Quality Assurance Paperback, by Deepak Gupta Rishabh Anand, Tariq Hussain Sheikh, 2016, Publisher : Bhavya Books; First 2016 edition ,2016, ISBN-13 : 978-9383992201.

NATIONAL SERVICE SCHEME (NSS)												
Course	22NSS	560					CIE Marks		50	50		
Code							(each	Seme	ester)			
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 outco	omes:											
At the end of the course, the student will be able to:												
22NSS60.1	Understand the importance of his / her responsibilities towards society.											
22NSS60.2	Analys	se the e	environm	iental ar	ıd socie	etal pro	blems/	'issues	and v	vill be ab	le to des	sign solutions for
	the sa	me.										
22NSS60.3	Evalua	ate the	existing	system	and to p	oropos	e practi	cal sol	utions	for the s	same for	sustainable
	develo	pmen	t. Implen	ient gov	ernmer	nt or se	lf-drive	en proj	ects e	ffectively	in the f	ield.
22NSS60.4	Develo	op capa	acity to n	neet em	ergenci	es and	natura	l disas	ters &	practice	nationa	l integration and
	social	harmo	ny in ger	ieral.								
Mapping of	Course	Outco	mes to	Progra	m Outo	comes						
	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
22NSS60.1	-	-	-	-	-	3	3	-	2	-	-	1
22NSS60.2	-	-	-	-	-	3	3	-	2	-	-	1
22NSS60.3	-	-	-	-	-	3	3	-	2	-	-	1
22NSS60.4	-	-	-	-	-	3	3	-	2	-	-	1

Semester/ Course Code	CONTENT	COs	HOURS
3 RD 22NSS30	 Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing Waste management–Public, Private and Govt organization, 5R's. Setting of the information imparting club for women leading to contribution in social and economic 	22NSS30.1 22NSS30.2 22NSS30.3	30 HRS
	issues.	22NSS30.4	
4 ^{тн} 22NSS40	 Water conservation techniques – Role of different stakeholders– Implementation. Preparing an actionable business proposal for enhancing the village income and approach for implementation. Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education. 	22NSS40.1 , , , , , , , , , , , , , , , , , , ,	30 HRS
5 th 22NSS50	 Developing Sustainable Water management system for rural areas and implementationapproaches. Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill developmentprograms etc. Spreading public awareness under rural outreach programs. (minimum 5 programs). 	22NSS50.1 22NSS50.2 22NSS50.3 22NSS50.4	30 HRS

	21. Organize National integration	and social harmon	y 22NSS60.1	
6 TH	events / workshops / semina	, 0,		
22NSS60	programs).		22NSS60.2	30 HRS
	22. Govt. school Rejuvenation and he	lping them to achiev	e,	
	good infrastructure.		22NSS60.3	
			,	
		D	22NSS60.4	
CIE Assessme	ent Pattern (50 Marks – Activity base	d) -		
CIE ao	man and far arrange and ator	Morte		
Presentation	- 1			
Selection of t	ronic PHASE - 1	10		
Commencem	ent of activity and its progress -	10		
PHASE - 2		10		
Case study-b	ased Assessment Individual	10		
performance	۱ <u>ــــــــــــــــــــــــــــــــــــ</u>			
Sector wise s	tudy and its consolidation	10		
Video based	seminar for 10 minutes by each	10		
student at th	e end of semester with Report.			
Total marks	s for the course in each semester	50		
T l.				
Impler The last	nentation strategies of the project (NSS	WORKJ.	1	
• I ne las	st report should be signed by NSS Office	er, the HOD and print	cipai.	
• At last	report should be evaluated by the NSS		e. 	he mede and lable at
Finally	, the consolidated marks sheet should	be sent to the univer	rsity and also to	be made available at
	arning Pasourcas			
Reference R	noks			
13 NSS C	ourse Manual Published by NSS Cell V	VTH Belagavi		
14. Gover	nment of Karnataka, NSS cell, activitie	es reports and its ma	anual	
15. Gover	nment of India, NSS cell, Activities rep	orts and its manual		
Pre-requisite	es to take this Course:			
4. Students	s should have a service-oriented minds	et and social concer	n.	
5. Students	s should have dedication to work at any	remote place, anytin	ne with available	e resources and
proper	time management for the other works	5.		
6. Students	s should be ready to sacrifice some of th	e time and wishes to	achieve service-	-oriented targets on
time.				
Pedagogy:				
• In every	semester from 3rd semester to 6th sem	ester, each student s	should do activit	ies according to the
scheme a	ind syllabus.			
• At the en	d of every semester student performan	ce has to be evaluate	d by the NSS offi	cer for the assigned
activity p	progress and its completion.			
• At last, in	1 6th semester consolidated report of a	all activities from 3r	d to 6th semest	er, compiled report
should be	e submitted as per the instructions.			
• State the	need for NSS activities and its present r	elevance in the socie	ety and provide r	eal-life examples.
Support a	and guide the students for self-planned	activities.	1	
NSS coor	dinator will also be responsible for assi	gning homework, gr	ading assignmer	its and quizzes, and
	tung students progress in real activities	o ili ule llelu.	analytical altilla	
	se the students for group work to impro	ve men 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
 - $\circ \quad \text{Students Presentation on Topics}$
 - \circ Presentation 1, Selection of topic, PHASE 1
 - \circ $\,$ Commencement of activity and its progress PHASE 2 $\,$
 - Execution of Activity
 - \circ $\$ Case study-based Assessment, Individual performance
 - 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/Continu ous 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 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.	May be individual or team	Villages/ City Areas /Grama 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
5.	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	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
6.	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	May be individual or team	Local government / private/ aided schools/Government Schemes officers	School 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
7.	Developing Sustainable Water management system for rural areas and implementation approaches.	May be individual or team	Villages/ City Areas /Grama 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
8.	Contribution to any national level initiative of Government of India.For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme,Skill development programs etc.	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

					•	
9.	Spreading public awareness under rural outreach 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
10.	Organize National integration and social harmony events / workshops / seminars. (Minimum 02 programs).	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Place 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
11.	Govt. school Rejuvenation andhelping them to achieve good infrastructure.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Place 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

PHYSICAL EDUCATION (PE) (SPORTS AND ATHLETICS)													
Course	22PEI	D60				-)(-	CIE M	arks		50			
Code							(each	seme	ster)				
L:T:P:S	0:0:0:	0					SEE M	Iarks	j				
Hrs / Wee	k 2	-					Total	Mark	s	50	x 4 = 20)()	
Credits	00						Exam	Hour	s	02			
Course outcomes:													
At the end of the course, the student will be able to:													
22PED60.1 Understand the fundamental concepts and skills of Physic								cal Edu	cation.	Health.	Nutrition and		
Fitness									, -	,			
22PED60.2	Create	consci	ousness	among	the stud	dents c	n Healt	h. Fitn	less and	Wellne	ess in de	veloping and	
	maint	aining a	healthy	lifestyl	e.			,				, ereping and	
22PED603	Perfor	m in th	e selecte	ed sport	s or ath	letics	of stude	nt's ch	oice an	d nartic	rinate in	the	
221 10 00.0	compe	etition a	t region	al/state	e / natio	nal / i	nternat	ional l	evels.	u pur de	ipute in	the	
22PED604	Under	Understand the roles and responsibilities of organization and administration of sports and											
	games	understand the roles and responsibilities of organization and administration of sports and											
	games	•											
Manning	of Course	Outcor	nes to l	Progra	m Outo	omes	•						
in apping c	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	
22PED60.1	-	-	-	-	-	2	-	3	3	-	-	2	
22PED60.2	-	-	-	-	-	2	-	3	3	-	-	2	
22PED60.3	-	-	-	-	-	2	-	3	3	-	-	2	
22PED60.4	· _	-	-	-	-	2	-	3	3	-	-	2	
						L L		-	_				
Semeste				CONTE	NT				C	Os		HOURS	
r													
	Module	1: Orie	ntation	l I									
	F.]	Lifestyle	2,						2205	1 0203			
	G.]	Fitness							221 1000.1		5 HRS		
	Н.]	Food &	Nutritio	n					22PF	, 22PED30.2		5 1113	
	I.]	Health &	& Wellne	ess					2211	1000.2			
-	J.]	Pre-Fitn	less test				6.51.						
	Module	2: Gene	eral Fit	ness &	Compo	onents	of Fiti	iess					
3 RD	G.	warmin	ig up (Fi	ree Han	a exerci	ses			2200	C 0 C 0			
22PED3	н. с	Strengti	1 - PUSII	-up / Pi Doch	un-ups				2285	D30.2			
0	I	Agility	SU MU Shuttle	Dasii					2205	, 2 0 2 0 2		13 ПКЗ	
	J. J	-ginty - Flevihili	tv - Sit	and Rea	ch				2211	1030.3			
	K. 1 I (Cardiov	ascular	Endura	nce – Ha	arvard	sten Te	oct					
-	Module	3. Recr	eation	al Activ	vities		step re	.51					
	F.	Postura	l deform	nities.	THES				22PF	CD30.3			
		Stress n	nanagen	ient.								10 HRS	
	G. /	Aerobic	s.						22PE	, D30.4			
	н. ′	н. Traditional Games.											
	Module	1: Ethio	cs and I	Moral V	/alues				22PE	ED40.1			
		lodule 1: Ethics and Moral Values									5 HRS		
ЛТН	C .]	C. Ethics in Sports										5 1113	
4 TH	C.] D.]	Ethics in Moral V	n Sports alues in	Sports	and Gar	nes			22PE	, 2D40.2		5 1105	
4 ^{тн} 22PED40	C.] D.] Module 2	Moral V 2: Spec	n Sports alues in t ific Ga i	Sports nes (A	and Gar nyone (nes to be s	electe	d by	22PE	, 2D40.2 2D40.3		20 HRS	

	G. Volleyball – Attack, Block, Service, Upper Hand Pass and		
	Lower hand Pass.		
	H. Throwball – Service, Receive, Spin attack, Net Drop &		
	Jump throw.		
	I. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle		
	hold and Bonus.		
	J. Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole		
	turning, 3-6 Up.		
	к. Table Tennis – Service (Fore Hand & Back Hand),		
	Receive (Fore Hand & Back Hand), Smash.		
	L. Athletics (Track / Field Events) – Any event as per		
	availability of Ground.		
	Module 3: Role of Organization and administration	22PED40.4	5 HRS
5 TH	Fitness Components: Meaning and Importance, Fit India		
22PED50	Movement, Definition of fitness, Components of fitness,		
	Benefits of fitness, Types of fitness and Fitness tips.		
	Practical Components: Speed, Strength, Endurance,		
	Flexibility, and Agility		
	Athletics:		
	4. Track-Sprints:		
	• Starting Techniques: Standing start and Crouch		
	start (its variations) use of Starting Block.		
	 Acceleration with proper running techniques. 		
	• Finishing technique: Run Through, Forward		
	Lunging and Shoulder Shrug.		
	5. Jumps- Long Jump: Approach Run, Take-off, Flight in		
	the air (Hang Style/Hitch Kick)and Landing		
	6. Throws- Shot Put: Holding the Shot, Placement, Initial		
	O'Brien Technique)	22PED50.1	
	o brien reeninquej		Total 30 Hrs/
	Handball OR Ball Badminton	, 22PED50.2	Semester
	Handball: B Fundamental Skills	,	
	7. Catching, Throwing and Ball control,	22PED50.3	2 Hrs/week
	8. Goal Throws: Jumpshot, Centershot, Diveshot,	,	
	Reverseshot.	22PED50.4	
	10 Attack and counter attack simple counter attack		
	counter attack from two wings and center.		
	11. Blocking, Goal Keeping and Defensive skills.		
	12. Game practice with application of Rules and		
	Regulations.		
	c. Rules and their interpretations and duties of officials		
	Ball badminton:		
	B. Fundamental Skills		
	5. Basic Knowledge: various parts of the Racket and Grin.		
	6. Service: Short service, Long service, Long-high		
	service.		
	7. Shots: Overhead shot, Defensive clearshot,		
	Attacking clearshot, Dropshot, Netshot, Smash.		
	Regulations.		
	B. Rules and their interpretation and duties of officials.		
L			1

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6 ^{тн}	Athletics:		
22PED60	4. Track -110 Mtrs and 400Mtrs:		
	Hurdling Technique: Lead leg Technique, Trail leg		
	Technique, Side Hurdling, Over the Hurdles		
	Crouch start (its variations) use of Starting Block.		
	Approach to First Hurdles, In Between Hurdles, Last		
	Furnes to Finishing.		
	5. Jumps- High Jump: Approach Run, Take-oli, Bar		
	Clearance (Straddle) and Landing.		
	Stance Primary Swing, Turn, Release and Recovery		
	(Rotation in the circle).		
	Football OR Hockey		
	Football: A Fundamental Skills		
	1. Kicking: Kicking the ball with inside of the foot. Kicking		
	the ball with Full Instep of the foot, Kicking the ball with		
	Inner Instep of the foot, Kicking the ball with Outer Instep		
	10 Tranning: Tranning the Polling hall and the		
	Bouncing ball with sole of the foot.		
	11. Dribbling: Dribbling the ball with Instep of the		
	foot, Dribbling the ball with Inner and Outer Instep of the	22PED60.1	
	foot.	,	Total 30 Hrs/
	12. Heading: In standing, running and jumping	22PED60.2 , 22PED60.3 , 22PED60.4	Semester
	condition.		2 Hrs/week
	13. Throw-in: Standing throw-in and Running throw-		
	III.		
	hody.		
	15. Tackling: Simple Tackling, Slide Tackling,		
	16. Goal Keeping: Collection of Ball, Ball clearance-		
	kicking, throwing and deflecting.		
	17. Game practice with application of Rules and		
	Regulations.		
	B. Rules and their interpretation and duties of officials.		
	Hockey:		
	A. Fundamental Skills		
	1. Passing: Short pass, Longpass, pushpass, hit 2. Trapping		
	3. Dribbling and Dozing		
	9. Penalty stroke practice.		
	10. Penalty corner practice.		
	11. Tackling: Simple Tackling, Slide Tackling.		
	12. Goal Keeping, Ball clearance- kicking, and		
	deflecting.		
	13. Game practice with application of Rules and		
	Regulations.		
	b. Rules and their interpretation and duties of officials		

CIE Assessment Pattern (50 Marks - Practical) -

CIE to be evaluated every semester end based on practical demonstration of Sports and Athletics activities learnt in the semester.

CIE	Marks
Participation of student in all the modules	10
Quizzes – 2, each of 7.5 marks	15
Final presentation / exhibition /	
Participation	25
in competitions/ practical on specific	
tasks assigned to the students	
Total	50

Suggested Learning Resources:

Reference Books:

- 1. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
- 2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
- 3. Petipus, et.al., Athlete's Guide to Career Planning, Human Kinetics.
- 4. Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi.
- 5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
- 6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
- 7. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
- 8. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
- 9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
- 10. Dubey H.C., Basketball, Discovery Publishing House, New Delhi.
- 11. Rachana Jain, Teach Yourself Basketball, Sports Publication.
- 12. Jack Nagle, Power Pattern Offences for Winning basketball, Parker Publishing Co., New York.
- 13. Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
- 14. SallyKus, Coaching Volleyball Successfully, Human Kinetics.

						YOG	4					
Course	22Y00	60					CIE M	larks		50		
L:T:P:S	0:0:0:0)					SEE M	larks				
Hrs / Week	2	2 Total Marks						s	$50 \times 4 = 200$			
Credits	00						Exam	Hour	s	02		
Course outcomes:												
At the end o	At the end of the course, the student will be able to:											
22Y0G60.1	Unders	Understanding the origin, history, aim and objectives of Yoga.										
22Y0G60.2	Becom	Become familiar with an authentic foundation of Yogic practices.										
22Y0G60.3	Practic	Practice different Yogic methods such as Suryanamaskara, Pranayama and some of the Shat										
22Y0G60.4	Use the	e teachi	ings of F	Patanjali	in daily	y life.						
Mapping of			nes to	Progra	m Outo	comes		DOO	D 00	D010	DO11	D012
222000001	P01	POZ	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
2210660.1	-	-	-	-	-	<u>う</u>	-	-	-	-	-	1
2210060.2	-	-	-	-	-	3	-	-	-	-	-	1
2210000.3	-	-	-	-	-	3 3	-	-	-	-	-	1
221000.4		-	-	_	_	5	_		-	-	-	
Semester /												
Course				CONT	ENT					COs		HOURS
Code												
3 rd 22Y0G30	Yoga, its definitic Brief in Yogic pr Rules a practice Miscon Differen Suryana 3. Sury bend 4. Sury Differen 5. Sitti 6. Star 7. Proj 8. Sup	s origin ons. Diff actices actices and reg s by pr. ception ce betv amaska vanama efits of vanama t types ing: Pac nding: V ne line: ineline	, history ferent s for con gulation actition ns of veen yo ara: skar pr skar pr skar 12 of Asan lmasana /rikshar Bhujan : Utthita	y and de chools c f yogic nmon m is: Rule er yoga: gic and ayer and ager and ayer and ager and ayer and ager and ayer and ager and ayer and ager ager ager ager ager ager ager ager ager ager ager ager	evelopm of yoga, i practic an to pr s to be Yoga non-yog d its me Crounds cana, Su onasana Shalabl asana, A	nent. Yoga, its meaning, importance of prayer ces for common man: romote positive health followed during yogic its misconceptions, gic practices. eaning, Need, importance s ukhasana a, Ardhakati Chakrasana ohasana					Total 32 Hrs/ Semester 2 Hrs/week	
4 ^{тн} 22Y0G40	 Suryanamaskara: Suryanamaskar 12 count,4rounds Brief introduction and importance of: Kapalabhati: Revision of Kapalabhati -40strokes/min3rounds Different types of Asanas: 5. Sitting: Paschimottanasana, Ardha Ushtrasana, Vakrasana, Aakarna Dhanurasana 6. Standing: Parshva Chakrasana, Urdhva Hastothanasana, Hastapadasana 7. Prone line: Dhanurasana 8. Supine line: Karna Peedasana, Sarvangasana, Chakraasana Patanjali's Ashtanga Yoga: Asana, Pranayama 									22YOG4(22YOG4(22YOG4(22YOG4(22YOG4)).1,).2,).3,).4	Total 32 Hrs/ Semester 2 Hrs/week

	Kapalabhati: Revision of Kapalabhati - 60strokes/min3rounds						
	Brief introduction and importance of:						
	Different types of Asanas:						
	5. Sitting: Yogamudra in Padmasana, Vibhakta						
	Paschimottanasana Yogamudra in Vairasana						
	6 Standing: Parivritta Trikonasana IItkatasana	22Y0	G50.1,	Total 32 Hrs/			
5 TH	0. Stanung, Fanvitta Tirkonasana, Otkatasana,	22Y0	G50.2.	Semester			
22YOG50	7 Prone line: Padangushtha Dhanurasana Poorna	22Y0	G50.3	2 Hrs/week			
	Rhujangasana / Rajakanotasana	2210	G504				
	8 Sunine line: Navasana/Noukasana, Pavanamuktasana	2210	000.1				
	Sarvangasana						
	Pataniali's Ashtanga Yoga: Pratvahara, Dharana						
	Pranavama: Ujjavi, Sheetali, Sheektari						
	Kanalabhati: Revision of Kanalabhati – 80 strokes/min3round						
	Brief introduction and importance of:						
	Different types of Asanas						
	5 Sitting Bakasana Hanumanasana Ekanada						
	Rajakanotasana	22YOG60.1, 22YOG60.2, 22YOG60.3, 22YOG60.4		Total 32 Hrs/ Semester 2 Hrs/week			
6 тн	6 Standing: Parivritta Trikonasana Utkatasana						
22Y0G60	Darshvakonasana						
2210000	7 Sunine line: Setubandhasana Shayasanaa (Relaxation nosi						
	8. Balancing: Sheershasana						
	Patanjali's AshtangaYoga: Dhyana (Meditation), Samadhi						
	Pranayama: Bhastrika, Bhramari, Ujjai						
	Shat Kriyas: Jalaneti and sutraneti, Sheetkarma Kapalabhati						
CIE Assessment Pattern (50 Marks – Practical)							
CIE to be evaluated every semester based on practical demonstration of Yogasana learnt in the							
semeste	r and internal tests (objective type)						
	CIE Marks						
	Avg of Test 1 and Test 2 25						
	Demonstration of Yogasana 25						
	Total 50						
Suggested	Learning Resources:						
Reference	Books:						
	1. Swami Kuvulyananda: Asma (Kavalyadhama, Lonavala)						
2. Tiwari, O P: Asana Why and How							
3. Ajitkumar: Yoga Pravesha (Kannada)							
4. Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha (Bihar School of yoga,							
Munger)							
5. Swami Satyananda Saraswati: Surya Namaskar (Bihar School of yoga, Munger)							
6. Nagendra H R: The art and science of Pranayama							
7. Tiruka: Shatkriyegalu (Kannada)							
8. Iyengar B K S: Yoga Pradipika (Kannada)							
9. Iyengar B K S: Light on Yoga (English)							
Web links	and Video Lectures (e-Resources):						
https://youtu.be/KB-TYlgd1wE							
• https://voutu.be/aa-TG0Wg1Ls							

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 appropriate Tasks for each Assessment Type by the course coordinator					
	2.Assign/fix the marks for each Assessment Type by course co-oridnator.					
	3.Students either submitthe report for Task or not, as determined by the course coordinator.					
	4. Need to get final approval from the HoD/BOS Chairman once finalising the mark allocations for Tasks and Assessment types.					

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 degree program are the statements that describe the expected achievements of graduate in theircareer 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.
- **P05 Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modeling to complexEngineering 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 norms of the Engineering practice.
- **P09** Individual and Team Work: Function effectively as an individual, and as a member or leader in 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 clear instructions.
- **P011 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.
- **P012** 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 other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.



BLOOM'S TAXOMONY

www.newhorizonindia.edu

Ring Road, Bellandur Post, Near Marathahalli, Bengaluru, Karnataka 560103, India.

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